

## >> **Perfect Competition and The Supply Curve**

**Krugman/Wells  
Economics**

# WHAT YOU WILL LEARN IN THIS CHAPTER

- What a **perfectly competitive market** is and the characteristics of a **perfectly competitive industry**
- How a **price-taking producer** determines its profit-maximizing quantity of output
- How to assess whether or not a producer is profitable and why an unprofitable producer may continue to operate in the short run
- Why industries behave differently in the short run and the long run
- What determines the **industry supply curve** in both the short run and the long run

# Perfect Competition

- A **price-taking producer** is a producer whose actions have no effect on the market price of the good it sells.
- A **price-taking consumer** is a consumer whose actions have no effect on the market price of the good he or she buys.
- A **perfectly competitive market** is a market in which all market participants are price-takers.
- A **perfectly competitive industry** is an industry in which producers are price-takers.

# Two Necessary Conditions for Perfect Competition

- 1) For an industry to be perfectly competitive, it must contain many producers, none of whom have a large **market share**.
  - A producer's **market share** is the fraction of the total industry output accounted for by that producer's output.
  
- 2) An industry can be perfectly competitive only if consumers regard the products of all producers as equivalent.
  - A good is a **standardized product**, also known as a **commodity**, when consumers regard the products of different producers as the same good.

# Free Entry and Exit

- There is **free entry and exit** into and from an industry when new producers can easily enter into or leave that industry.
- Free entry and exit ensure:
  - that the number of producers in an industry can adjust to changing market conditions, and,
  - that producers in an industry cannot artificially keep other firms out.

# Production and Profits

## Profit for Jennifer and Jason's Farm When Market Price Is \$18

Quantity of tomatoes $Q$ (bushels)	Total revenue of output $TR$	Total cost of output $TC$	Profit $TR - TC$
0	\$0	\$14	\$-14
1	18	30	-12
2	36	36	0
3	54	44	10
4	72	56	16
5	90	72	18
6	108	92	16
7	126	116	10

# Using Marginal Analysis to Choose the Profit-Maximizing Quantity of Output

- **Marginal revenue** is the change in total revenue generated by an additional unit of output.

$$\text{Marginal revenue} = \frac{\text{Change in total revenue}}{\text{Change in output}} = \text{Change in total revenue generated by one additional unit of output}$$

$$\mathbf{MR = \Delta TR / \Delta Q}$$

# The Optimal Output Rule

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- The **optimal output rule** says that profit is maximized by producing the quantity of output at which the marginal cost of the last unit produced is equal to its marginal revenue.



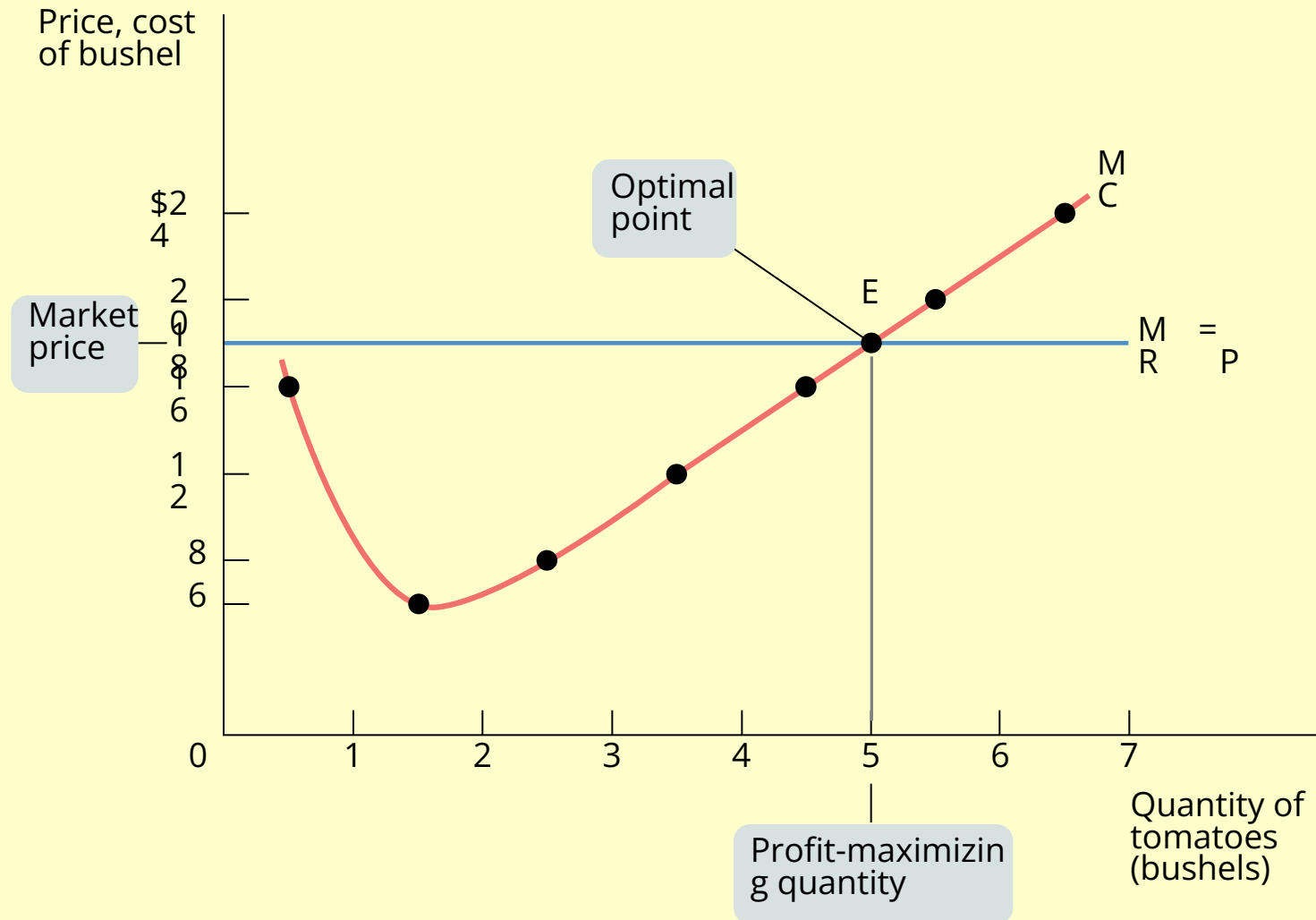
# Short-Run Costs for Jennifer and Jason's Farm

Quantity of tomatoes $Q$ (bushels)	Variable cost of output $VC$	Total cost of output $TC$	Marginal cost of bushel $MC = \Delta TC / \Delta Q$	Marginal revenue of bushel	Net gain of bushel = $MR - MC$
0	\$0	\$14			
1	16	30	\$16	\$18	\$2
2	22	36	6	18	12
3	30	44	8	18	10
4	42	56	12	18	6
5	58	72	16	18	2
6	78	92	20	18	-2
7	102	116	24	18	-6

# Marginal Analysis Leads to Profit-Maximizing Quantity of Output

- The **price-taking firm's optimal output rule** says that a price-taking firm's profit is maximized by producing the quantity of output at which the marginal cost of the last unit produced is equal to the market price.
- The **marginal revenue curve** shows how marginal revenue varies as output varies.

# The Price-Taking Firm's Profit-Maximizing Quantity of Output



# When Is Production Profitable?

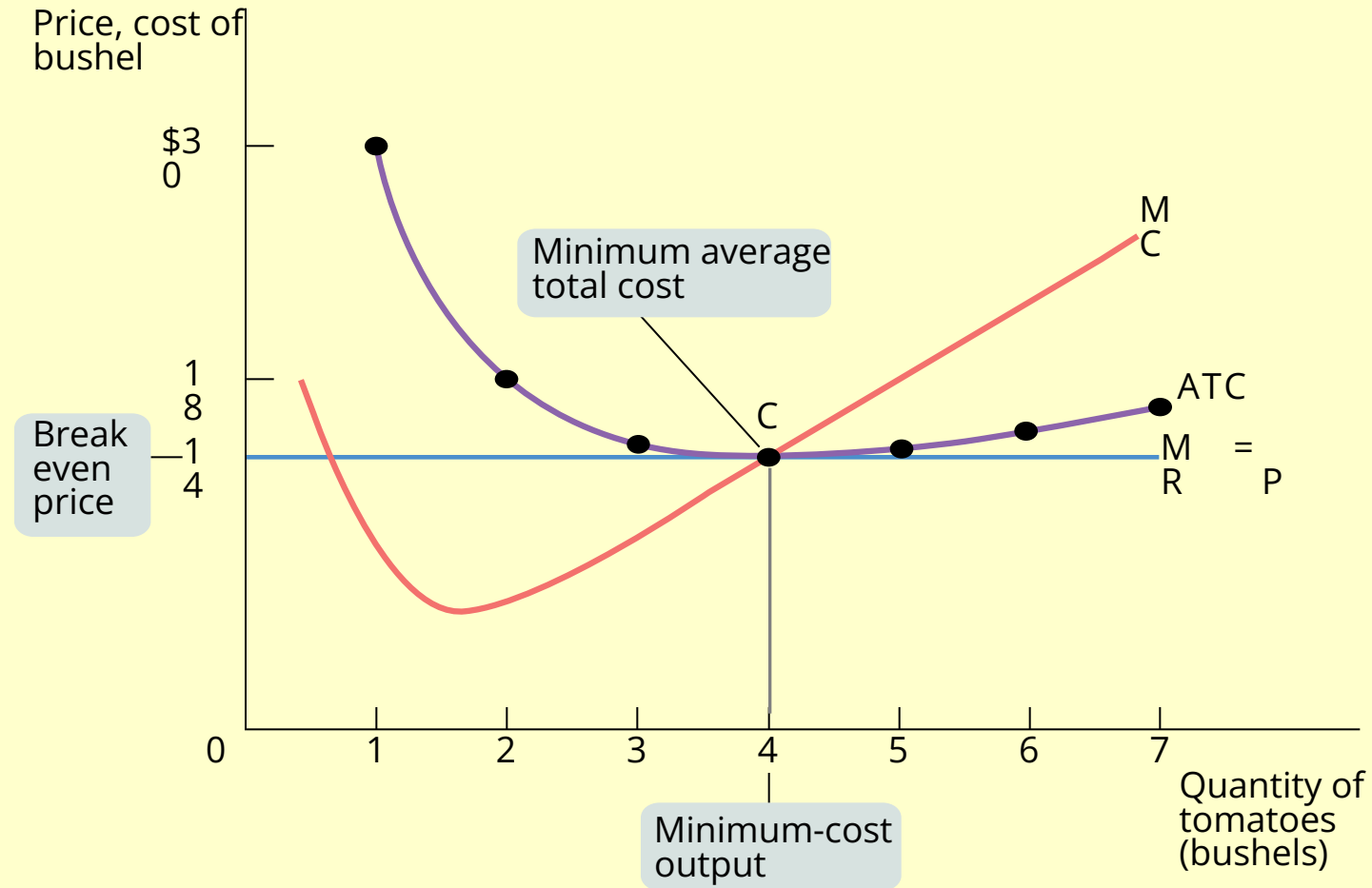
- If  $TR > TC$ , the firm is *profitable*.
- If  $TR = TC$ , the firm *breaks even*.
- If  $TR < TC$ , the firm *incurs a loss*.

# Short-Run Average Costs

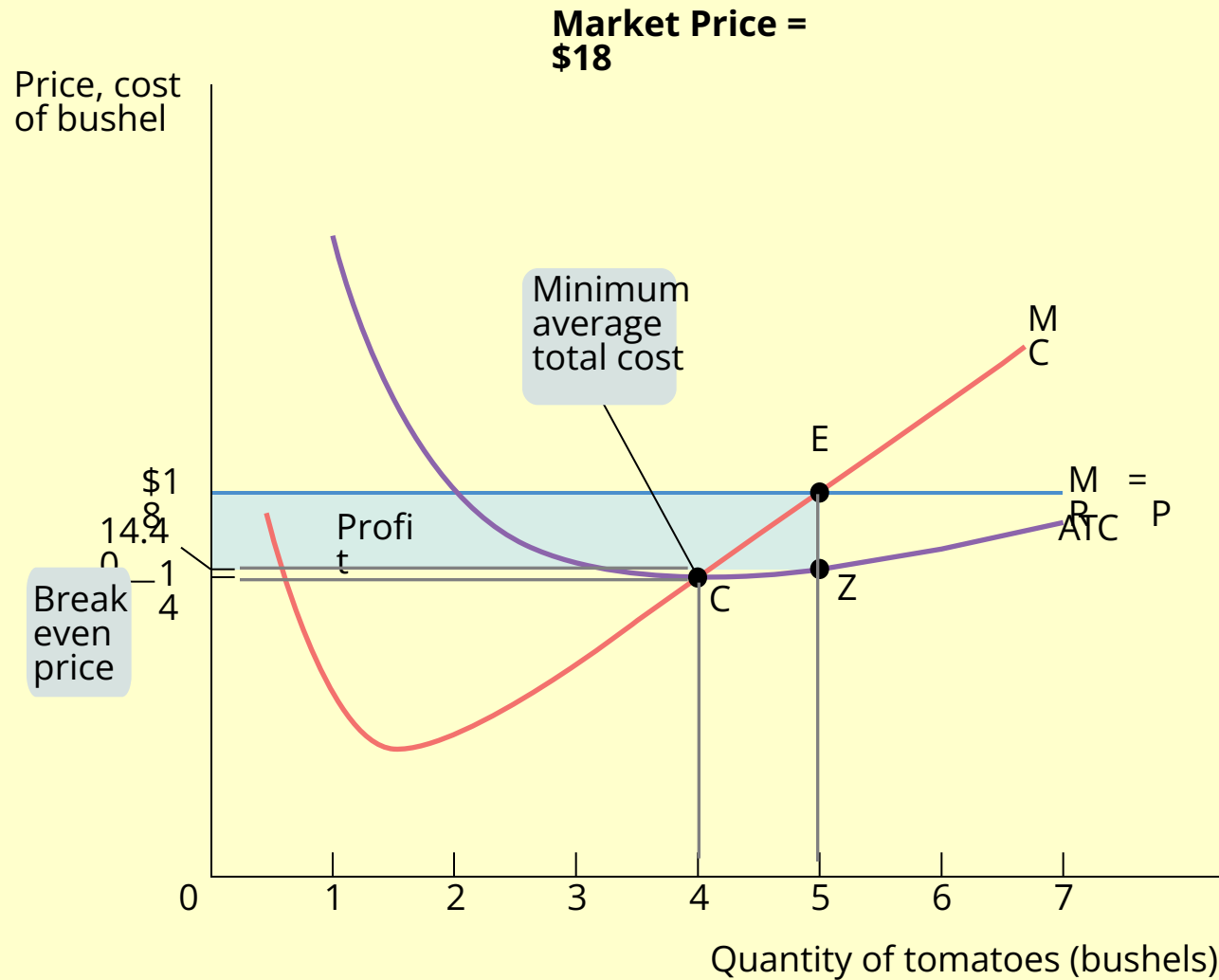
## Short-Run Average Costs for Jennifer and Jason's Farm

Quantity of tomatoes $Q$ (bushels)	Variable cost $VC$	Total cost $TC$	Short-run average variable cost of bushel $AVC = VC/Q$	Short-run average total cost of bushel $ATC = TC/Q$
1	\$16.00	\$30.00	\$16.00	\$30.00
2	22.00	36.00	11.00	18.00
3	30.00	44.00	10.00	14.67
4	42.00	56.00	10.50	14.00
5	58.00	72.00	11.60	14.40
6	78.00	92.00	13.00	15.33
7	102.00	116.00	14.57	16.57

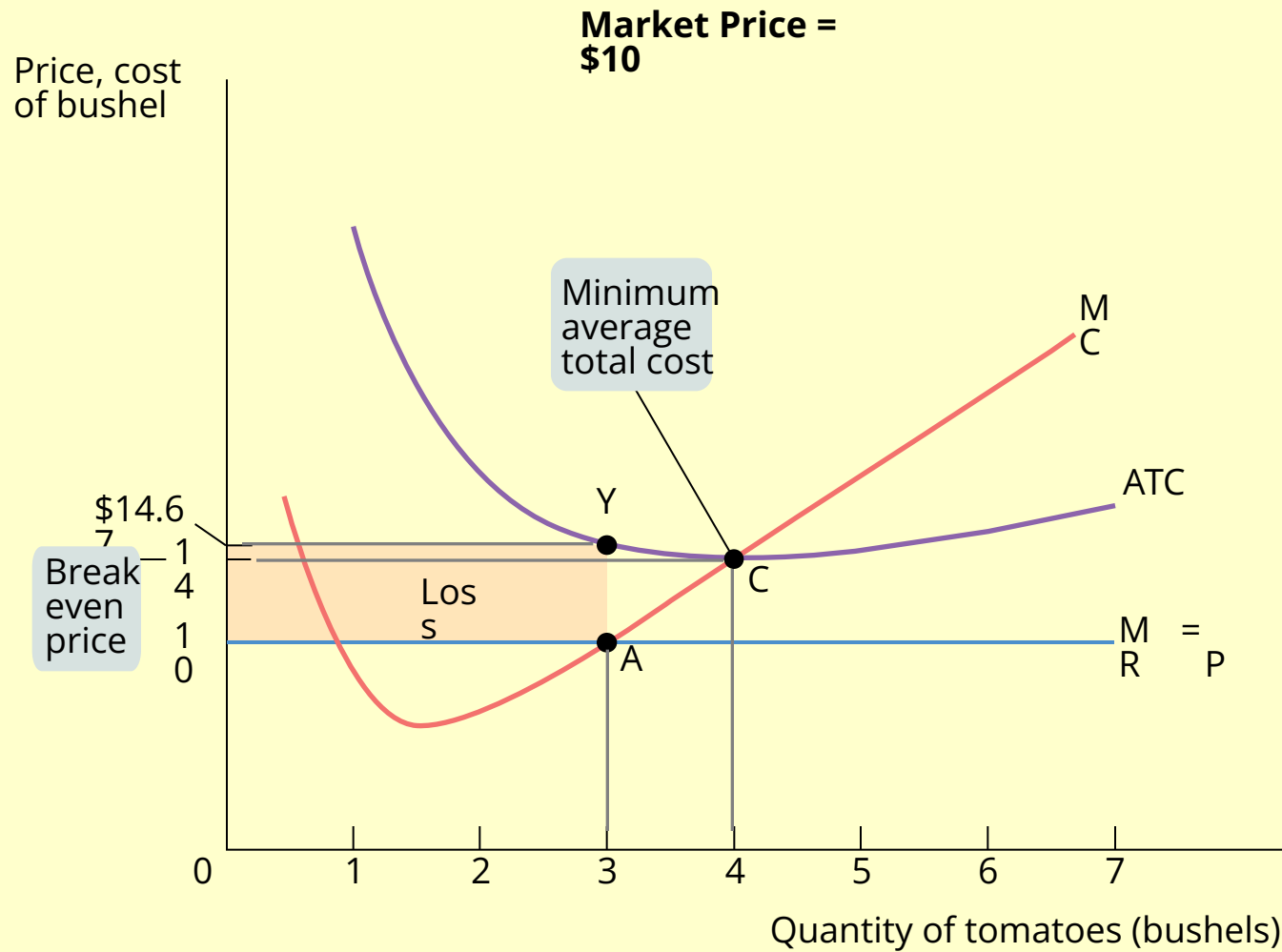
# Costs and Production in the Short Run



# Profitability and the Market Price



# Profitability and the Market Price

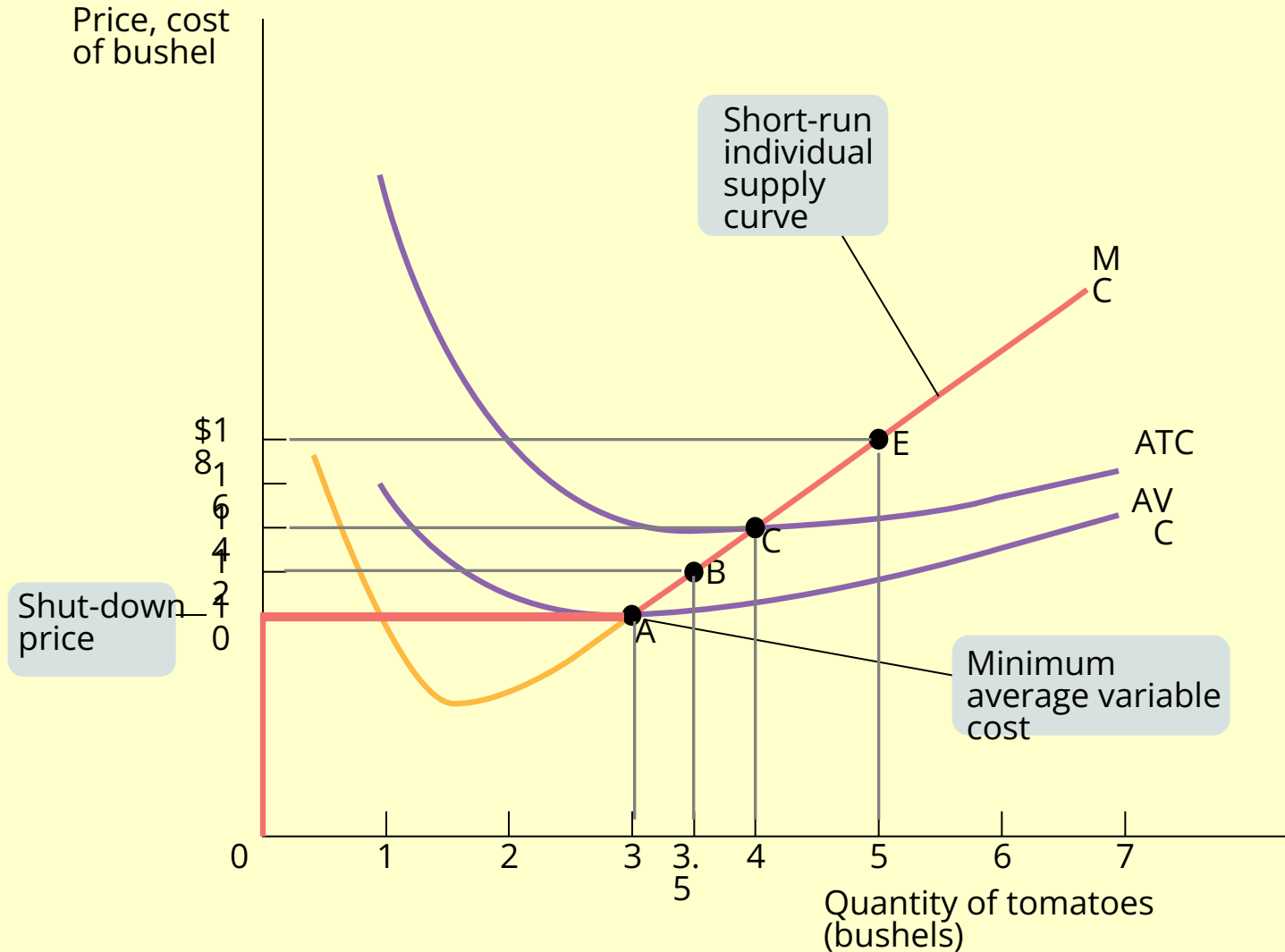




# Profit, Break-Even or Loss

- The **break-even price** of a price-taking firm is the market price at which it earns zero profits.
- Whenever market price exceeds minimum average total cost, the producer is profitable.
- Whenever the market price equals minimum average total cost, the producer breaks even.
- Whenever market price is less than minimum average total cost, the producer is unprofitable.

# The Short-Run Individual Supply Curve



# Summary of the Competitive Firm's Profitability and Production Conditions

<b>Profitability Condition</b> (minimum $ATC$ = break-even price)	<b>Result</b>
$P > \text{minimum } ATC$	Firm profitable. Entry into industry in the long run.
$P = \text{minimum } ATC$	Firm breaks even. No entry into or exit from industry in the long run.
$P < \text{minimum } ATC$	Firm unprofitable. Exit from industry in the long run.
<b>Production Condition</b> (minimum $AVC$ = shut-down price)	<b>Result</b>
$P > \text{minimum } AVC$	Firm produces in the short run. If $P < \text{minimum } ATC$ , firm covers variable cost and some but not all of fixed cost. If $P > \text{minimum } ATC$ , firm covers all variable cost and fixed cost.
$P = \text{minimum } AVC$	Firm indifferent between producing in the short run or not. Just covers variable cost.
$P < \text{minimum } AVC$	Firm shuts down in the short run. Does not cover variable cost.

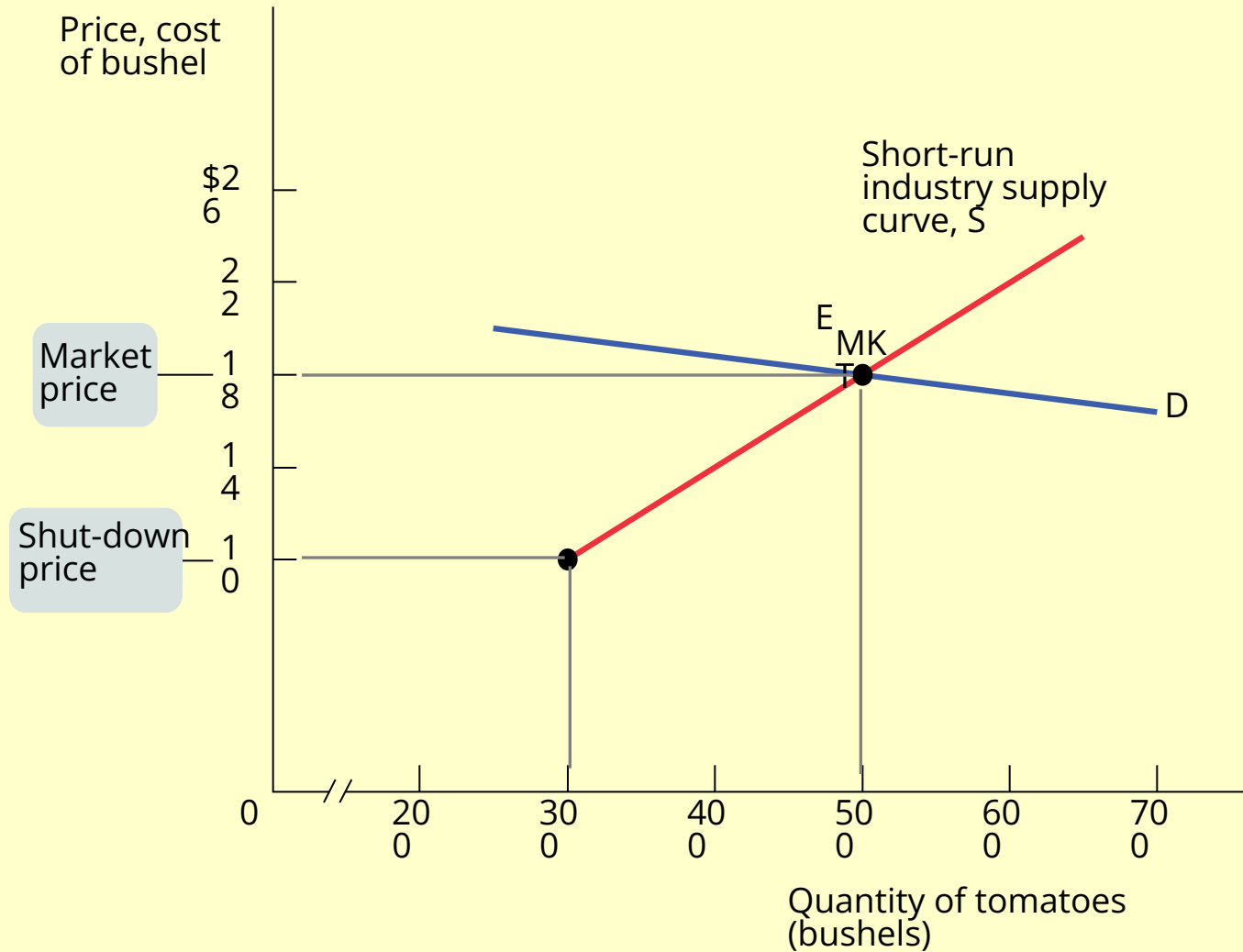
# Industry Supply Curve

- The **industry supply curve** shows the relationship between the price of a good and the total output of the industry as a whole.
- The short-run industry supply curve shows how the quantity supplied by an industry depends on the market price given a fixed number of producers.
- There is a **short-run market equilibrium** when the quantity supplied equals the quantity demanded, taking the number of producers as given.

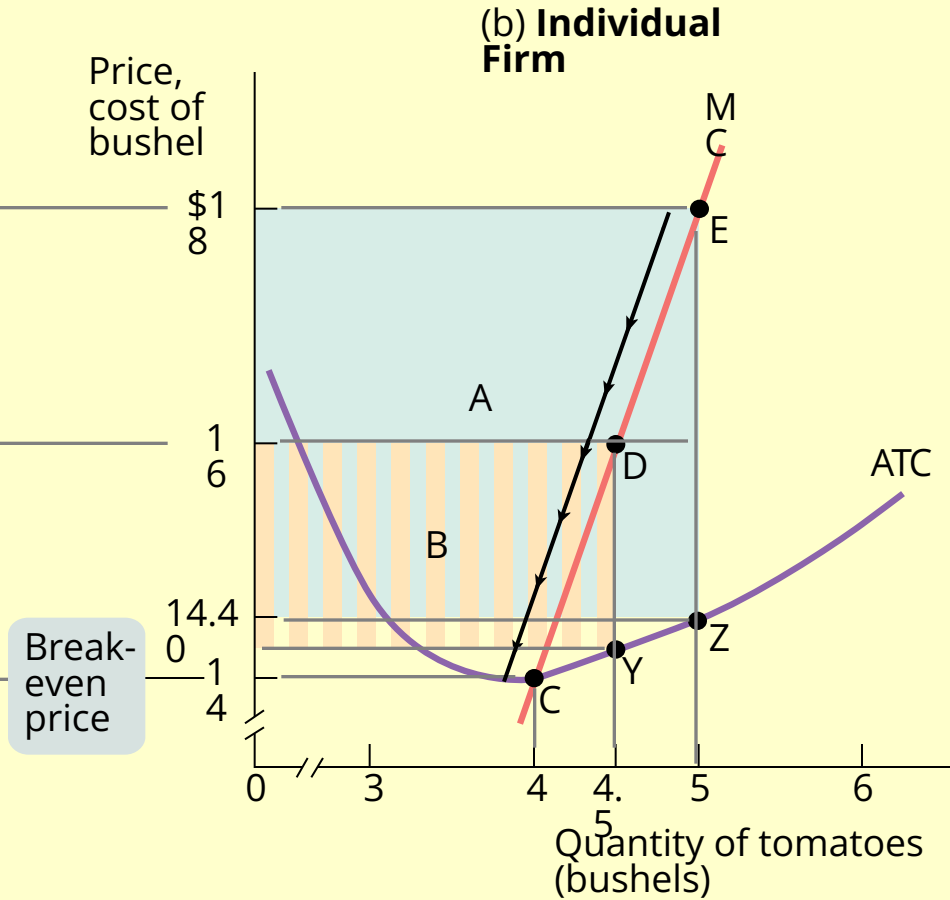
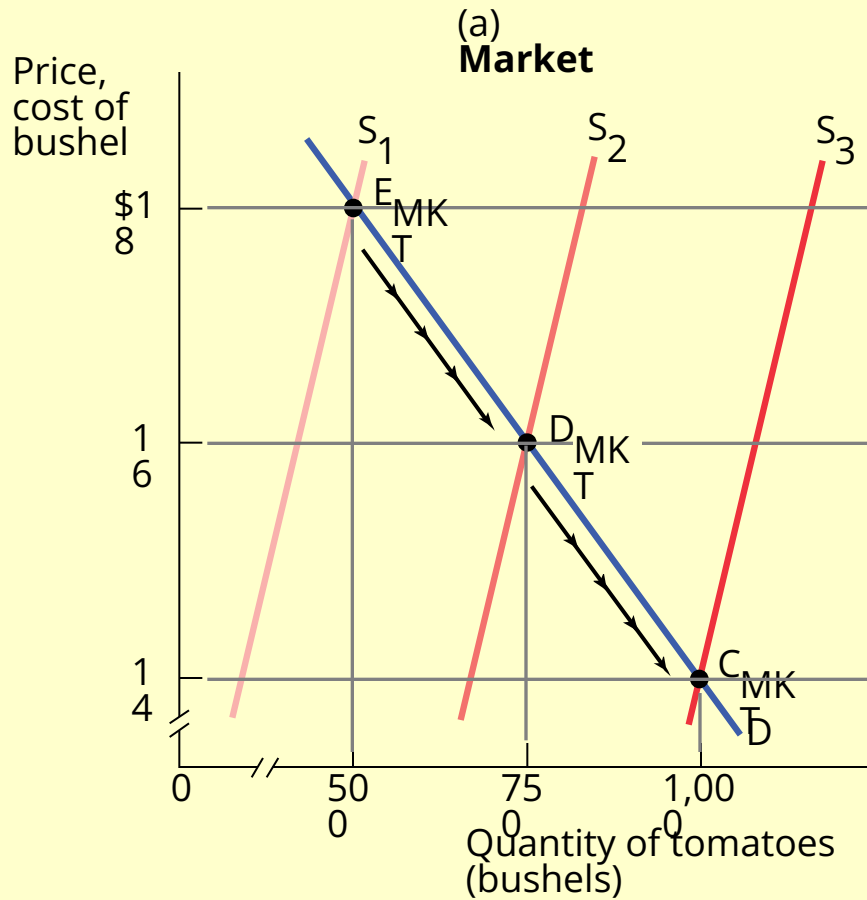
# The Long-Run Industry Supply Curve

- A market is in **long-run market equilibrium** when the quantity supplied equals the quantity demanded, given that sufficient time has elapsed for entry into and exit from the industry to occur.

# The Short-Run Market Equilibrium



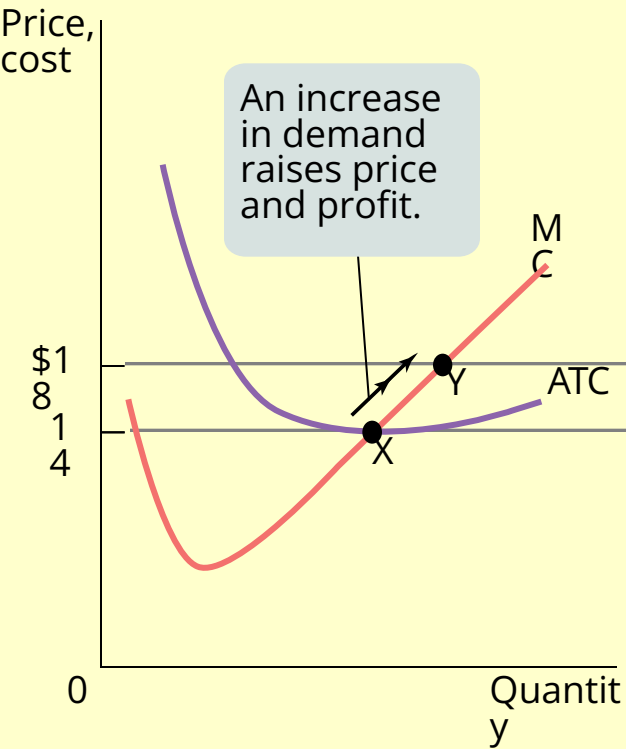
# The Long-Run Market Equilibrium



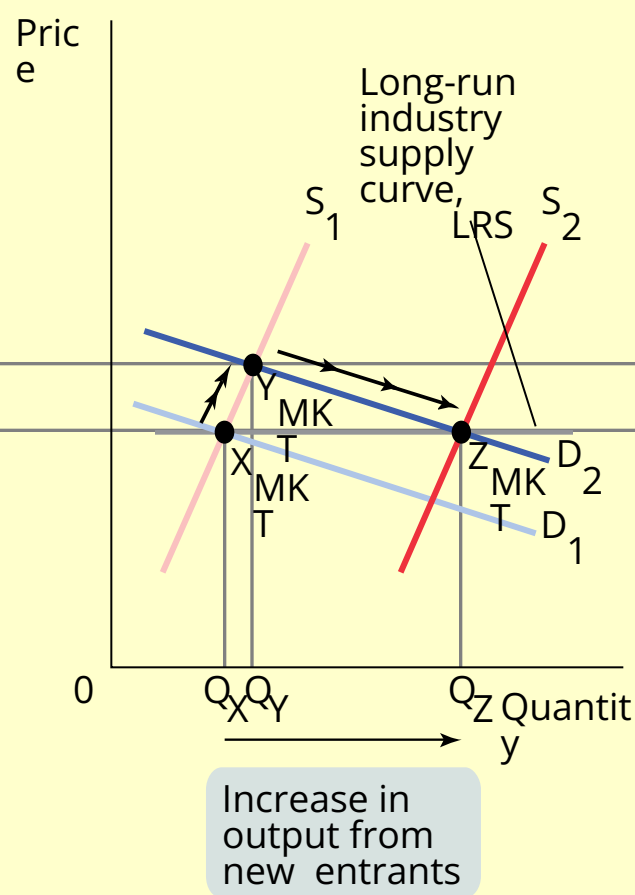
Break-even price

# The Effect of an Increase in Demand in the Short Run and the Long Run

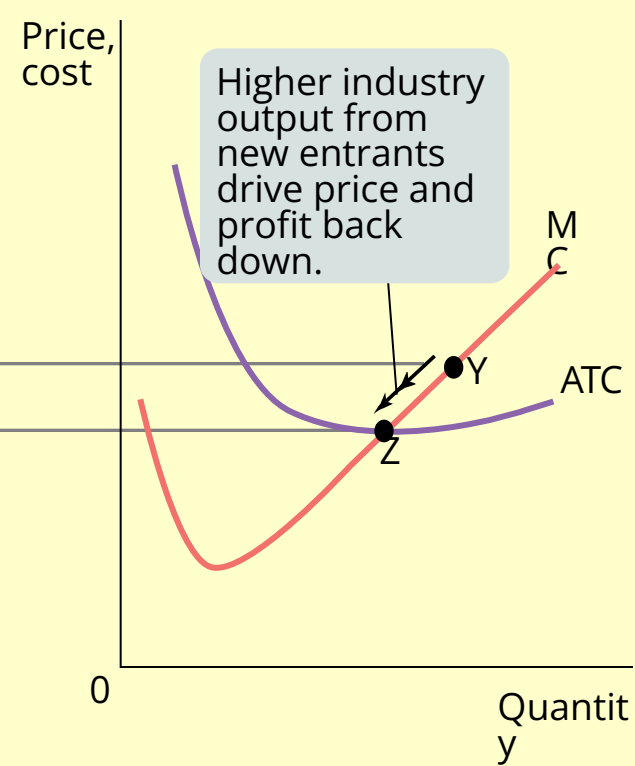
(a) Existing Firm Response to Increase in Demand



(b) Short-Run and Long-Run Market Response to Increase in Demand

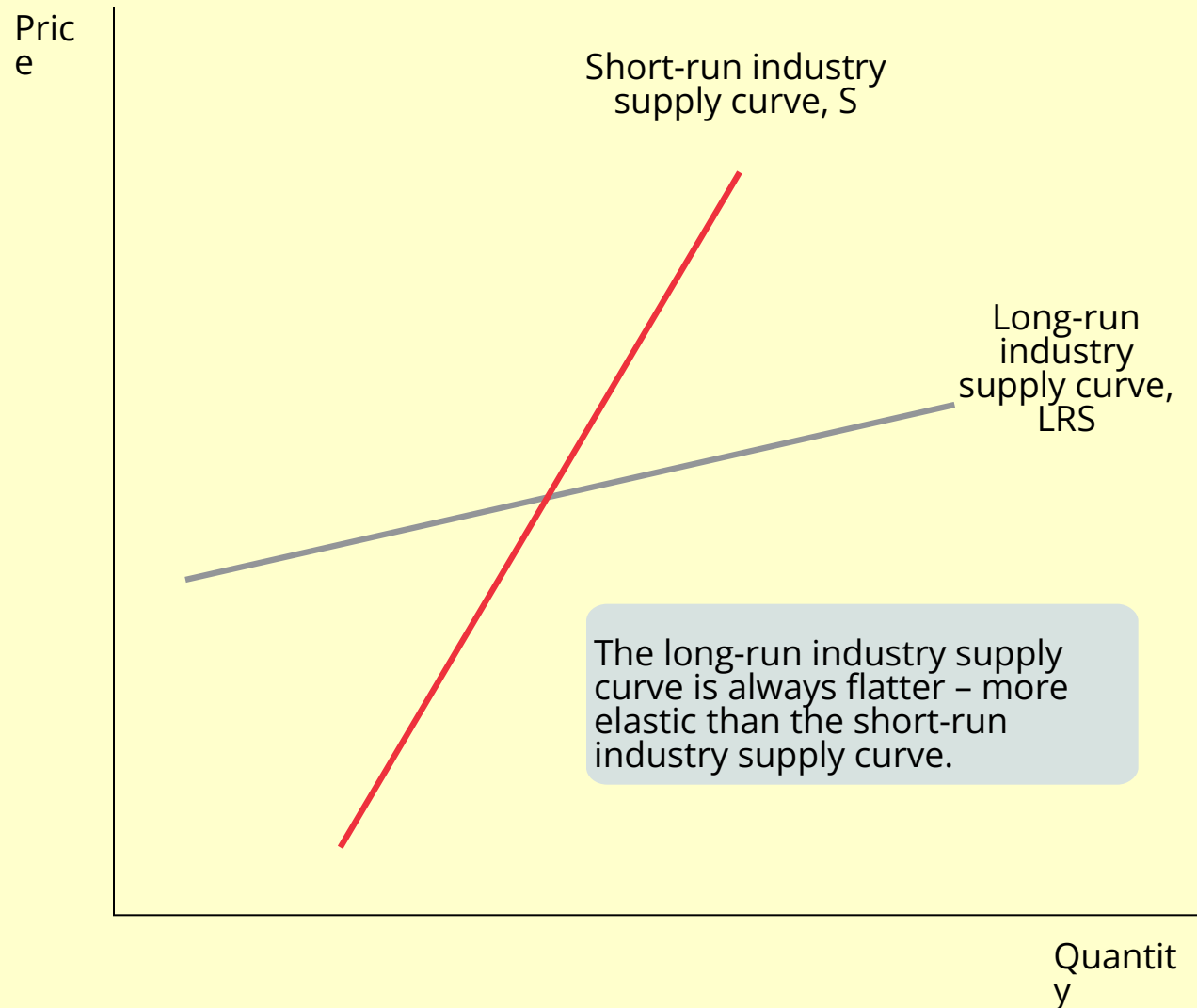


(a) Existing Firm Response to New Entrants





# Comparing the Short-Run and Long-Run Industry Supply Curves



# Conclusions

- Three conclusions about the cost of production and efficiency in the long-run equilibrium of a perfectly competitive industry:
  - In a perfectly competitive industry in equilibrium, the value of marginal cost is the same for all firms.
  - In a perfectly competitive industry with free entry and exit, each firm will have zero economic profits in long-run equilibrium.
  - The long-run market equilibrium of a perfectly competitive industry is efficient: no mutually beneficial transactions go unexploited.

## SUMMARY

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1. In a **perfectly competitive market** all producers are **price-taking producers** and all consumers are **price-taking consumers**.
2. There are two necessary conditions for a perfectly competitive industry: there are many producers, none of whom have a large **market share**, and the industry produces a **standardized product** or **commodity**. A third condition is often satisfied as well: **free entry and exit** into and from the industry.

## SUMMARY

3. A producer chooses output according to the **optimal output rule**: produce the quantity at which **marginal revenue** equals marginal cost. For a price-taking firm, marginal revenue is equal to price and its **marginal revenue curve** is a horizontal line at the market price. It chooses output according to the **price-taking firm's optimal output rule**: produce the quantity at which price equals marginal cost.
4. A firm is profitable if total revenue exceeds total cost or, equivalently, if the market price exceeds its **break-even price**—minimum average total cost.

## SUMMARY

5. Fixed cost is irrelevant to the firm's optimal short-run production decision, which depends on its **shut-down price**—its minimum average variable cost—and the market price. When the market price is equal to or exceeds the shut-down price, the firm produces the output quantity where marginal cost equals the market price. When the market price falls below the shut-down price, the firm ceases production in the short run. This generates the firm's **short-run individual supply curve**.
6. Fixed cost matters over time. If the market price is below minimum average total cost for an extended period of time, firms will exit the industry in the long run. If above, existing firms are profitable and new firms will enter the industry in the long run.

## SUMMARY

7. The **industry supply curve** depends on the time period. The **short-run industry supply curve** is the industry supply curve given that the number of firms is fixed. The **short-run market equilibrium** is given by the intersection of the short-run industry supply curve and the demand curve.
8. The **long-run industry supply curve** is the industry supply curve given sufficient time for entry into and exit from the industry. In the **long-run market equilibrium**—given by the intersection of the long-run industry supply curve and the demand curve—no producer has an incentive to enter or exit. The long-run industry supply curve is often horizontal. It may slope upward if there is limited supply of an input. It is always more elastic than the short-run industry supply curve.

## SUMMARY

9. In the long-run market equilibrium of a competitive industry, profit maximization leads each firm to produce at the same marginal cost, which is equal to market price. Free entry and exit means that each firm earns zero economic profit—producing the output corresponding to its minimum average total cost. So the total cost of production of an industry's output is minimized. The outcome is efficient because every consumer with a willingness to pay greater than or equal to marginal cost gets the good.