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PRINCIPLES OF

ECONOMICS

Eight Edition

CHAPTER

14

Firms in Competitive Markets

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What is a Competitive Market, Part 1

- Competitive market
  - Perfectly competitive market
  - Market with many buyers and sellers
  - Trading identical products
  - Each buyer and seller is a price taker
  - Firms can freely enter or exit the market

What is a Competitive Market, Part 2

- Firm in a competitive market
  - Tries to maximize profit
- Profit
  - Total revenue minus total cost
- Total revenue, TR = P x Q
  - Price times quantity
  - Proportional to the amount of output

What is a Competitive Market, Part 3

- Average revenue, AR = TR / Q
  - Total revenue divided by the quantity sold
- Marginal revenue, MR = ΔTR / ΔQ
  - Change in total revenue from an additional unit sold
- For competitive firms
  - AR = P
  - MR = P

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

(1) Quantity (Q)	(2) Price (P)	(3) Total Revenue (TR = P × Q)	(4) Average Revenue (AR = TR / Q)	(5) Marginal Revenue (MR = ΔTR / ΔQ)
1 gallon	$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	6

Profit Maximization, Part 1

- Maximize profit
  - Produce quantity where total revenue minus total cost is greatest
  - Compare marginal revenue with marginal cost
    - If MR > MC: increase production
    - If MR < MC: decrease production
    - Maximize profit where MR = MC

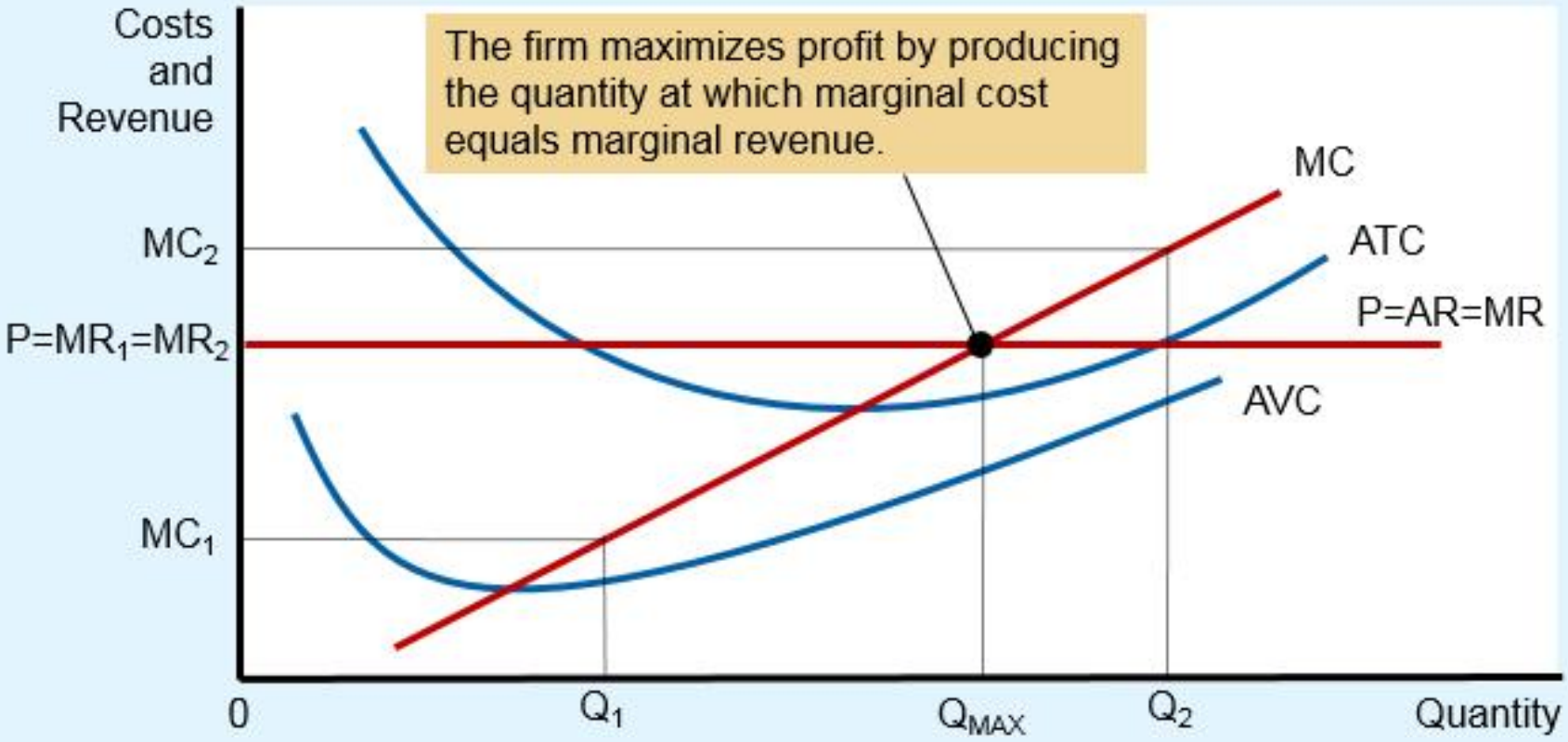
Table 2 Profit Maximization: A Numerical Example

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

Profit Maximization, Part 2

- The marginal-cost curve and the firm's supply decision
  - MC curve is upward sloping
  - ATC curve is U-shaped
  - MC curve crosses the ATC curve at the minimum of ATC curve
  - The price line is horizontal: P = AR = MR

Figure 1 Profit Maximization for a Competitive Firm

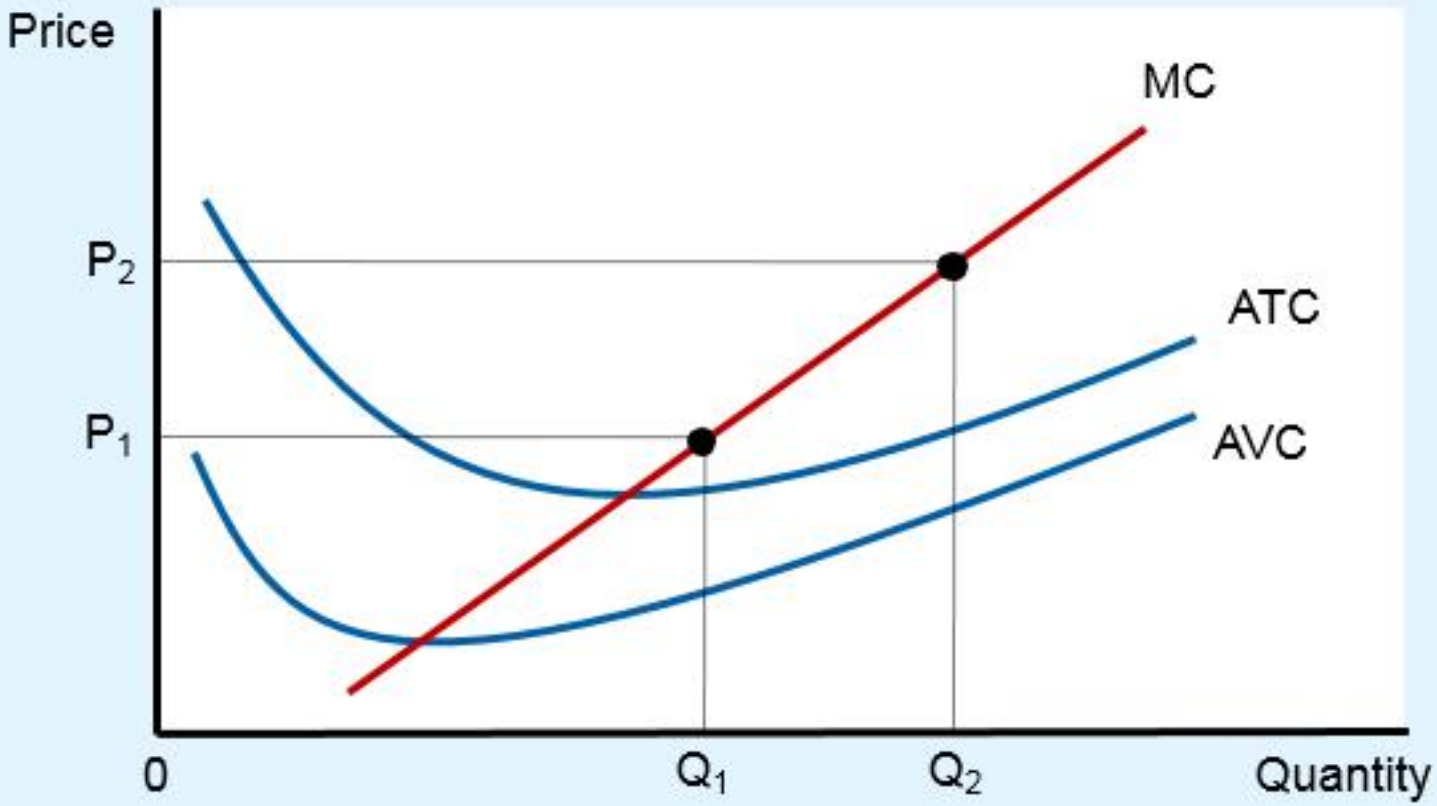


This figure shows the marginal-cost curve (MC), the average-total-cost curve (ATC), and the average-variable-cost curve (AVC). It also shows the market price (P), which for a competitive firm equals both marginal revenue (MR) and average revenue (AR).
At the quantity Q_1, $MR_1 > MC_1$, so raising production increases profit.
At the quantity Q_2, $MC_2 > MR_2$, so reducing production increases profit.
The profit-maximizing quantity Q_{MAX} is found where the horizontal line representing the price intersects the marginal-cost curve.

Profit Maximization, Part 3

- Rules for profit maximization:
  - If MR > MC, firm should increase output
  - If MC > MR, firm should decrease output
  - If MR = MC, profit-maximizing level of output
- Marginal-cost curve
  - Determines the quantity of the good the firm is willing to supply at any price
  - Is the supply curve

Figure 2 Marginal Cost as the Competitive Firm's Supply Curve



An increase in the price from P_1 to P_2 leads to an increase in the firm's profit-maximizing quantity from Q_1 to Q_2. Because the marginal-cost curve shows the quantity supplied by the firm at any given price, it is the firm's supply curve.

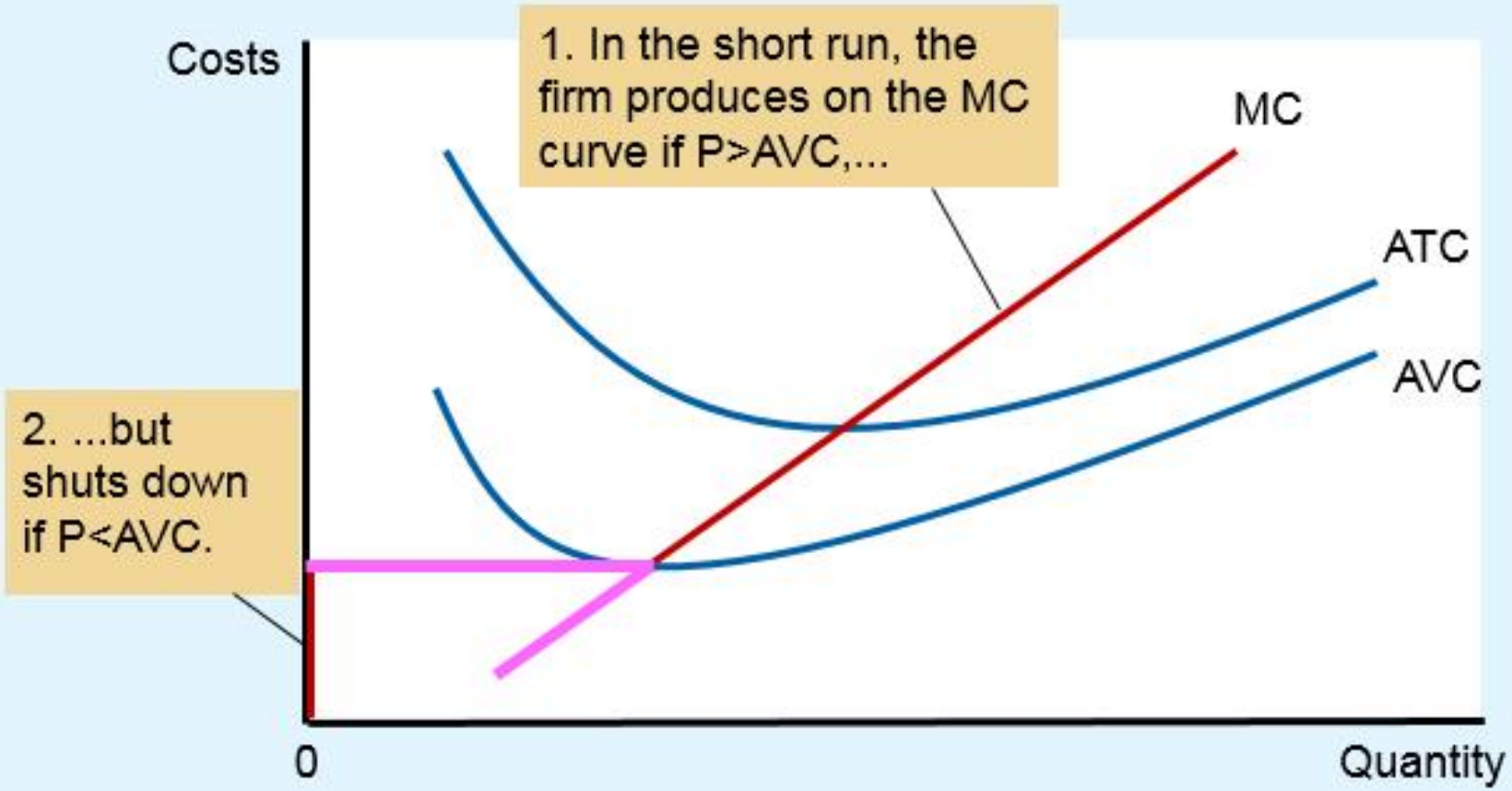
Profit Maximization, Part 4

- Shutdown
  - Short-run decision not to produce anything
  - During a specific period of time
  - Because of current market conditions
  - Firm still has to pay fixed costs
- Exit
  - Long-run decision to leave the market
  - Firm doesn't have to pay any costs

Profit Maximization, Part 5

- The firm's short-run decision to shut down
  - TR = total revenue
  - VC = variable costs
- Firm's decision:
  - Shut down if TR < VC (or P < AVC)
- Competitive firm's short-run supply curve
  - The portion of its marginal-cost curve
  - That lies above average variable cost

Figure 3 The Competitive Firm's Short-Run Supply Curve



In the short run, the competitive firm's supply curve is its marginal-cost curve (MC) above average variable cost (AVC). If the price falls below average variable cost, the firm is better off shutting down temporarily.

Profit Maximization, Part 6

- Sunk cost
  - A cost that has already been committed and cannot be recovered
  - Should be ignored when making decisions
  - "Don't cry over spilt milk"
  - "Let bygones be bygones"
  - In the short run, fixed costs are sunk costs

Near-empty restaurants & off-season miniature golf, Part 1

- Restaurant – stay open for lunch?
  - Fixed costs: not relevant; are sunk costs in short run
  - Variable costs, VC: relevant
    - Shut down if revenue from lunch < VC
    - Stay open if revenue from lunch > VC

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Staying open can be profitable, even with many tables empty.

CASE STUDY

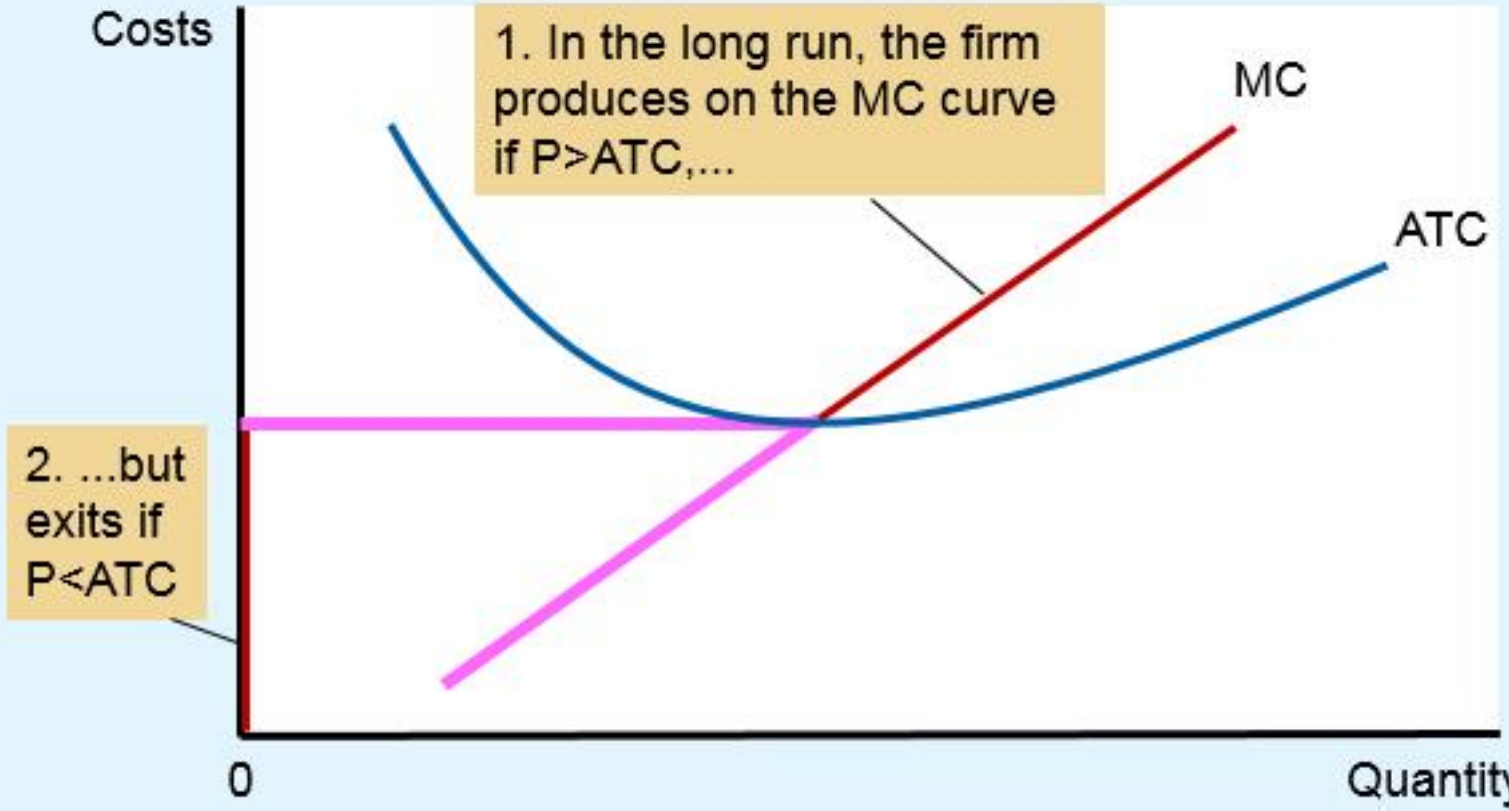
Near-empty restaurants & off-season miniature golf, Part 2

- Operator of a miniature-golf course
  - Ignore fixed costs
  - Shut down if
    - Revenue < variable costs
  - Stay open if
    - Revenue > variable costs

Profit Maximization, Part 7

- Firm's long-run decision
  - Exit the market if
    - Total revenue < total costs; TR < TC (same as: P < ATC)
  - Enter the market if
    - Total revenue > total costs; TR > TC (same as: P > ATC)
- Competitive firm's long-run supply curve
  - The portion of its marginal-cost curve that lies above average total cost

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

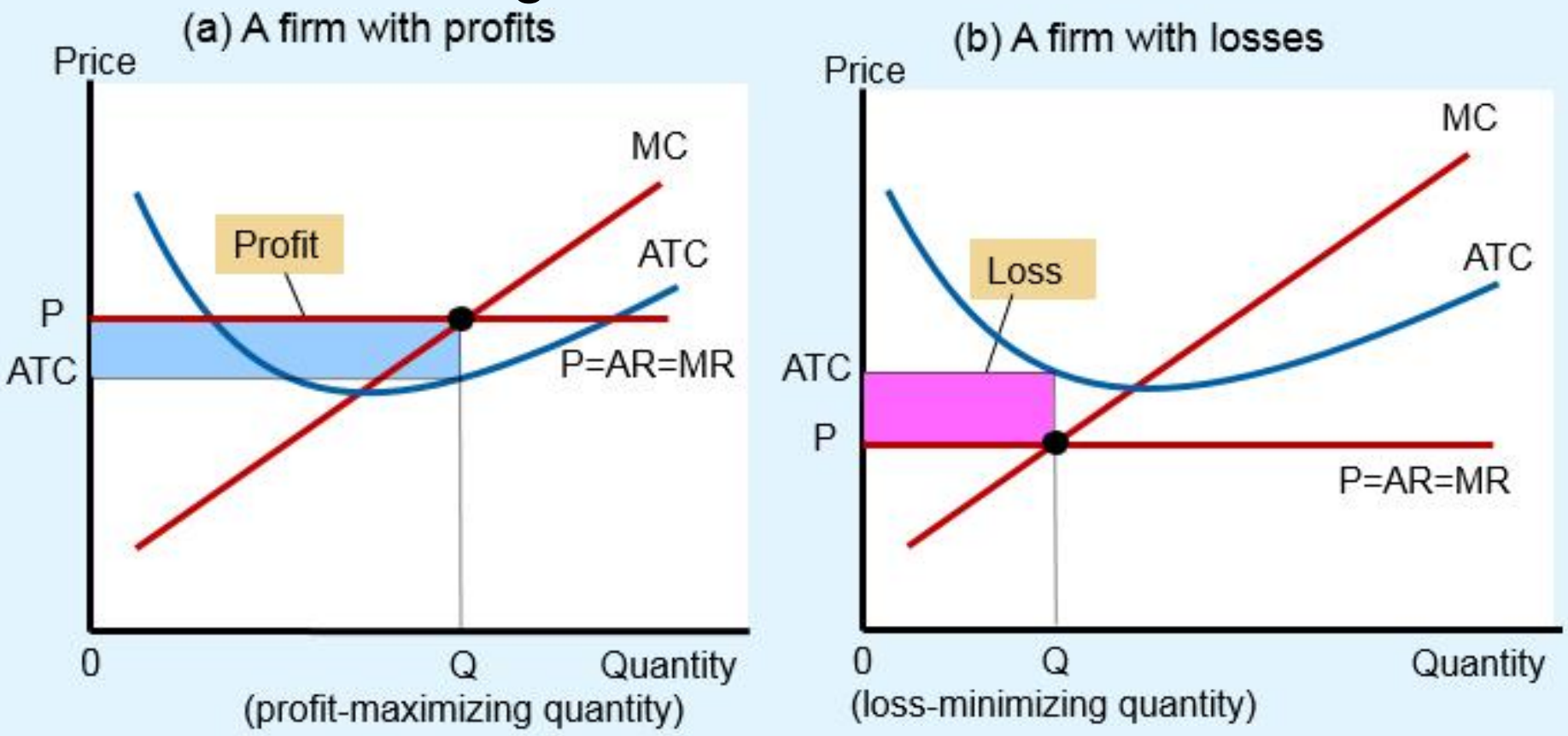


In the long run, the competitive firm's supply curve is its marginal-cost curve (MC) above average total cost (ATC). If the price falls below average total cost, the firm is better off exiting the market.

Profit Maximization, Part 8

- Measuring profit
  - If P > ATC
    - Profit = TR – TC = (P – ATC) x Q
  - If P < ATC
    - Loss = TC - TR = (ATC – P) x Q
    - = Negative profit

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

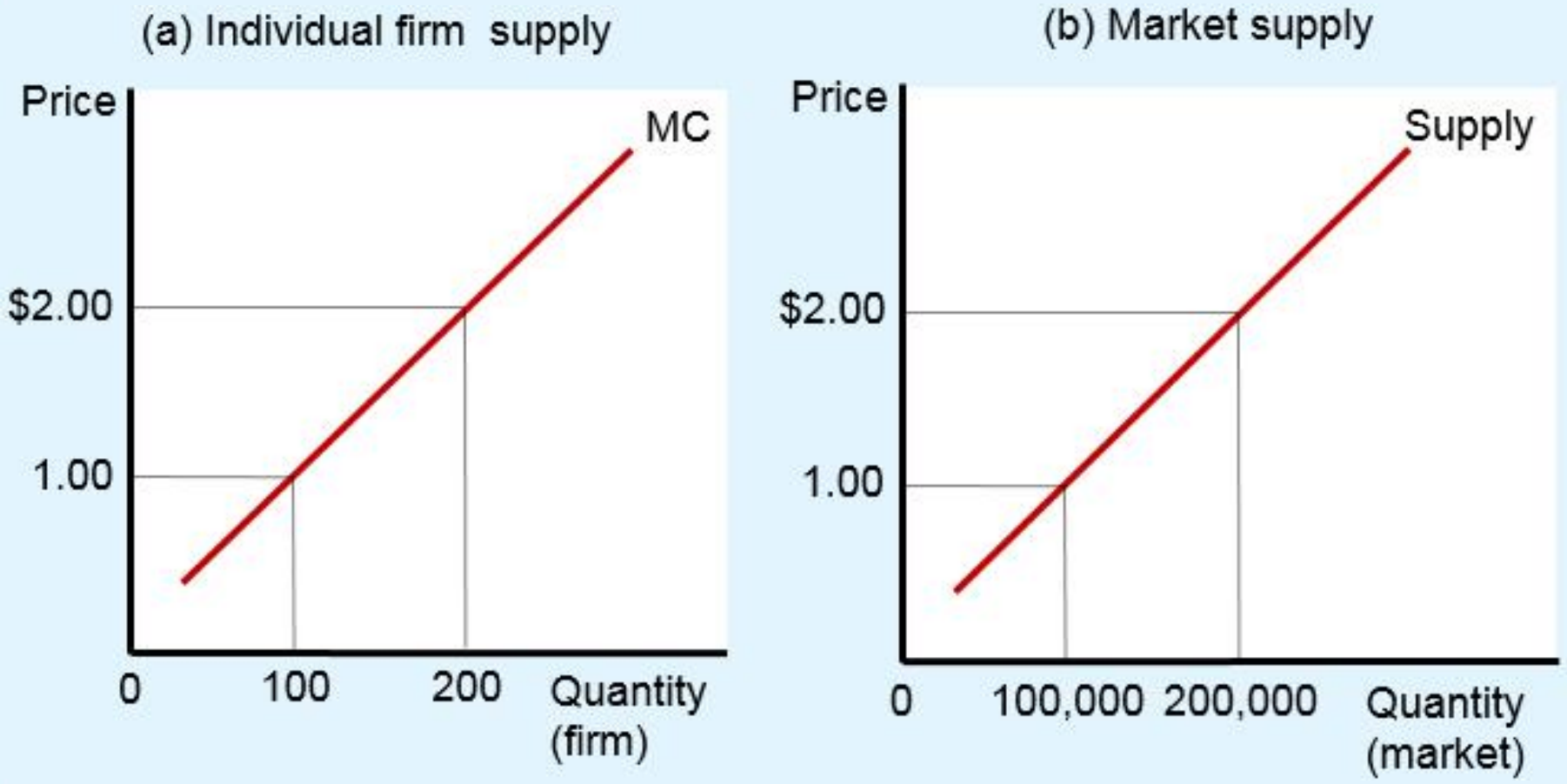


The area of the shaded box between price and average total cost represents the firm's profit. The height of this box is price minus average total cost (P – ATC), and the width of the box is the quantity of output (Q). In panel (a), price is above average total cost, so the firm has positive profit. In panel (b), price is less than average total cost, so the firm incurs a loss.

Supply Curve, Part 1

- Short run: market supply with a fixed number of firms
  - Short run: number of firms is fixed
  - Each firm supplies quantity where P = MC
    - For P > AVC: supply curve is MC curve
  - Market supply
    - Add up quantity supplied by each firm

Figure 6 Short-Run Market Supply



In the short run, the number of firms in the market is fixed. As a result, the market supply curve, shown in panel (b), reflects the individual firms' marginal-cost curves, shown in panel (a). Here, in a market of 1,000 firms, the quantity of output supplied to the market is 1,000 times the quantity supplied by each firm

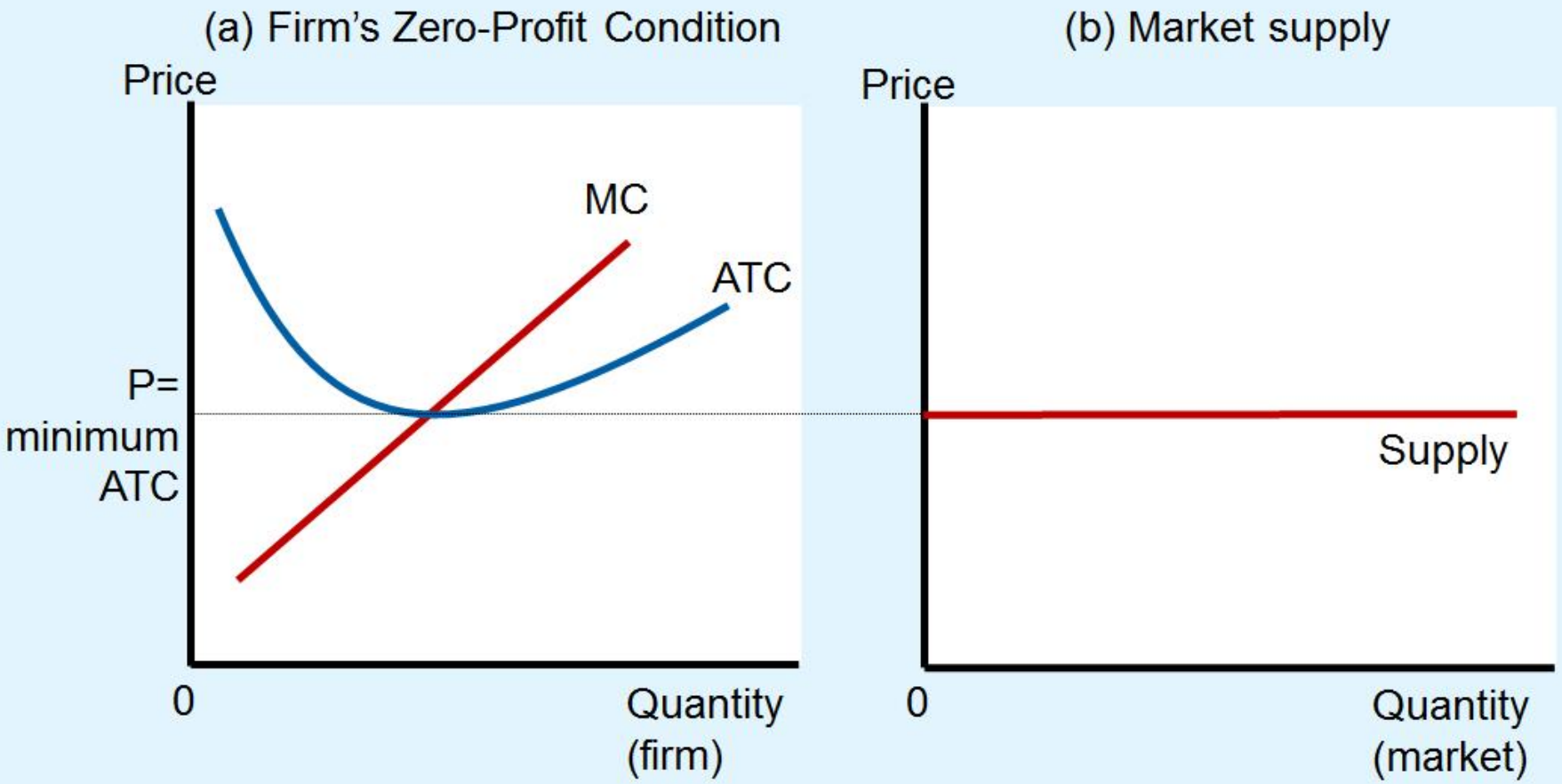
Supply Curve, Part 2

- Long run
  - Firms can enter and exit the market
  - If P > ATC, firms make positive profit
    - New firms enter the market
  - If P < ATC, firms make negative profit
    - Firms exit the market

Supply Curve, Part 3

- Long run
  - Process of entry and exit ends when
    - Firms still in market make zero economic profit (P = ATC)
    - Because MC = ATC: Efficient scale
  - Long run supply curve is perfectly elastic
    - Horizontal at minimum ATC

Figure 7 Long-Run Market Supply



In the long run, firms will enter or exit the market until profit is driven to zero. As a result, price equals the minimum of average total cost, as shown in panel (a). The number of firms adjusts to ensure that all demand is satisfied at this price. The long-run market supply curve is horizontal at this price, as shown in panel (b).

Supply Curve, Part 4

- Why do competitive firms stay in business if they make zero profit?
  - Profit = total revenue – total cost
  - Total cost includes all opportunity costs
  - Zero-profit equilibrium
    - Economic profit is zero
    - Accounting profit is positive

"We're a nonprofit organization - we don't intend to be, but we are!"

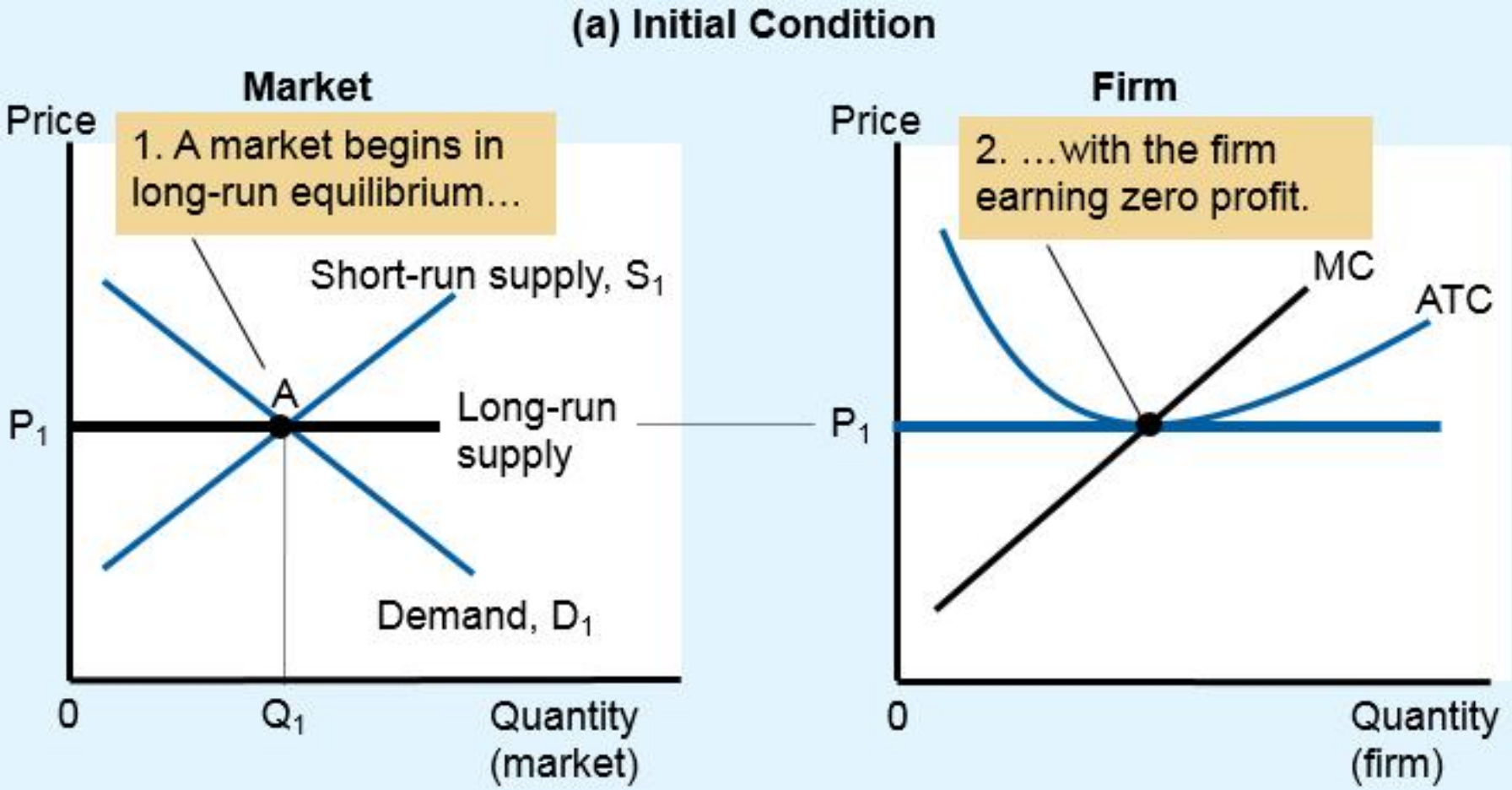
Supply Curve, Part 5

- Market in long run equilibrium
  - P = minimum ATC
  - Zero economic profit
- Increase in demand
  - Demand curve shifts outward
  - Short run
    - Higher quantity
    - Higher price: P > ATC, positive economic profit

Supply Curve, Part 6

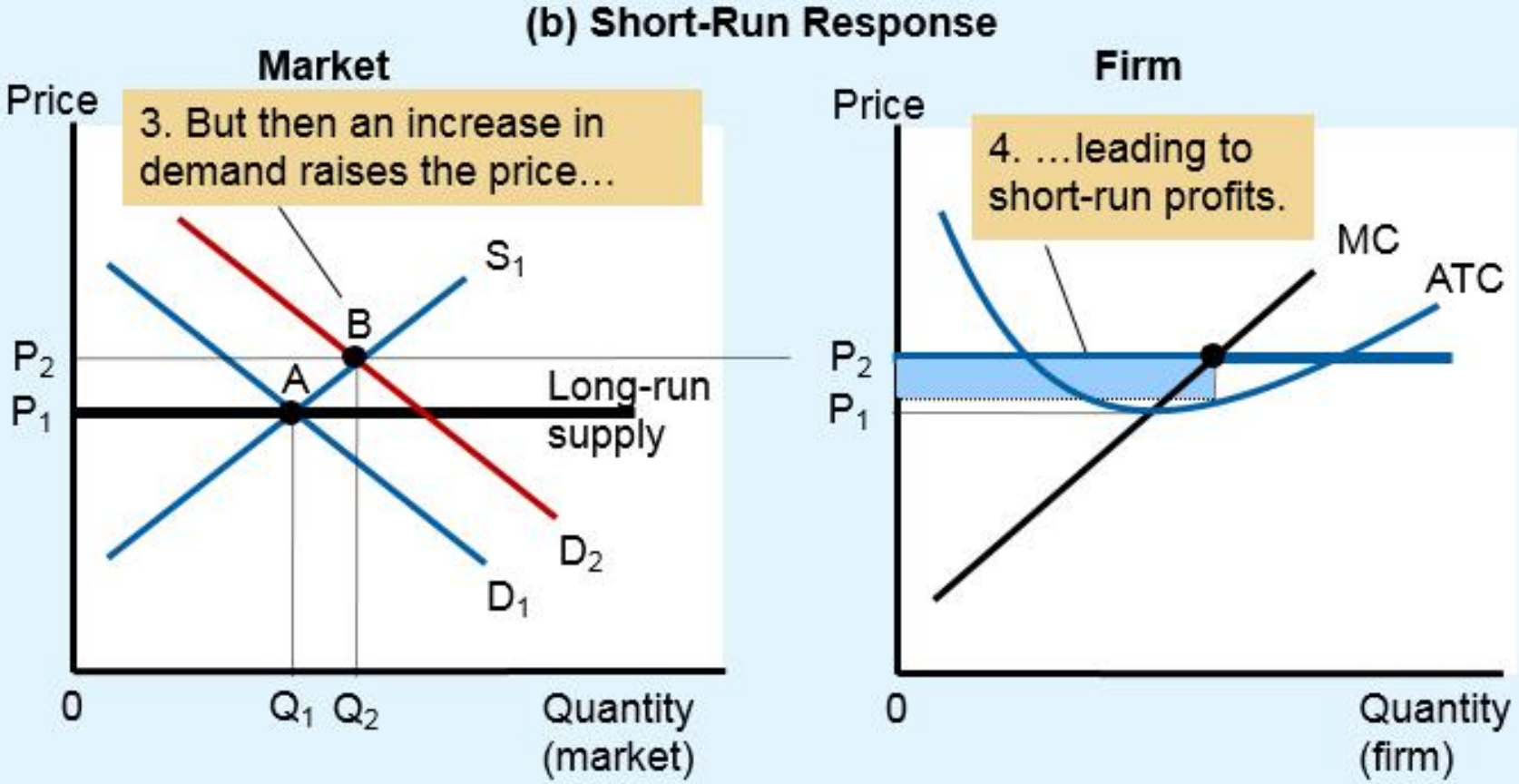
- Positive economic profit in short run
  - Long run – firms enter the market
  - Short run supply curve – shifts right
  - Price – decreases back to minimum ATC
  - Quantity – increases
    - Because there are more firms in the market
  - Efficient scale

Figure 8 An Increase in Demand in the Short Run and Long Run (a)



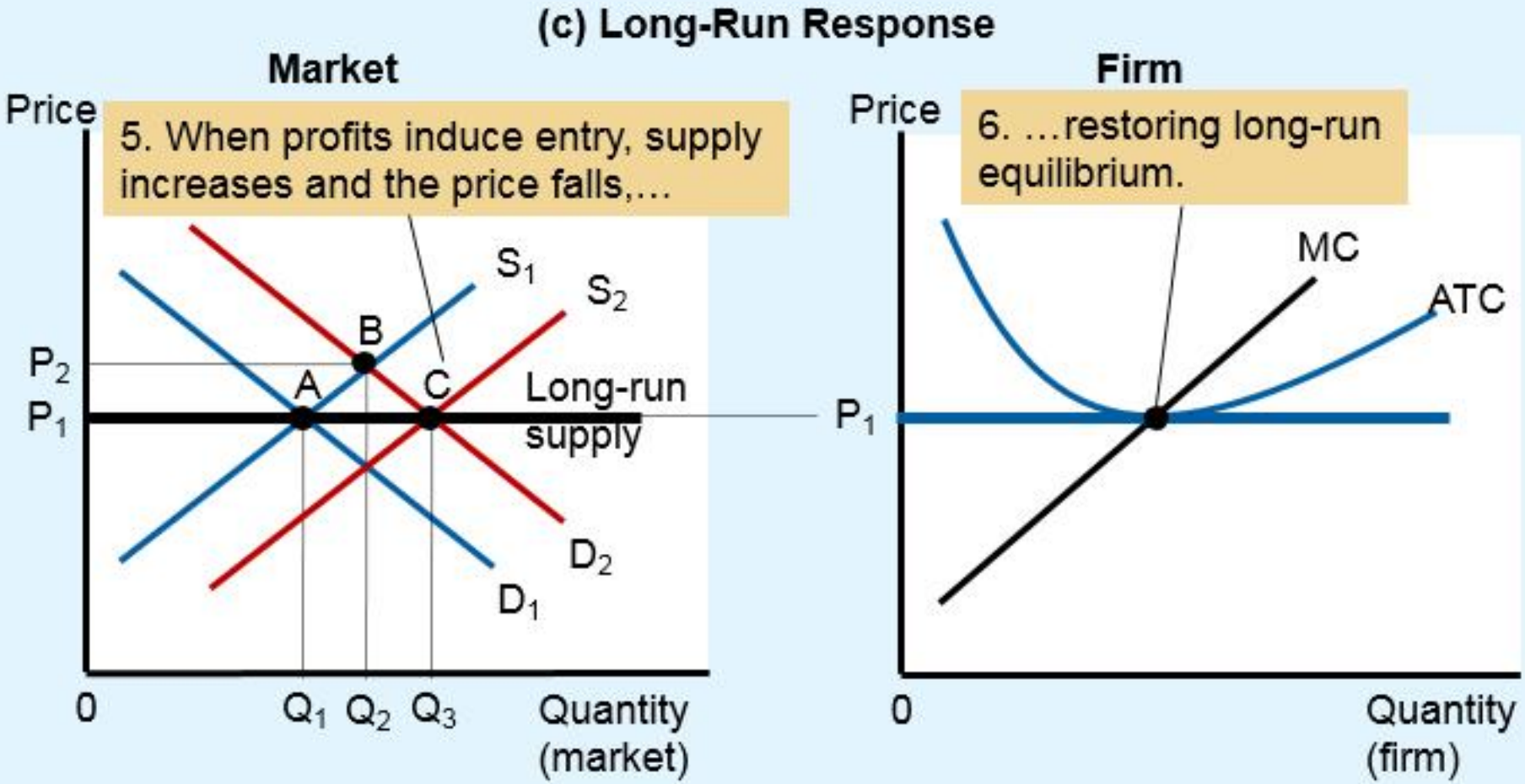
The market starts in a long-run equilibrium, shown as point A in panel (a). In this equilibrium, each firm makes zero profit, and the price equals the minimum average total cost.

Figure 8 An Increase in Demand in the Short Run and Long Run (b)



Panel (b) shows what happens in the short run when demand rises from D_1 to D_2. The equilibrium goes from point A to point B, price rises from P_1 to P_2, and the quantity sold in the market rises from Q_1 to Q_2. Because price now exceeds average total cost, each firm now makes a profit, which over time encourages new firms to enter the market.

Figure 8 An Increase in Demand in the Short Run and Long Run (c)



This entry shifts the short-run supply curve to the right from S_1 to S_2, as shown in panel (c). In the new long-run equilibrium, point C, price has returned to P_1 but the quantity sold has increased to Q_3. Profits are again zero, and price is back to the minimum of average total cost, but the market has more firms to satisfy the greater demand.

Supply Curve, Part 7

- Long-run supply curve might slope upward
  - Some resource used in production may be available only in limited quantities
    - Increase in quantity supplied – increase in costs – increase in price
  - Firms may have different costs
    - Some firms earn profit even in the long run
- Long-run supply curve
  - More elastic than short-run supply curve