ECONOMICS TUTORS

Microeconomics, Macroeconomics,

Econometrics, International Economics, Corporate Finance, Statistics

Learning Objectives

- Determine a perfectly competitive firm's profit-maximizing output level (supply) and profit in the short run.
- Explain the differences between shutdown and exit decisions of the firm.
- Show how economic profit and economic loss affect the number of firms in the industries in the long run.
- Explain the difference between economic profit and economic rent.
- Identify the market long-run and short-run supply curves.

WHAT IS A COMPETITIVE MARKET?

- A perfectly competitive market has the following characteristics:
  - There are many buyers and sellers in the market.
  - The goods offered by the various sellers are largely the same.

- Additional condition (**Free Competitive Market**):
  - **Firms can freely enter or exit the market**.
    - Low (or no) costs of entry or exit
    - No legal barriers to entry or exit

WHAT IS A COMPETITIVE MARKET?

- A competitive market has many buyers and sellers trading identical products, thus:
  - The actions of any single buyer or seller in the market have a negligible impact on the market price.
  - Buyers and sellers are a price taker.
  - Buyers and sellers must accept the price determined by the market.

The Revenue of a Competitive Firm

- Total revenue for a firm in a competitive market is the *selling price, P*, times the *quantity sold, q*.

$$TR = P \times q$$

The Revenue of a Competitive Firm

- *Average revenue* tells us how much revenue a firm receives for the typical unit sold.
- Average revenue is total revenue divided by the quantity sold.

$$AR = \frac{\text{Total Revenue}}{\text{Quanitity}} = \frac{TR}{q}$$

The Revenue of a Competitive Firm

- In perfect competition, average revenue equals the price of the good.

$$AR = \frac{TR}{q} = \frac{P \times q}{q} = P$$

- In general, the average revenue in any market with a single price is the market price.

The Revenue of a Competitive Firm

- ***Marginal revenue*** is the change in total revenue from an additional unit sold.

$$MR = \frac{\Delta TR}{\Delta q}$$

- For competitive firms, the price is given and fixed. Therefore, $\Delta TR = P \times \Delta q$ and marginal revenue equals:

$$MR = \frac{\Delta TR}{\Delta q} = \frac{P \times \Delta q}{\Delta q} = P$$

Table 1 Total, Average, and Marginal Revenue for a Competitive Firm

Quantity	Price	Total Revenue	Average Revenue	Marginal Revenue
(Q)	(P)	($TR = P \times Q$)	($AR = TR/Q$)	($MR = \Delta TR/\Delta Q$)
1 gallon	$6	$ 6	$6	
				$6
2	6	12	6	
				6
3	6	18	6	
				6
4	6	24	6	
				6
5	6	30	6	
				6
6	6	36	6	
				6
7	6	42	6	
				6
8	6	48	6	

PROFIT MAXIMIZATION AND THE COMPETITIVE FIRM'S SUPPLY CURVE

- The goal of a firm is to maximize profit.
- This means that the firm wants to produce the quantity that maximizes the *difference between total revenue and total cost*, as profit is defined as:

$$\pi = TR - TC$$

Table 2 Profit Maximization: A Numerical Example

Quantity (*Q*)	Total Revenue (*TR*)	Total Cost (*TC*)	Profit (*TR* – *TC*)	Marginal Revenue ($MR = \Delta TR/\Delta Q$)	Marginal Cost ($MC = \Delta TC/\Delta Q$)	Change in Profit (*MR* – *MC*)
0 gallons	$ 0	$ 3	−$3			
				$6	$2	$4
1	6	5	1			
				6	3	3
2	12	8	4			
				6	4	2
3	18	12	6			
				6	5	1
4	24	17	7			
				6	6	0
5	30	23	7			
				6	7	−1
6	36	30	6			
				6	8	−2
7	42	38	4			
				6	9	−3
8	48	47	1			

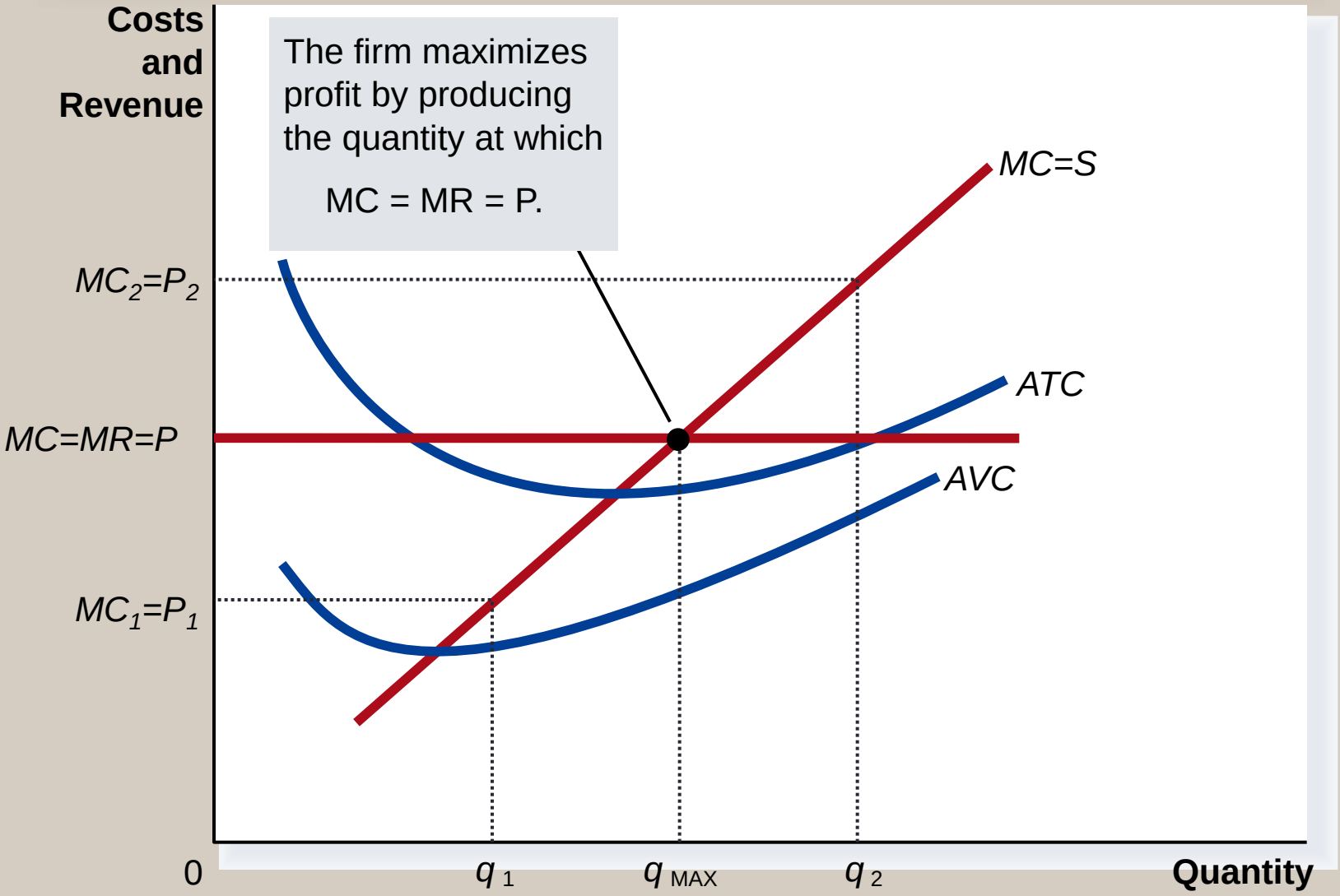
PROFIT MAXIMIZATION AND THE COMPETITIVE FIRM'S SUPPLY CURVE

- To maximize the profit:
- When MR > MC ⟹ increase q
- When MR < MC ⟹ decrease q
- When MR = MC ⟹ profit is maximized
- Thus, the condition to maximize the profit is:

$$MR = MC$$

- We can arrive at this condition much easier using calculus.

Figure 1 Profit Maximization for a Competitive Firm



The Firm's Short-Run Decision to Shut Down

A competitive firm supplies quantity that sets

$$\boldsymbol{MC(q) = P},$$

with two limitations:

- **Shutdown**: Shutdown refers to a short-run decision not to produce anything during a specific period of time because of current market conditions.
- **Exit**: Exit refers to a long-run decision to leave the market.

The Firm's Decisions and Sunk Costs

- The short-run and long-run decisions differ because firms cannot avoid their fixed cost in the short run but can do so in the long run.
- Basically, the fixed costs are sunk in the short-run.
  - **Sunk costs** are costs that have already been committed and cannot be recovered.
  - Economics teach us that we can ignore sunk costs when making decisions.

"Don't cry over spilt milk"

- Thus, the firm considers its fixed costs when deciding to exit (as the firm can recover them), but ignores them when deciding whether to shut down (as they are sunk).

The Firm's Short-Run Decision to Shut Down

- The firm shuts down if its revenue is less than the variable cost of production.
- So, a firm shuts down if

$$TR < VC$$

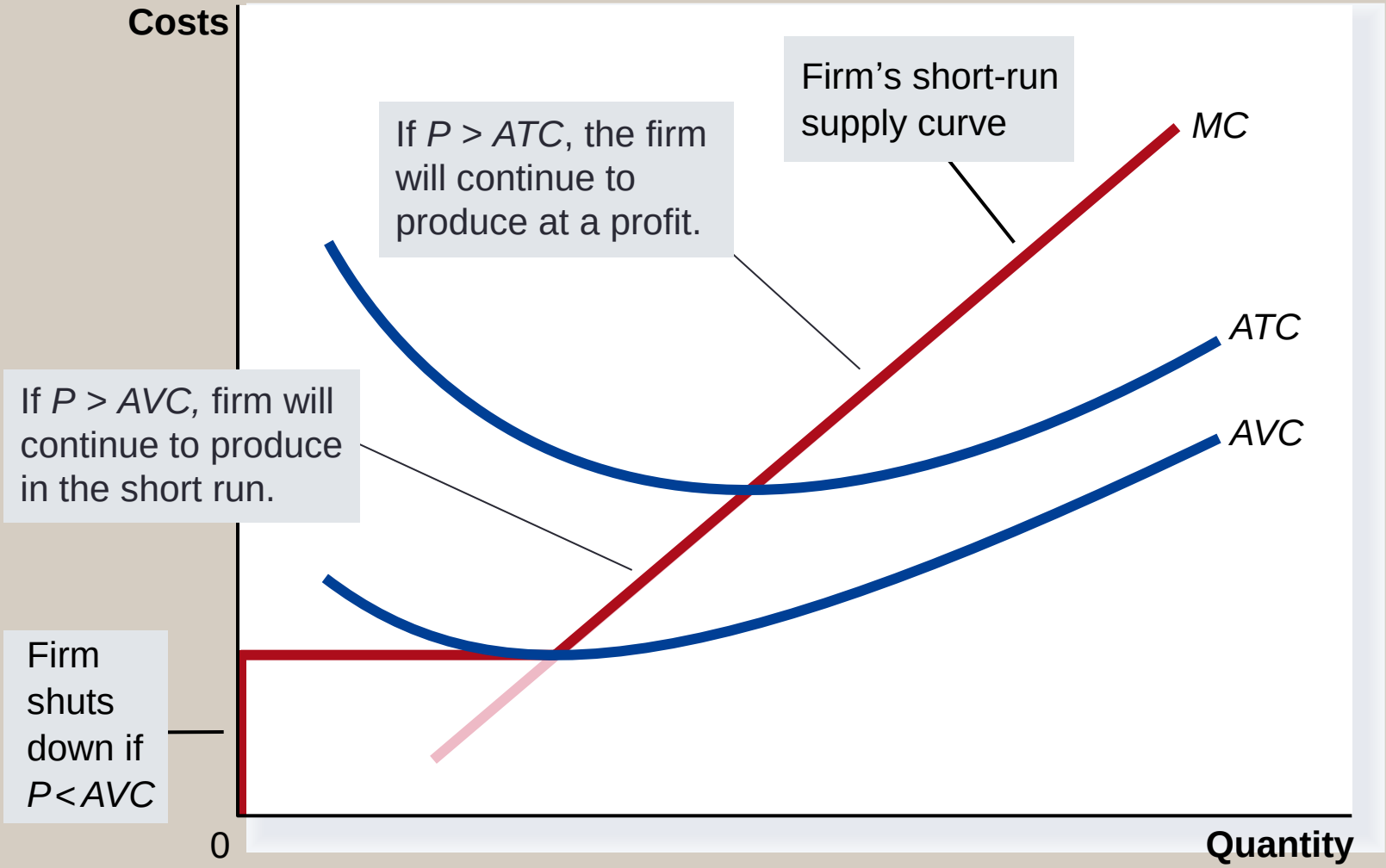
that is

$$TR/q < VC/q$$

that is

$$P < AVC$$

Figure 3 The Competitive Firm's Short Run Supply Curve



The Firm's Long-Run Decision to Exit or Enter a Market

- In the long run, the firm exits if its revenue is less than its total cost.
- So, a firm exits if

$$TR < TC$$

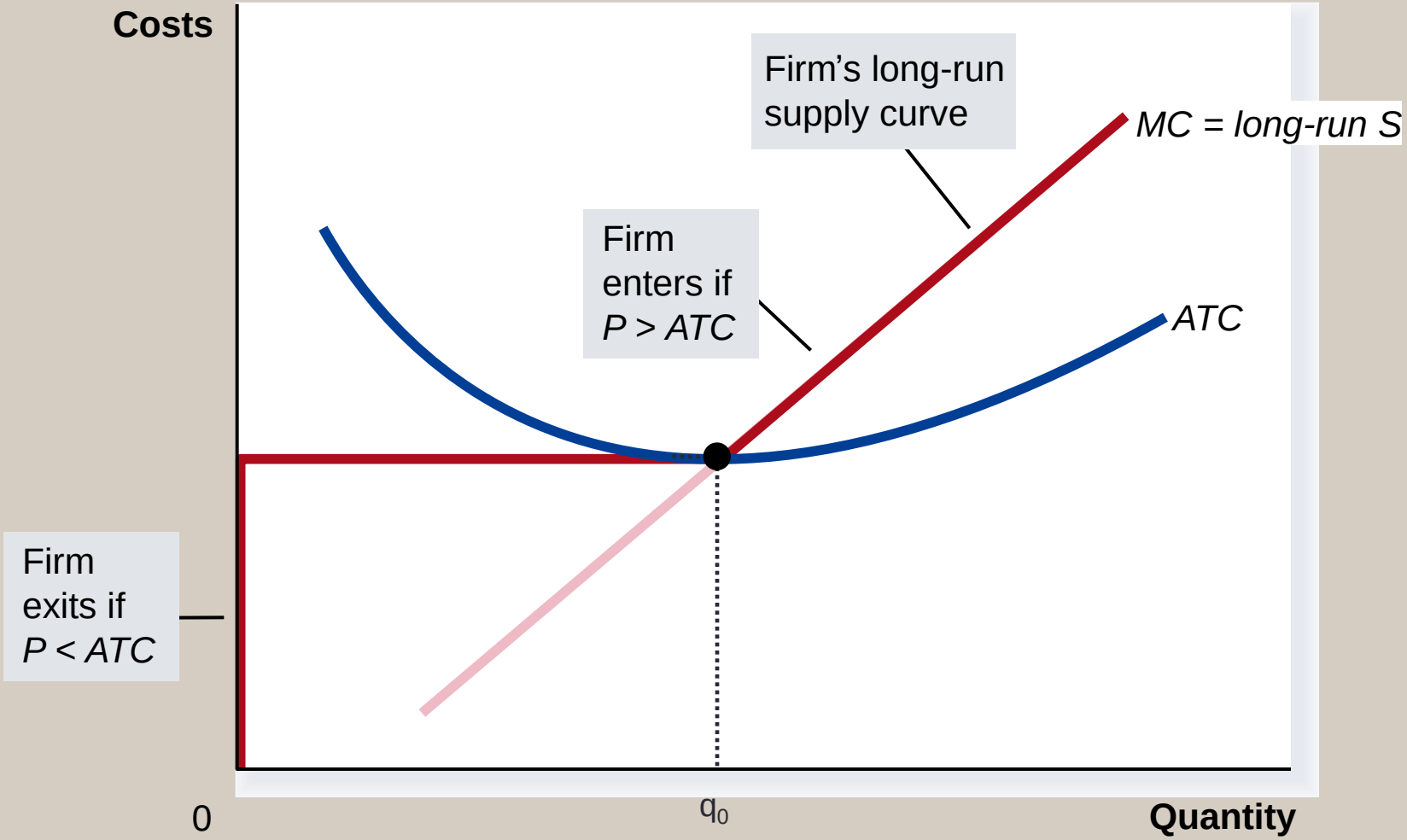
that is

$$TR/q < TC/q$$

that is

$$P < ATC$$

Figure 4 The Competitive Firm's Long-Run Supply Curve



The Firm's Long-Run Decision to Exit or Enter a Market

- Firms will enter the industry if such an action would be profitable.
- Thus, firms enter if

$$TR > TC$$

that is

$$TR/q > TC/q$$

that is

$$P > ATC$$

The Supply Curve of a Firm in competitive Market

- Short-Run Supply Curve of a Firm
  - The portion of the marginal cost curve that lies above the average variable cost.

- Long-Run Supply Curve of a Firm
  - The portion of the marginal cost curve above the average total cost curve.

The Short Run Market Supply: Fixed Number of Firms

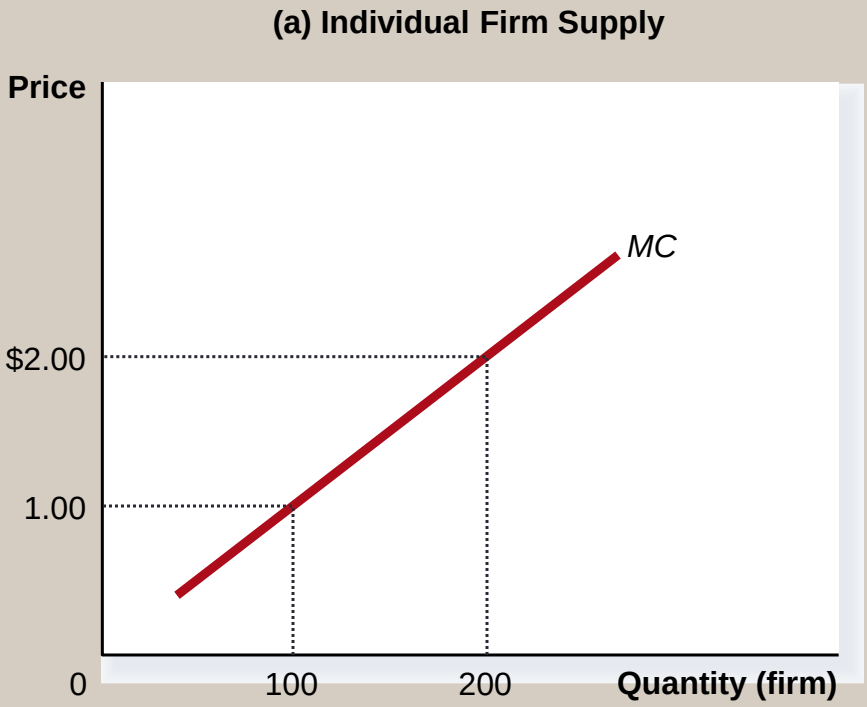
- Recall that the market supply equals the sum of the quantities supplied by the individual firms in the market.

- For any given price, each firm supplies a quantity of output so that its marginal cost equals price.

Thus, the short-run market supply curve is
the horizontal summation of
the individual firms' marginal cost curves.

- Note that firms may make profits or losses in the short-run.

Figure 6 Market Supply with a Fixed Number of Firms



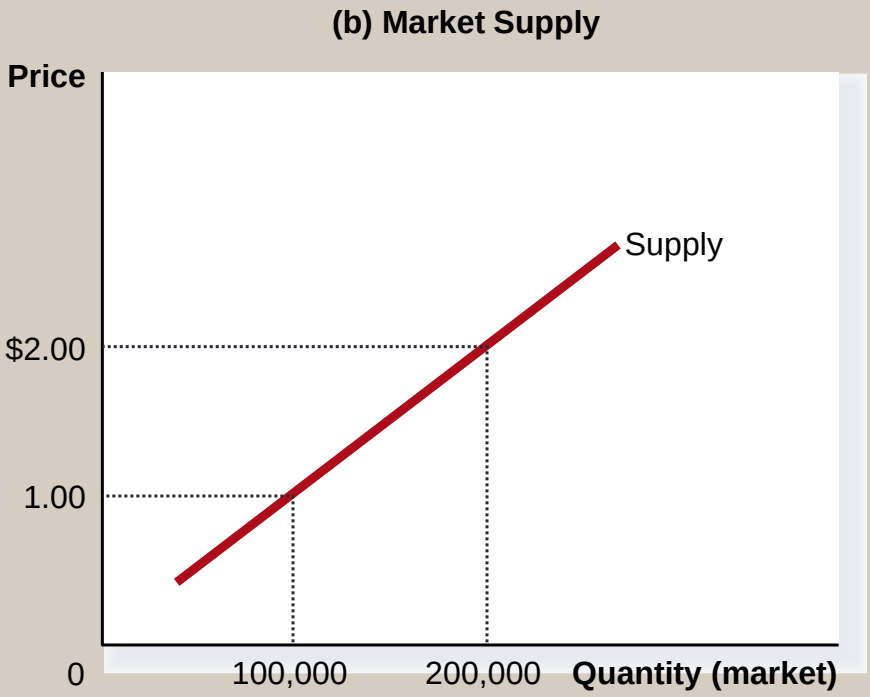


Figure 5 Profit as the Area between Price and Average Total Cost

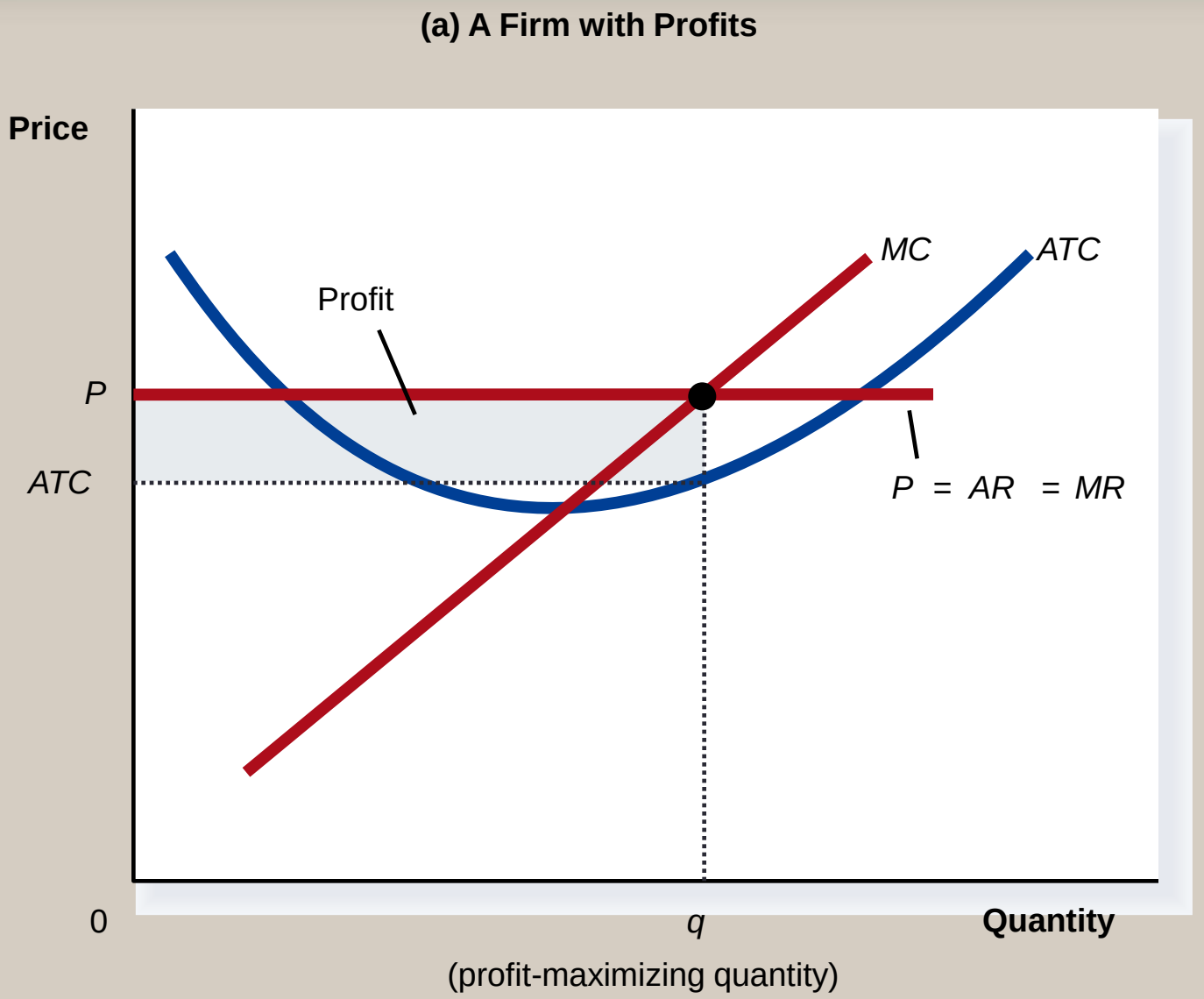
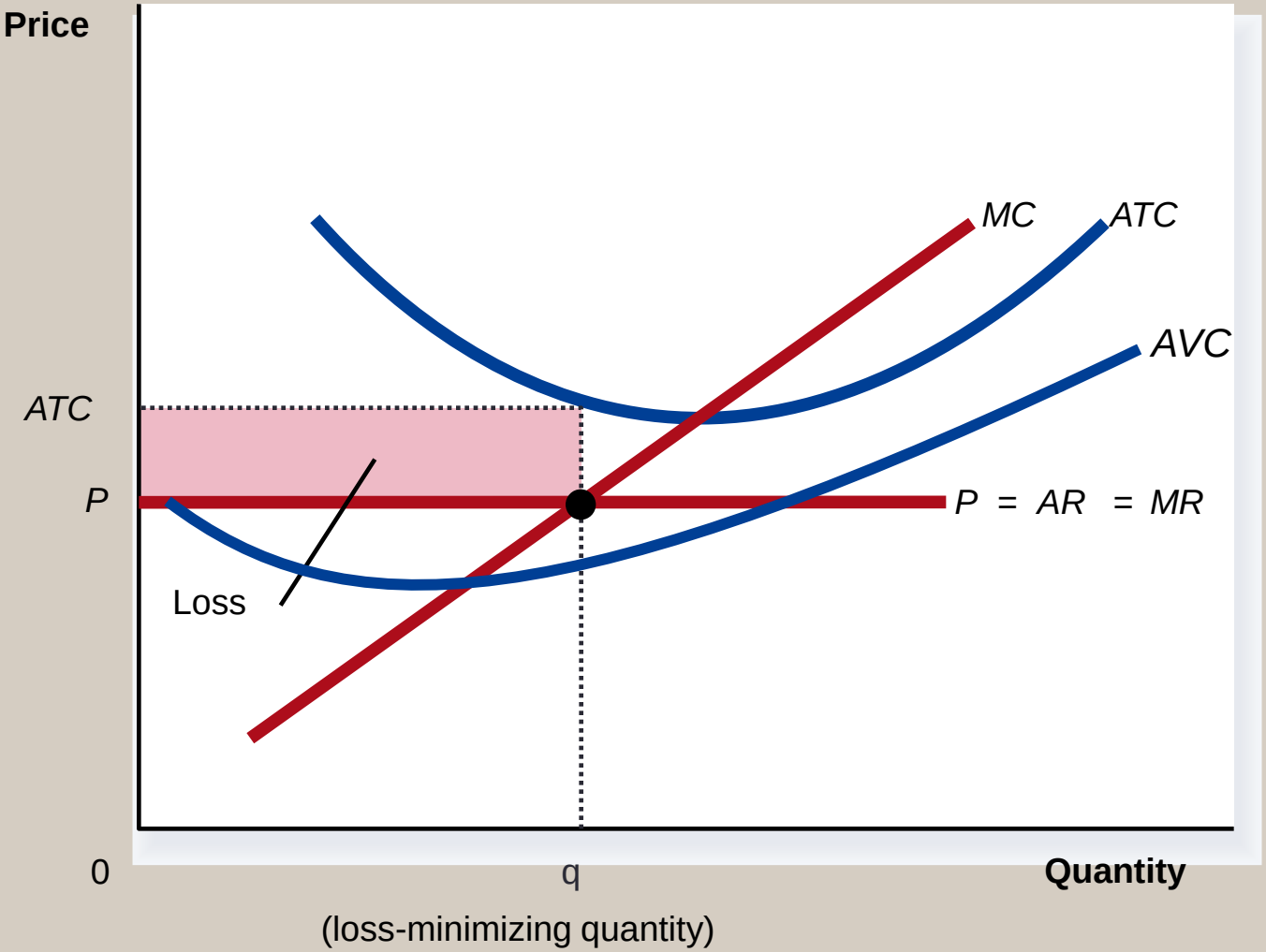


Figure 5 Profit as the Area between Price and Average Total Cost

(b) A Firm with Losses



The Long-Run Market Supply: Entry and Exit

- Use a side-by-side firm and market graphs on the white-board: Two cases

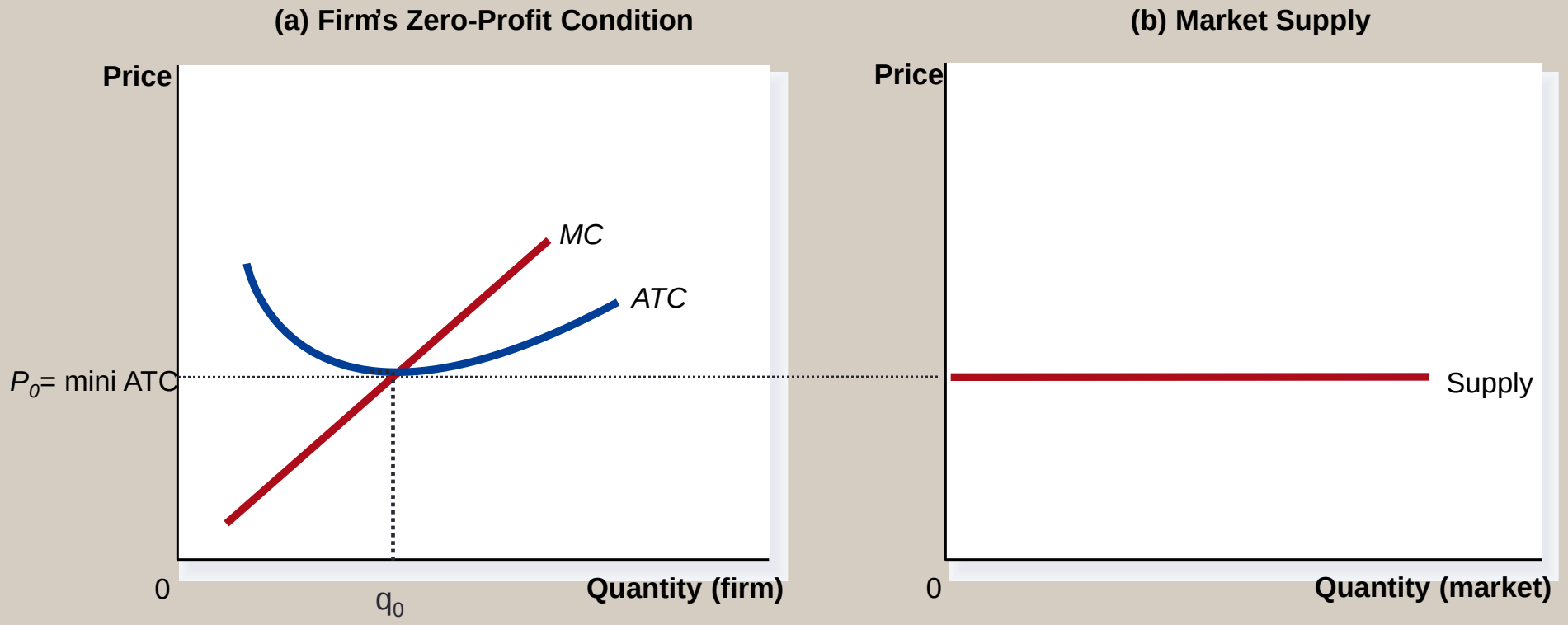
1. The market price is higher than the minimum of the average cost and firms make profit. Show that more firms enter, the market supply curve shifts to the right, price decreases to the minimum average cost, and profit goes to zero.
2. The market price is lower than the minimum of the average cost and firms make loss. Show that firms exit, the market supply curve shifts to the left, price increases to the minimum average cost, and profit goes to zero.

The Long Run: Market Supply with Entry and Exit

- We have seen:
  - Firms will enter or exit the market until profit is driven to zero.
  - In the long run, price equals the minimum of average total cost.

Thus, the long-run market supply curve is horizontal at the price equal to the minimum of average cost.

Figure 7 Market Supply with Entry and Exit



The Long Run: Market Supply with Entry and Exit

- At the end of the process of entry and exit, firms that remain must be making zero economic profit.
- The process of entry and exit ends only when price and average total cost are driven to equality, and the profit is driven to zero.
- Long-run equilibrium must have firms operating at their efficient scale.

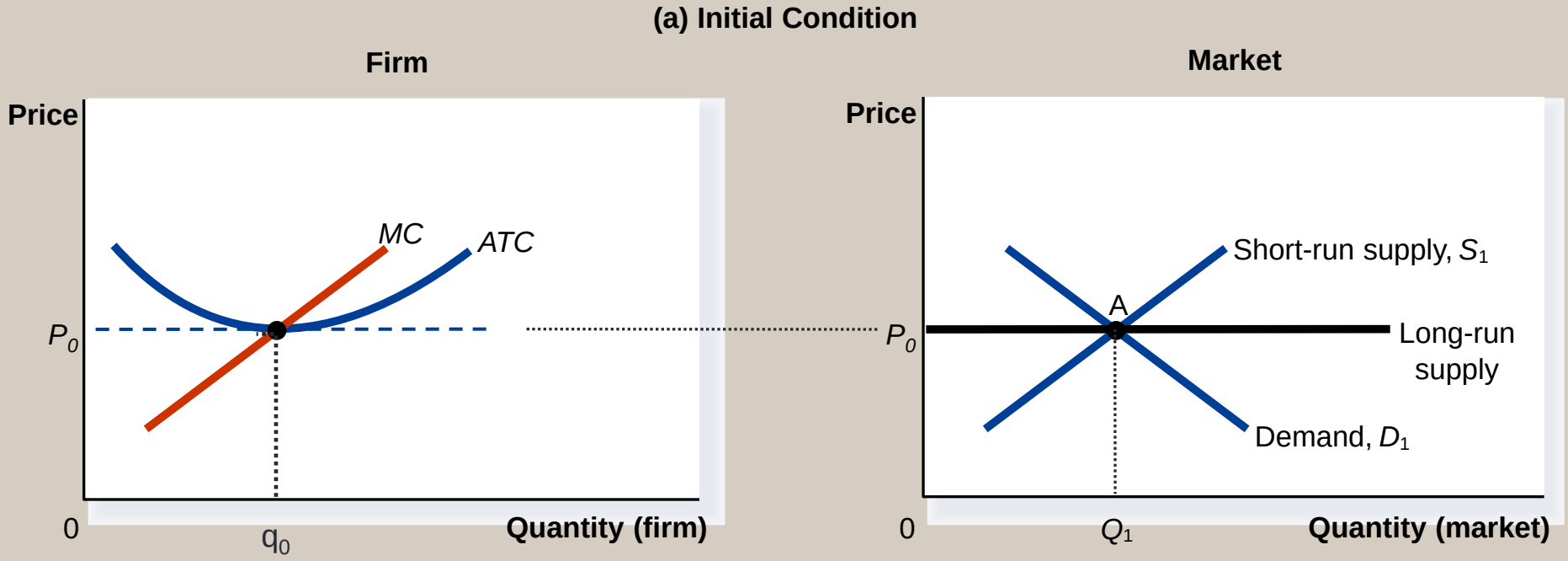
Why Do Competitive Firms Stay in Business If They Make Zero Profit?

- Recall that profit equals total revenue minus total cost.
- Total cost includes all the opportunity costs of the firm. For example, it includes the rental value of property even if it is owned by the business owner.
- In the zero-profit equilibrium, the firm's revenue not only covers the (explicit) costs but also compensates the owners for the time, money, and other resources they spend to keep the business going.
- Basically, the firm (or its owners) receives the normal economic returns on the inputs (including owners time and opportunity costs). However, there is no economic profit.

Effects of an Increase in Demand in the Short Run and Long Run

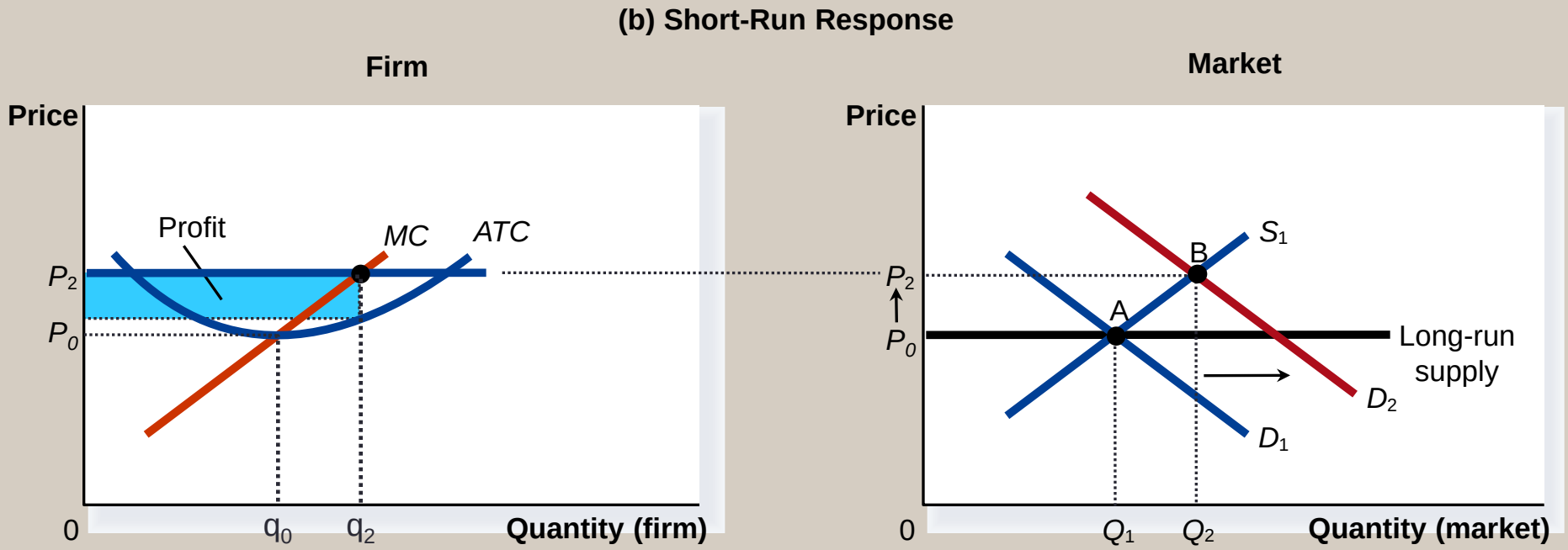
- In the short run, the number of firms does not change.
- An increase in demand raises the price, as supply curve is unchanged.
- Each Firm in the market reacts to a higher price, produces quantity larger than efficient scale, and earn economic profits because price now exceeds average total cost.
- The market quantity supplied increases following the short-run market supply curve.
- In the long run, however, more firms enter the market and derive the profit to zero and the price to minimum of average total cost.
- In the long run, each firms produces at the efficient scale again, but the number of firms in the market increases.

Figure 8 An Increase in Demand in the Short Run and Long Run



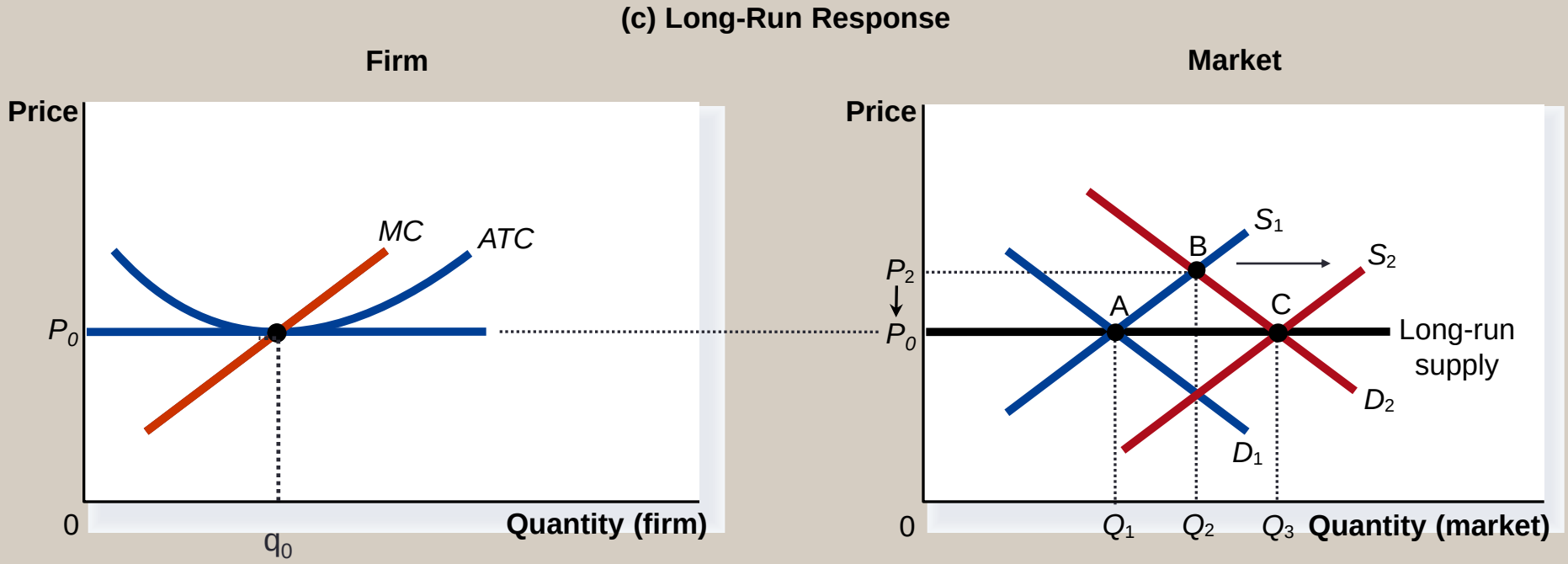
$$Q_1 = N_1 q_0$$

Figure 8 An Increase in Demand in the Short Run and Long Run



$$Q_2 = N_1 q_2$$

Figure 8 An Increase in Demand in the Short Run and Long Run



$$Q_3 = N_2\, q_0$$

Why the Long-Run Supply Curve Might Slope Upward

- Two reasons for upward-slopping long run market supply curve:
  1. Some resources used in production may be available only in limited quantities.
  2. Firms may have different costs.

- Marginal Firm
  - The marginal firm is the first firm that would exit the market if the price were any lower.