Economics

6th edition

Chapter 12

Firms in Perfectly Competitive Markets

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Market structures

The market structures we will examine are, in decreasing order of **competitiveness**:

- Perfectly competitive markets
- Monopolistically competitive markets
- Oligopolies
- Monopolies

Each market structure will be applicable to different real-world markets, and will give us insight into how firms in certain types of markets behave.

Discuss

The late Nobel prize—winning economist George Stigler once wrote, “the most common and most important criticism of perfect competition is that it is unrealistic”. Since few firm sell identical products in markets where there are no barriers to entry, why do economists believe that the model of perfect competition is important?

Source: George Stigler, “Perfect Competition, Historically Contemplated,” Journal of Political Economy, Vol. 65, February 1957, pp.1-17.

Characteristic	Market Structure			
	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Number of firms	Many	Many	Few	One
Type of product	Identical	Differentiated	Identical or differentiated	Unique
Ease of entry	High	High	Low	Entry blocked
Examples of industries	• Growing wheat • Poultry farming	• Clothing stores • Restaurants	• Manufacturing computers • Manufacturing automobiles	• First-class mail delivery • Providing tap water

Perfectly Competitive Markets

Perfectly competitive market: one in which

- There are many buyers and sellers.
- All firms sell identical products.
- There are no barriers to new firms entering the market.

Perfectly competitive firms are **price-takers**: they are unable to affect the market price.

This is because they are tiny relative to the market, and sell exactly the same product as everyone else.

Example: Agricultural markets, like the market for wheat, are often thought to be close to perfectly competitive.

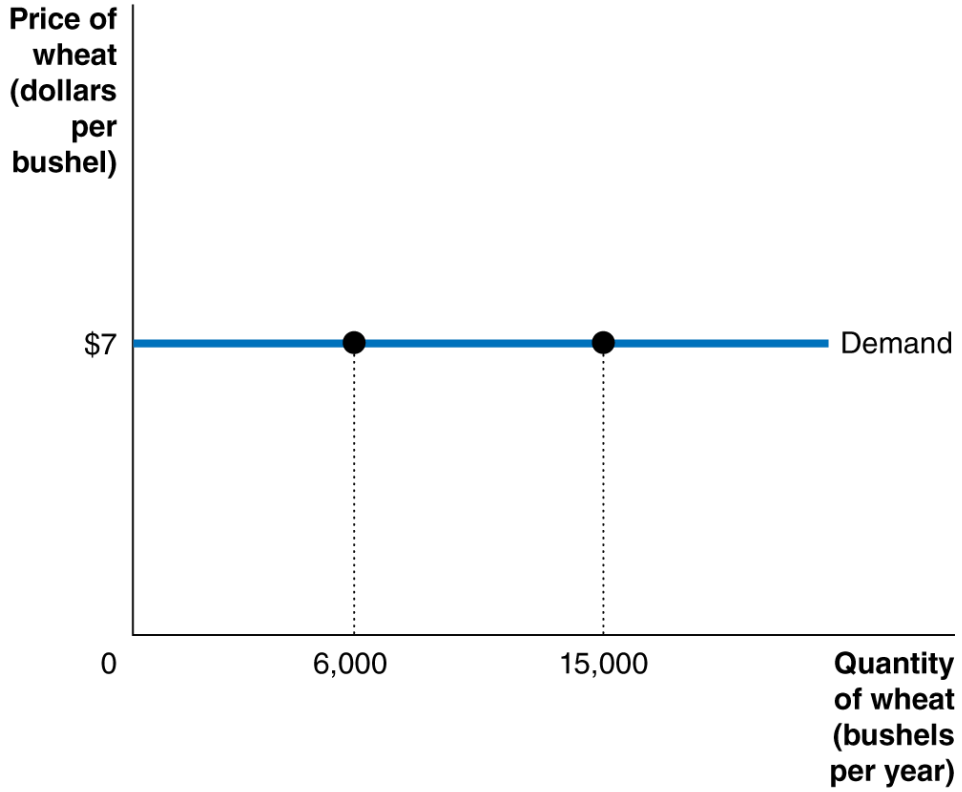
Figure 12.1

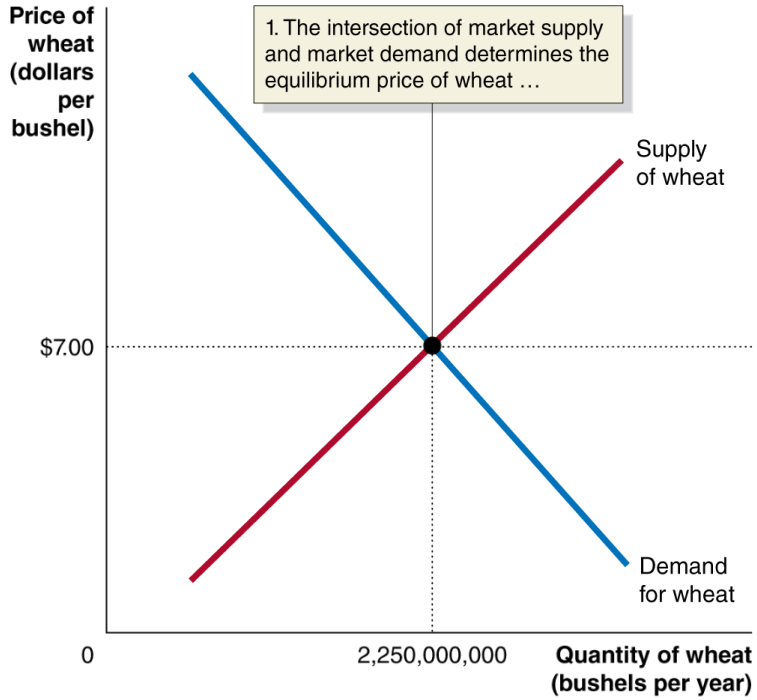
A perfectly competitive firm faces a horizontal demand curve

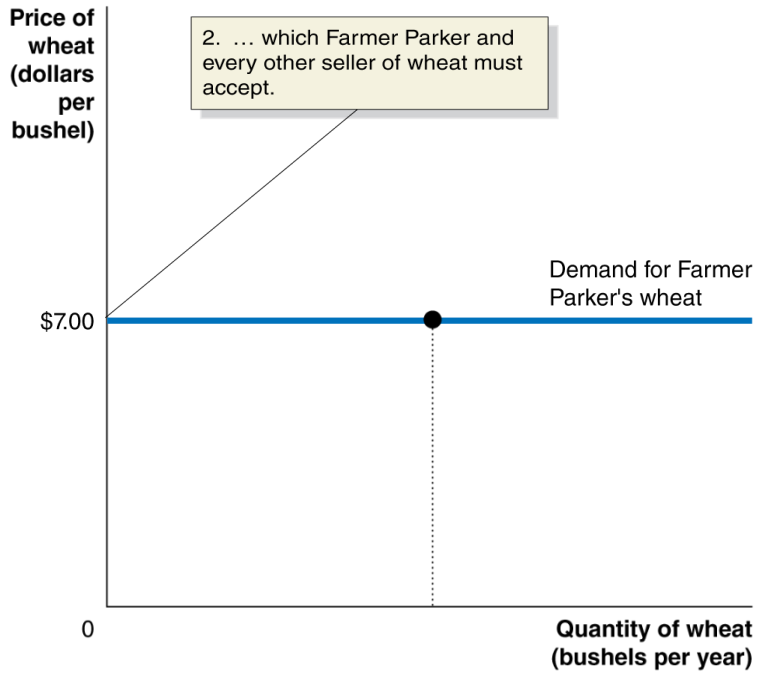
By definition, a perfectly competitive firm is too small to affect the market price.

Suppose you are a wheat farmer; whether you sell 6,000…

… or 15,000 bushels of wheat, you receive the same price per bushel: you are too small to affect the market price.







There are thousands of individual wheat farmers; their collective supply, combined with the overall market demand for wheat, determines the market price of wheat in the first panel.

The individual farmer takes this market price as his or her demand curve: the second panel.

How a Firm Maximizes Profit in a Perfect Competitive Market

We assume that all firms try to maximize. Recall that:

$$\text{Profit} = \text{Total Revenue} - \text{Total Cost}$$

Revenue for a perfectly competitive firm is easy: the firm receives the same amount of money for every unit of output it sells. So:

$$\textbf{Price} = \textbf{Average Revenue} = \textbf{Marginal Revenue}$$

Average revenue (*AR*) is total revenue divided by the quantity of the product sold

Marginal revenue (*MR*) is the change in total revenue from selling one more unit of a product.

Table 12.2 Farmer Parker's revenue from wheat farming

(1) Number of Bushels (*Q*)	(2) Market Price (per bushel) (*P*)	(3) Total Revenue (*TR*)	(4) Average Revenue (*AR*)	(5) Marginal Revenue (*MR*)
0	$7	$0	—	—
1	7	7	$7	$7
2	7	14	7	7
3	7	21	7	7
4	7	28	7	7
5	7	35	7	7
6	7	42	7	7
7	7	49	7	7
8	7	56	7	7
9	7	63	7	7
10	7	70	7	7

For a firm in a perfectly competitive market, price is equal to both average revenue and marginal revenue:

$$P = \frac{TR}{Q} = \frac{\Delta TR}{\Delta Q}$$

Table 12.3 Farmer Parker's profit from wheat farming (1 of 2)

(1) Quantity (bushels) (*Q*)	(2) Total Revenue (*TR*)	(3) Total Cost (*TC*)	(4) Profit (*TR* – *TC*)
0	$0.00	$10.00	–$10.00
1	7.00	14.00	–7.00
2	14.00	16.50	–2.50
3	21.00	18.50	2.50
4	28.00	21.00	7.00
5	35.00	24.50	10.50
6	42.00	29.00	13.00
7	49.00	35.50	13.50
8	56.00	44.50	11.50
9	63.00	56.50	6.50
10	70.00	72.00	–2.00

Suppose costs are as in the table.

We can calculate profit; profit is maximized at a quantity of 7 bushels. This is the *profit-maximizing level of output.*

Table 12.3 Farmer Parker's profit from wheat farming (2 of 2)

(1) Quantity (bushels) (*Q*)	(2) Total Revenue (*TR*)	(3) Total Cost (*TC*)	(4) Profit (*TR* – *TC*)	(5) Marginal Revenue (*MR*)	(6) Marginal Cost (*MC*)
0	$0.00	$10.00	–$10.00	—	—
1	7.00	14.00	–7.00	$7.00	$4.00
2	14.00	16.50	–2.50	7.00	2.50
3	21.00	18.50	2.50	7.00	2.00
4	28.00	21.00	7.00	7.00	2.50
5	35.00	24.50	10.50	7.00	3.50
6	42.00	29.00	13.00	7.00	4.50
7	49.00	35.50	13.50	7.00	6.50
8	56.00	44.50	11.50	7.00	9.00
9	63.00	56.50	6.50	7.00	12.00
10	70.00	72.00	–2.00	7.00	15.50

We can also calculate marginal revenue and marginal cost for the firm.

Profit is maximized by producing as long as MR>MC; or until MR=MC, if that is possible.

Figure 12.3 The profit-maximizing level of output (1 of 2)

If we show total revenue and total cost on the same graph, the vertical difference between the two curves is the profit the firm makes.

- (Or the loss, if costs are greater than revenues.)

At the profit-maximizing level of output, this (positive) vertical distance is maximized.

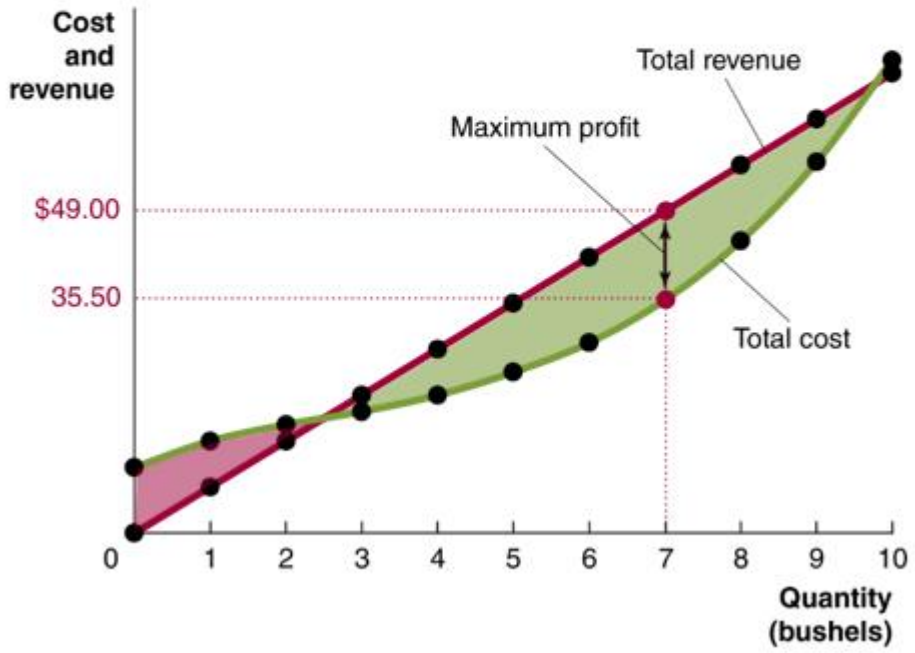
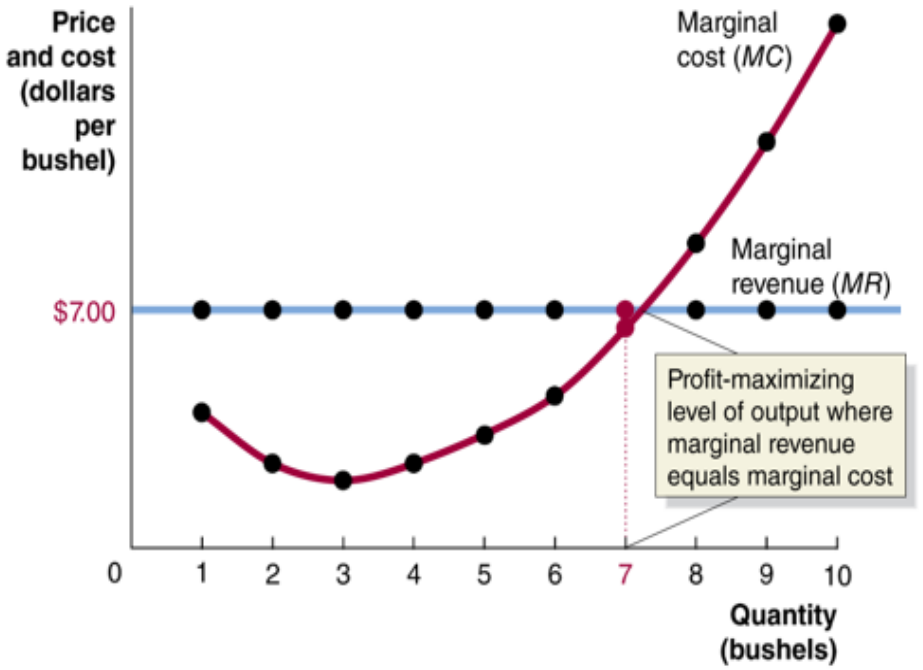


Figure 12.3 The profit-maximizing level of output (2 of 2)

It is generally easier to determine the profit-maximizing level of output on a graph of marginal revenue and marginal cost.

Marginal revenue is constant and equal to price for the perfectly competitive firm.

The firm maximizes profit by choosing the level of output where marginal revenue is equal to marginal cost (or just less, if equal is not possible).



Rules for profit maximization

The rules we have just developed for profit maximization are:

1. The profit-maximizing level of output is where the difference between total revenue and total cost is greatest; and
2. The profit-maximizing level of output is also where MR = MC.

However *neither of these rules require the assumption of perfect competition; they are true for every firm!*

For perfectly competitive firms, we can develop an additional rule, because for those firms, P = MR; this implies:

3. The profit-maximizing level of output is also where P = MC.

Illustrating Profit or Loss on the Cost Curve Graph

We know profit equals total revenue minus total cost; and total revenue is price times quantity. So write:

$$\text{Profit} = (P \times Q) - TC$$

Divide both sides by Q:17

$$\frac{\text{Profit}}{Q} = \frac{P \times Q}{Q} - \frac{TC}{Q}$$

$$\frac{\text{Profit}}{Q} = P - ATC$$

Multiply both sides by Q:

$$\text{Profit} = (P - ATC) \times Q$$

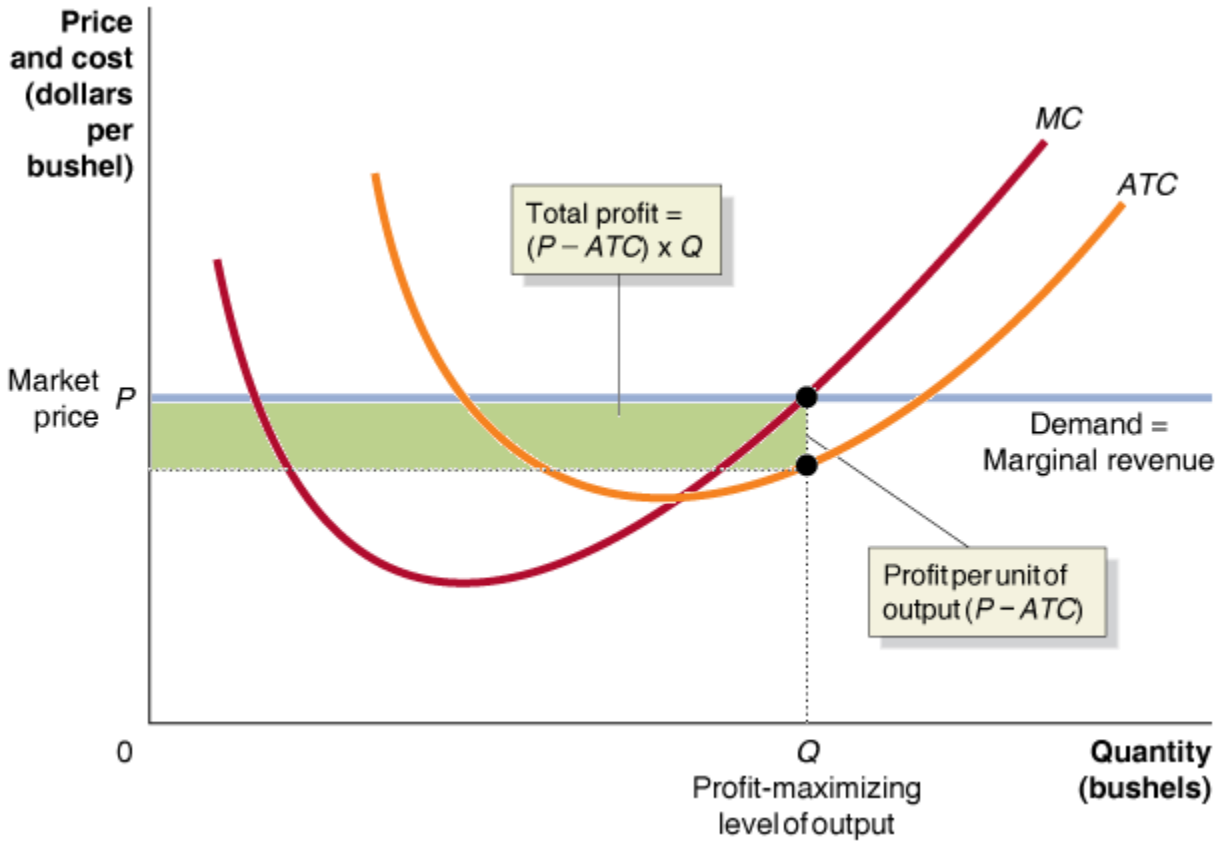
The right hand side is the area of a rectangle with height $(P - ATC)$ and length Q. We can use this to illustrate profit on a graph.

The area of maximum profit (1 of 2)

A firm maximizes profit at the level of output at which marginal revenue equals marginal cost.

The difference between price and average total cost equals profit per unit of output.

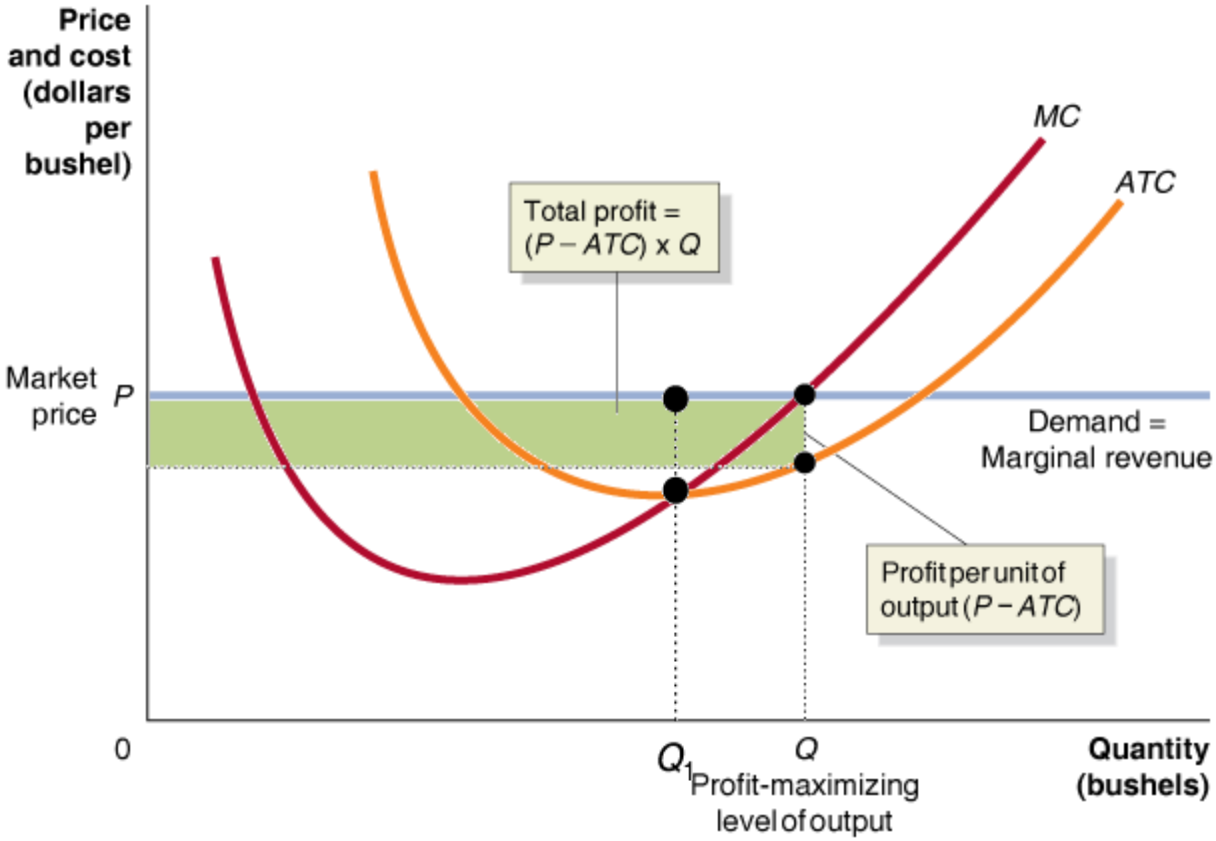
Total profit equals profit per unit of output, times the amount of output: the area of the green rectangle on the graph.



The area of maximum profit (2 of 2)

Common error: thinking profit is maximized at Q_1.

- This maximizes *profit per unit*, but NOT *profit*.
- The next few units bring in more marginal revenue than their marginal cost (*MR* > *MC* at Q_1); so they must increase profit.



Reinterpreting *MC* = *MR*

We know we should produce at the level of output where marginal cost equals marginal revenue (*MC=MR*).

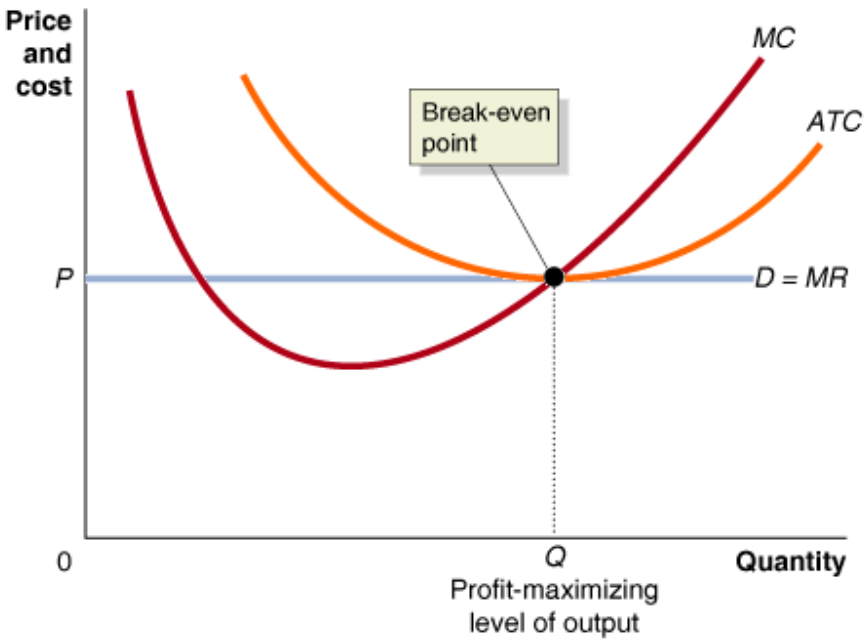
We have been calling this the **profit-maximizing level of output**. But what if the firm doesn't make a profit at this level of output, or at any other?

In this case, we would want to make the smallest loss possible.

- Note that sometimes a loss may be unavoidable, if we have high fixed costs.

It turns out that *MC=MR* is *still* the correct rule to use; it will guide us to the **loss-minimizing level of output.**

Example 1: A firm breaking even.



(a) A firm breaking even

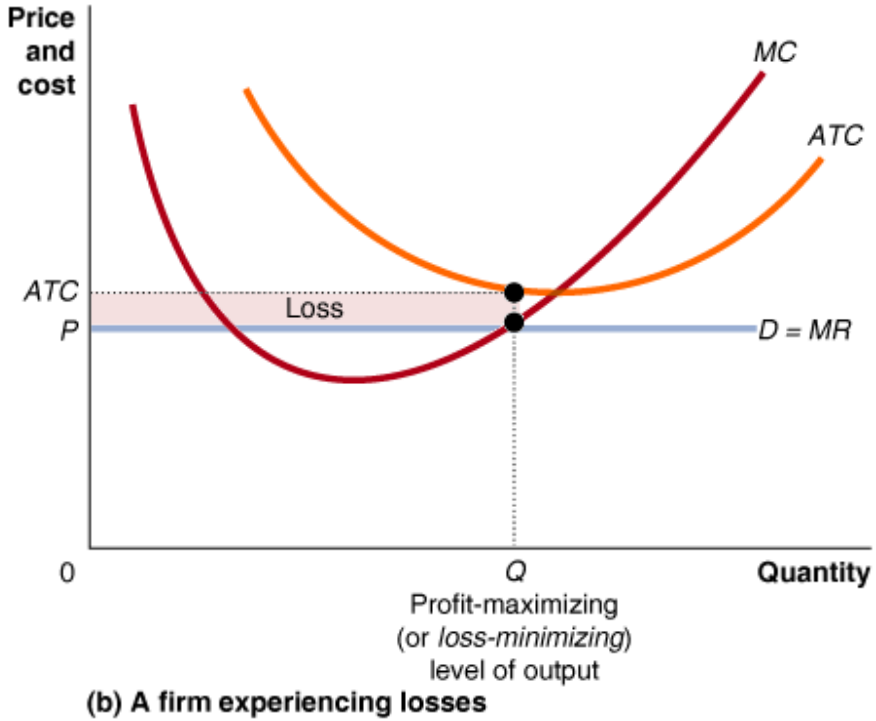
In the graph on the left, price never exceeds average cost, so the firm could not possibly make a profit.

The best this firm can do is to *break even*, obtaining no profit but incurring no loss.

Example 2: A firm experiencing a loss.

The situation is even worse for this firm; not only can it not make a profit, price is always *lower* than average total cost, so it *must* make a loss.

It makes the smallest loss possible by again following the *MC=MR* rule. No other level of output allows the firm's loss to be so small.



(b) A firm experiencing losses

Identifying whether a firm can make a profit

Step 1: Determined the quantity where *MC=MR*

Step 2: At that quantity,

- If *P* > *ATC*, the firm is making a profit
- If *P* = *ATC*, the firm is breaking even
- If *P* < *ATC*, the firm is making a loss

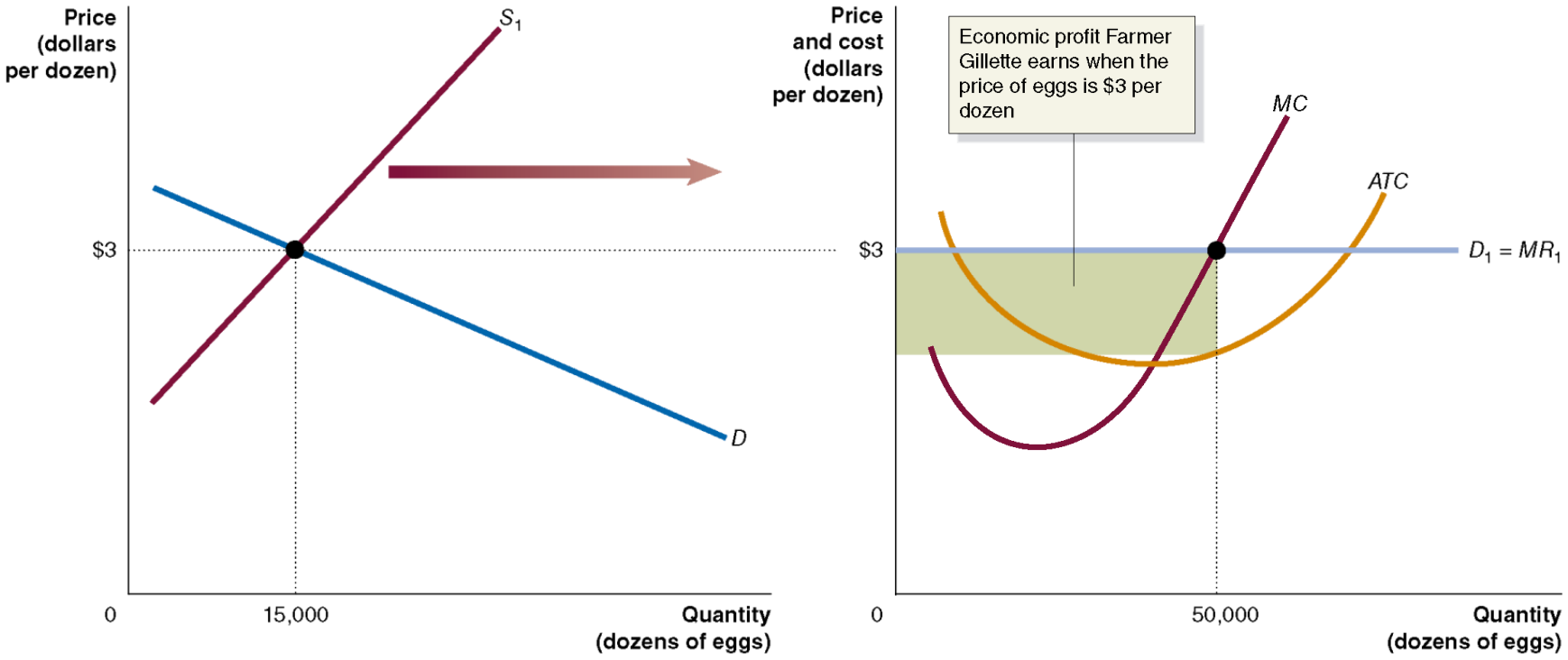
Even better: these statements hold true at *every* level of output.

“If Everyone Can Do It, You Can’t Make Money at It”: The Entry and Exit of Firms in the Long Run

1.When firms in an industry are earning economic profits, new firms will enter the industry.

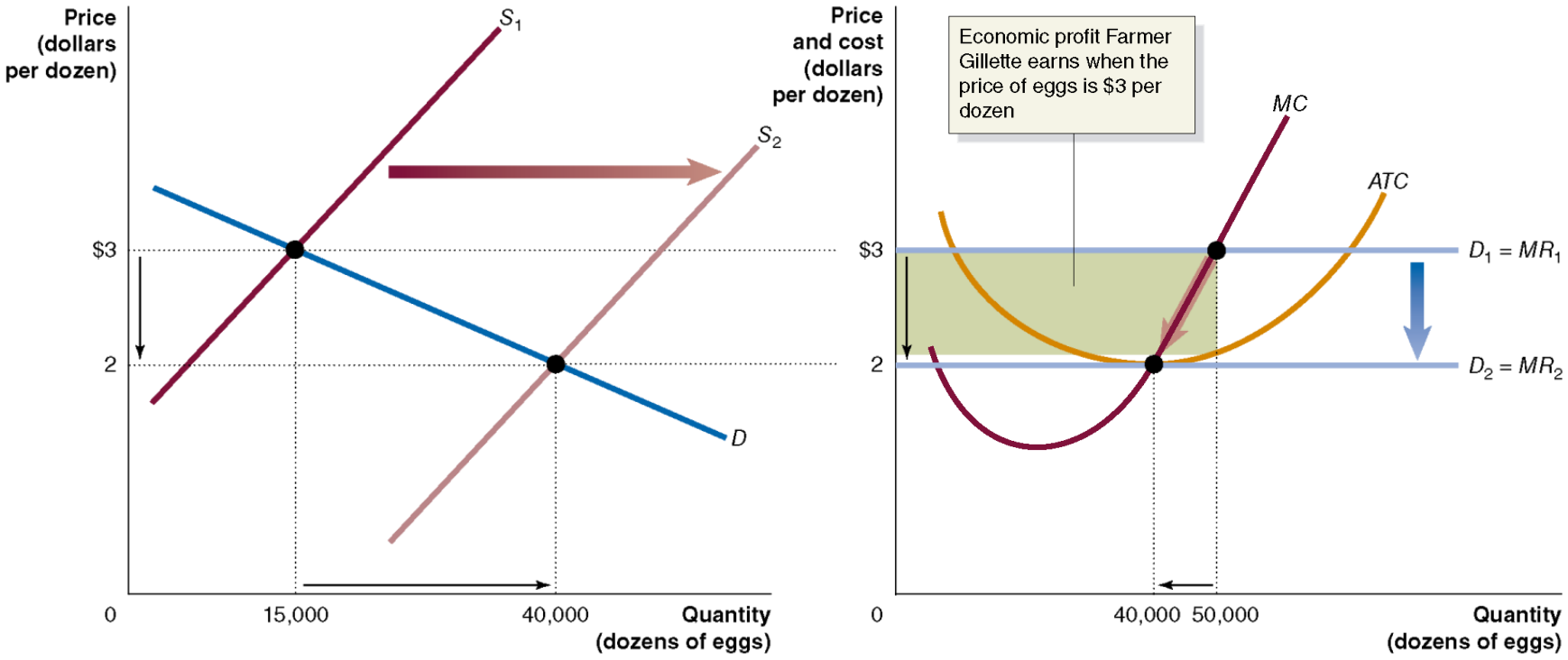
2. When firms in an industry are suffering economic losses, some of those firms will exit the industry.

Case 1: The effect of entry on economic profit



The profit attracts new firms, which increases supply.

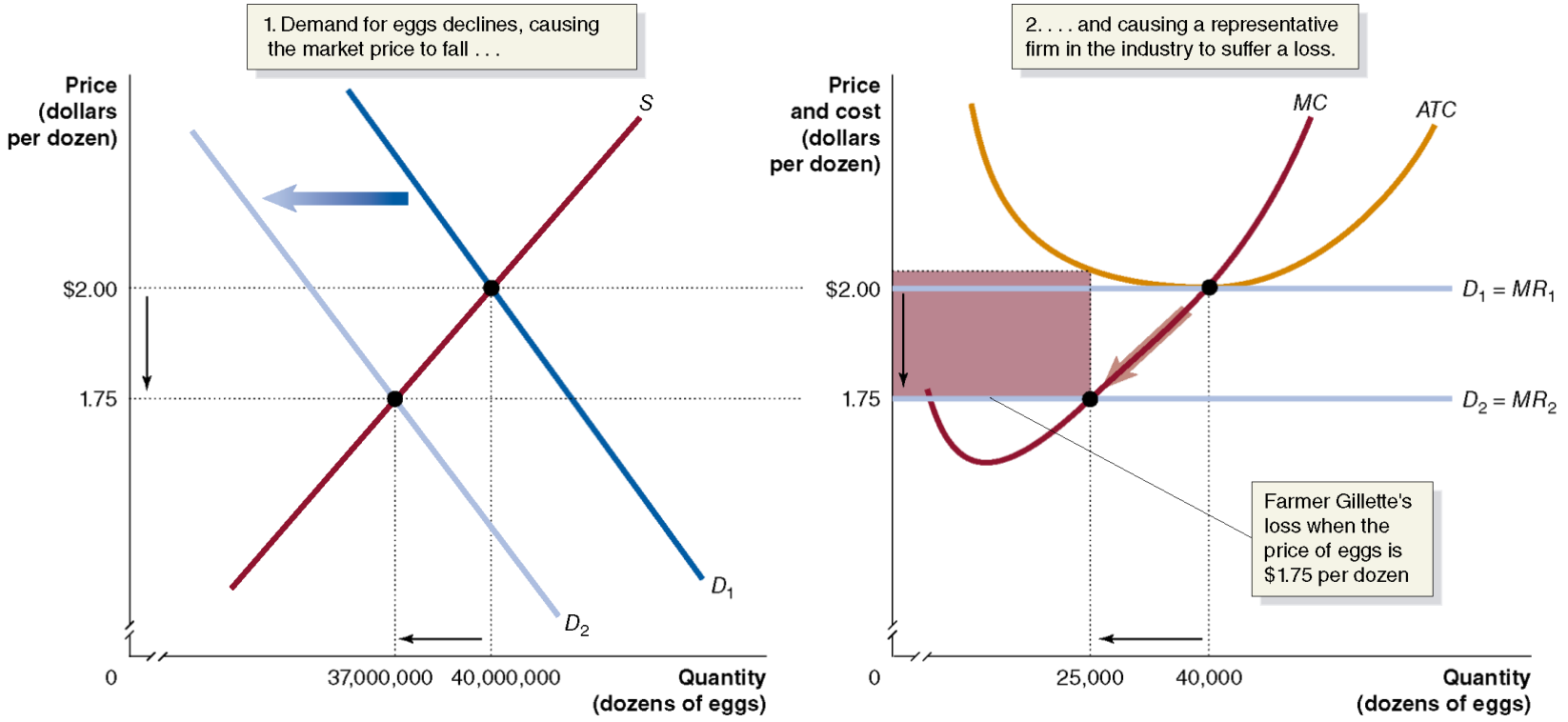
Case 1: The effect of entry on economic profit



The increased supply causes the market equilibrium price to fall.

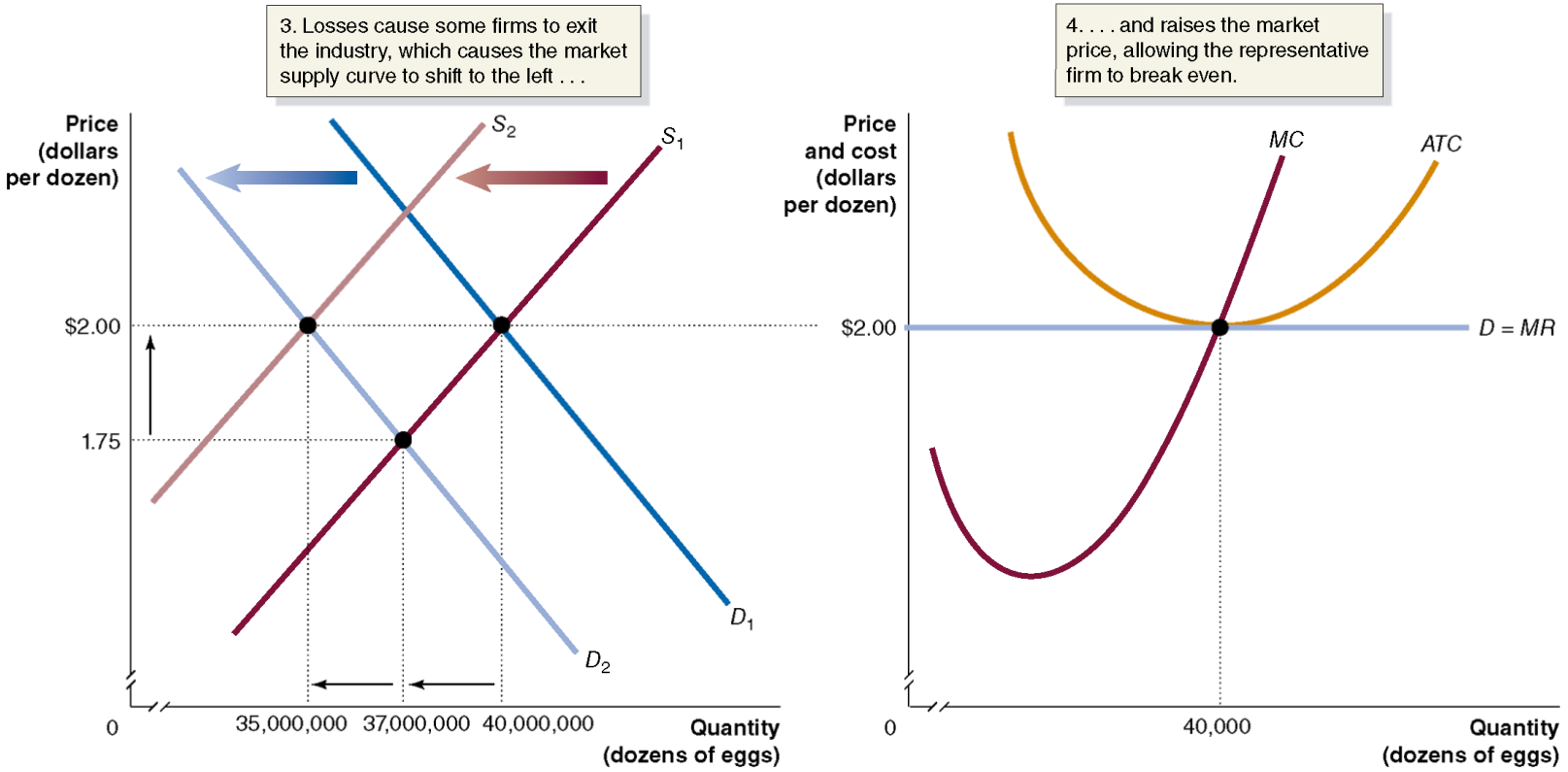
It falls until there is no incentive for further firms to enter the market; that is, when individual firms make no economic profit.

Case 2: The effect of exit on economic losses



Price is $2 and firms are breaking even. Then the demand falls. The demand curve shifts from D1 to D2. The price falls to $1.75.

Case 2: The effect of exit on economic losses (2 of 2)



Discouraged by the losses, some farmers will exit the market.

The resulting decrease in supply causes prices to rise. Firms continue to leave until price returns to the break-even price of $2.

Long-run equilibrium in a perfectly competitive market

The previous slides have described how *long-run competitive equilibrium* is achieved in a perfectly competitive market:

- If firms are making an economic profit, additional firms enter the market, driving down price to the break-even level.
- If firms are making an economic loss, existing firms exit the market, driving price up to the break-even level.

Long-run competitive equilibrium: The situation in which the entry and exit of firms has resulted in the typical firm breaking even.