

Previously

Costs are defined in a number of ways, but marginal cost plays the most crucial role in a firm's cost structure

The MC curve always leads the ATC and AVC curves, and the Average follows the Marginal cost.

Long run costs are a reflection of scale: Economies of Scale, Diseconomies of Scale, and Constant Return to Scale.

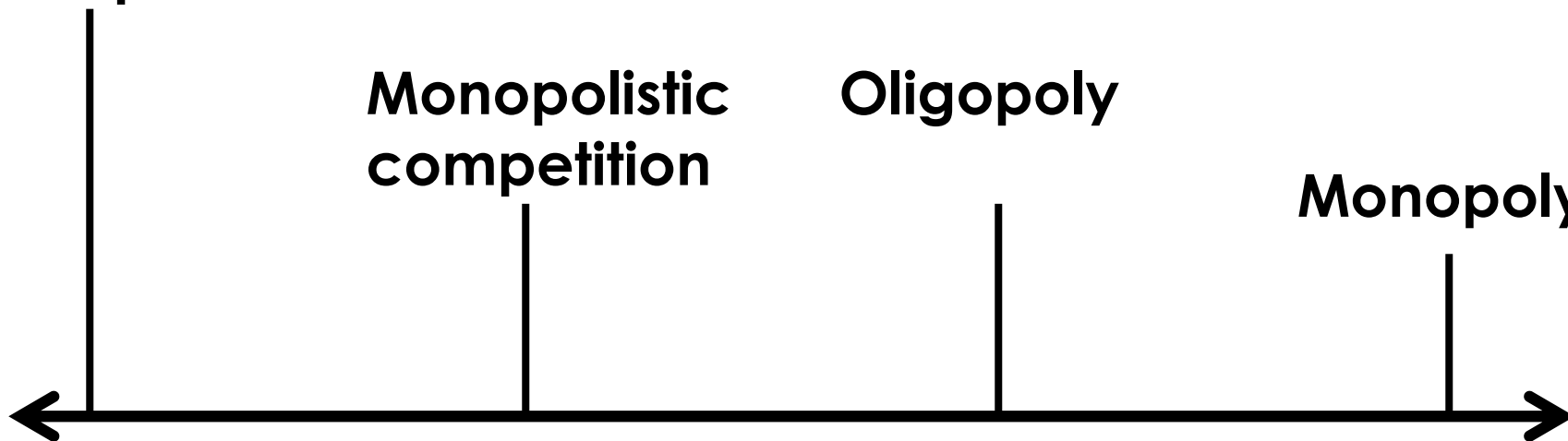
The Landscape of Firms

**Perfect
competition**

**Monopolistic
competition**

Oligopoly

Monopoly



*More competition
(less price control)*

*Less competition
(more price control)*

Big Questions

- › How do firms in the competitive market maximize profits?
- › Why an unprofitable producer may continue to operate in the short run
- › How do competitive markets work?
- › What are the characteristics of a competitive market?

Competitive Markets

Competitive markets

Many buyers and sellers

Similar (if not identical) goods

Free entry and exit

Firms are price takers

Price taker

Has no control over the market price

“takes” the price as given







Which of the following markets is likely to be the most competitive?

- a) Cable television**
- b) Automobiles and trucks**
- c) Oil refining**
- d) Farm commodities**

Active Learning: Practice



Example	How It Works	Reality Check
Stock market 	Buyers and sellers have real-time information about prices. Most of the traders make up only a small share of the market.	Some large institutional investors, buyers, can be very big, that they are influential to the market price.
Farmer's markets 	Sellers are free to come and go, many buyers are also present. The market price for similar products will converge to a single price.	In reality, there are usually not too many sellers in the market, so they usually sell price higher.

Market Share:

HHI: Hirschman-Herfindahl Index

HHI <100:	Highly Competitive
HHI < 1,000:	Competitive, unconcentrated
HHI between 1,000 – 1,800:	Moderately Competitive
HHI above 1,800:	High concentration (Oligopoly, Monopoly)
HHI closed to 10,000:	Monopoly

1) An industry with only 3 firms and their market shares are 60%, 25%, and 15%;

$$\text{HHI} = 60^2 + 25^2 + 15^2 = 4,450$$

2) An industry with only 1 firm (Monopoly):

$$\text{HHI} = 10,000$$

3) An industry with 100 firms, let's say each firm has 1% market share:

$$\text{HHI} = 100$$

4) An industry with 200 firms, let's say each firm is identical and has 0.5% market share. HHI = ?

Production and Profits

Each firm's **total revenue** will be equal to *price × quantity sold*, or

$$TR = P \times Q$$

And **Profit** = *total revenue – total cost*, or

$$\text{Profit} = TR - TC$$



But there is another way to think about it... using the optimizing rule:

$$MR = MC$$

Marginal revenue: change in total revenue generated by an additional unit of output.

$$MR = \Delta TR / \Delta Q$$

And, as you recall,

$$MC = \Delta TC / \Delta Q = \Delta VC / \Delta Q$$

Production and Profits

Maximum Profit: when the highest difference between TR and TC

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

Profit is highest at $Q = 5$, which is also the point where marginal cost = marginal revenue.

Short-Run Costs for Jennifer and Jason's Farm

Maximum Profit: when $MR = MC$

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

Optimal Output Rule: $MR=MC$

Why is profit maximized where $MR = MC$?

If $MR > MC$

The firm can increase profits by producing more Q

If $MR < MC$

The firm has produced “too much” Q , and profits are not maximized

For competitive firms: $MR = P$

(competitive firms are “price-taker” – not “price-setter”)

The profit-maximizing rule is: (from $MR=MC$)

Choose the quantity of output where $P = MC$

When Is Production Profitable?

$$\text{Profit} = TR - TC = (\textcolor{red}{TR}/Q - \textcolor{blue}{TC}/Q) \times Q$$

or

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

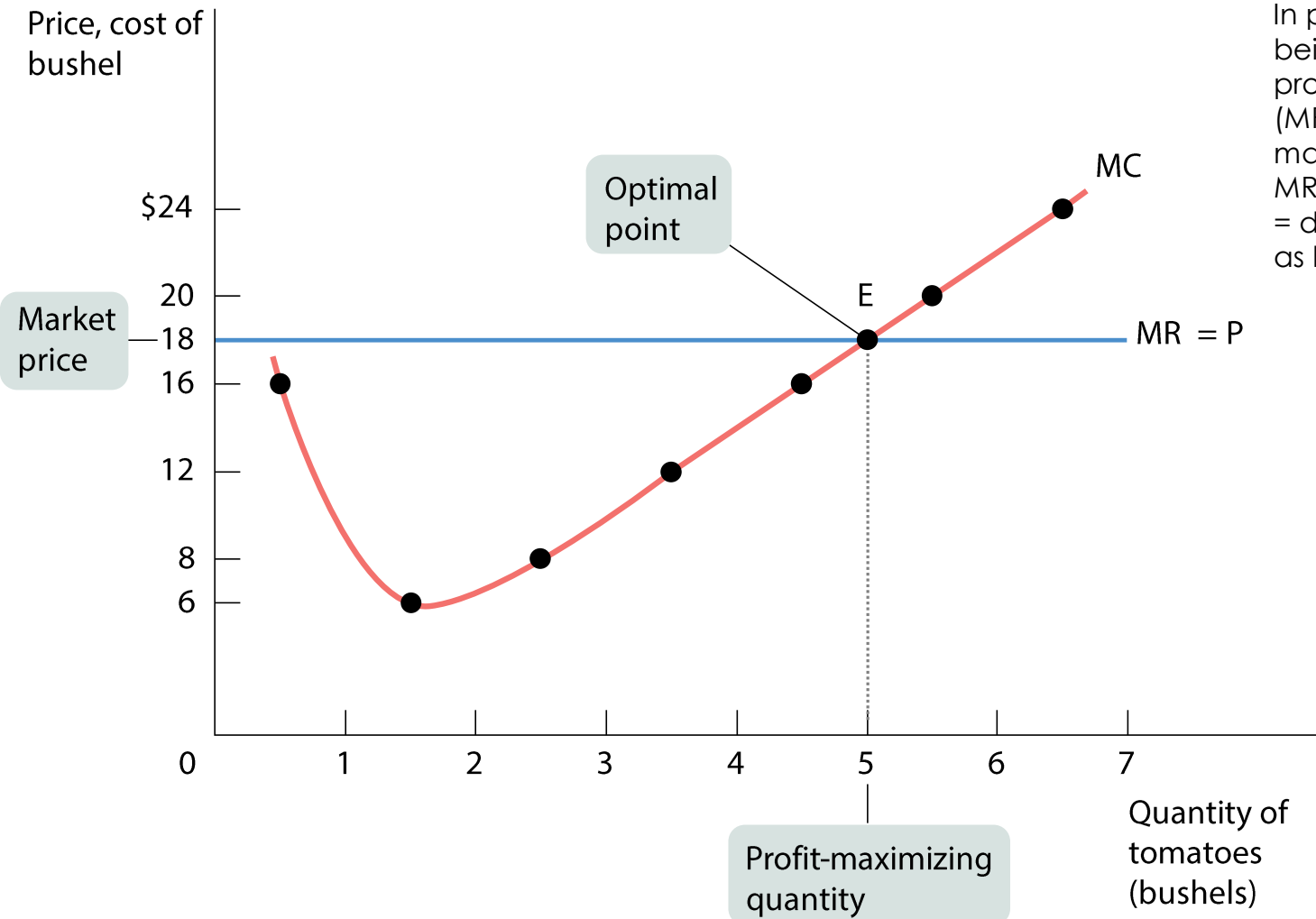
*Recall we are using economic profit (not “accounting profit”), which includes implicit costs.

If $TR > TC$, the firm is *profitable*.

If $TR = TC$, the firm *breaks even*.

If $TR < TC$, the firm *incurs a loss*.

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



In perfect competition market, being a price-taker, the producer's marginal revenue (MR) equals to P (Price) in the market. Graphically, the firm's $MR=P$ (which is also equal to D = demand curve) is described as horizontal line.

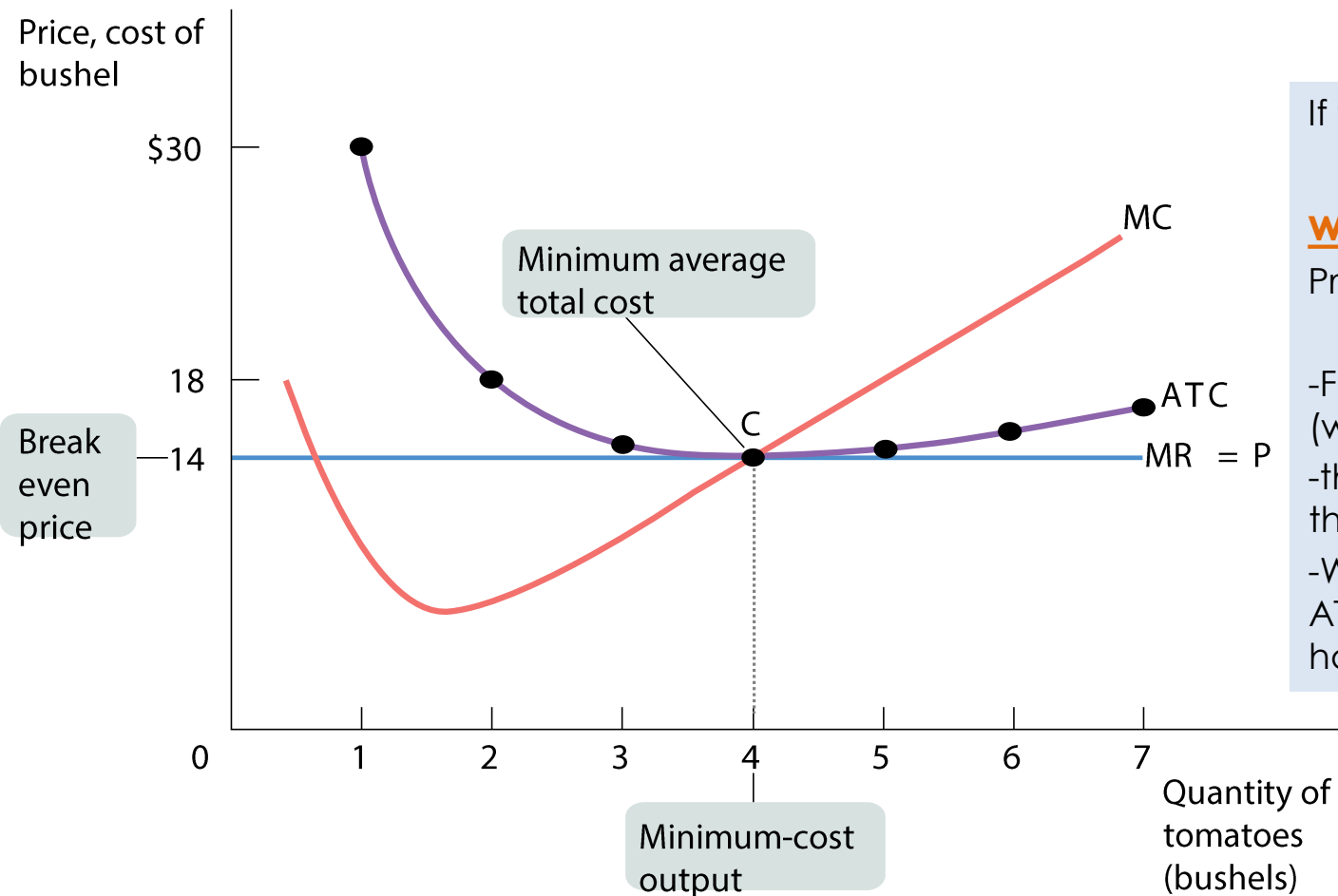
1) WHAT IF MARGINAL REVENUE AND MARGINAL COST AREN'T EXACTLY EQUAL?

Choose the closest point of $MR=MC$, as long as MR is slightly higher than MC

2) WHAT IF THERE ARE TWO POINTS WHERE MARGINAL REVENUE AND MARGINAL COST?

Choose the higher Q , where $MR=MC$

BREAK EVEN: when $TR=TC$ or when $P=ATC$



If the market price is \$14:

what is the profit?

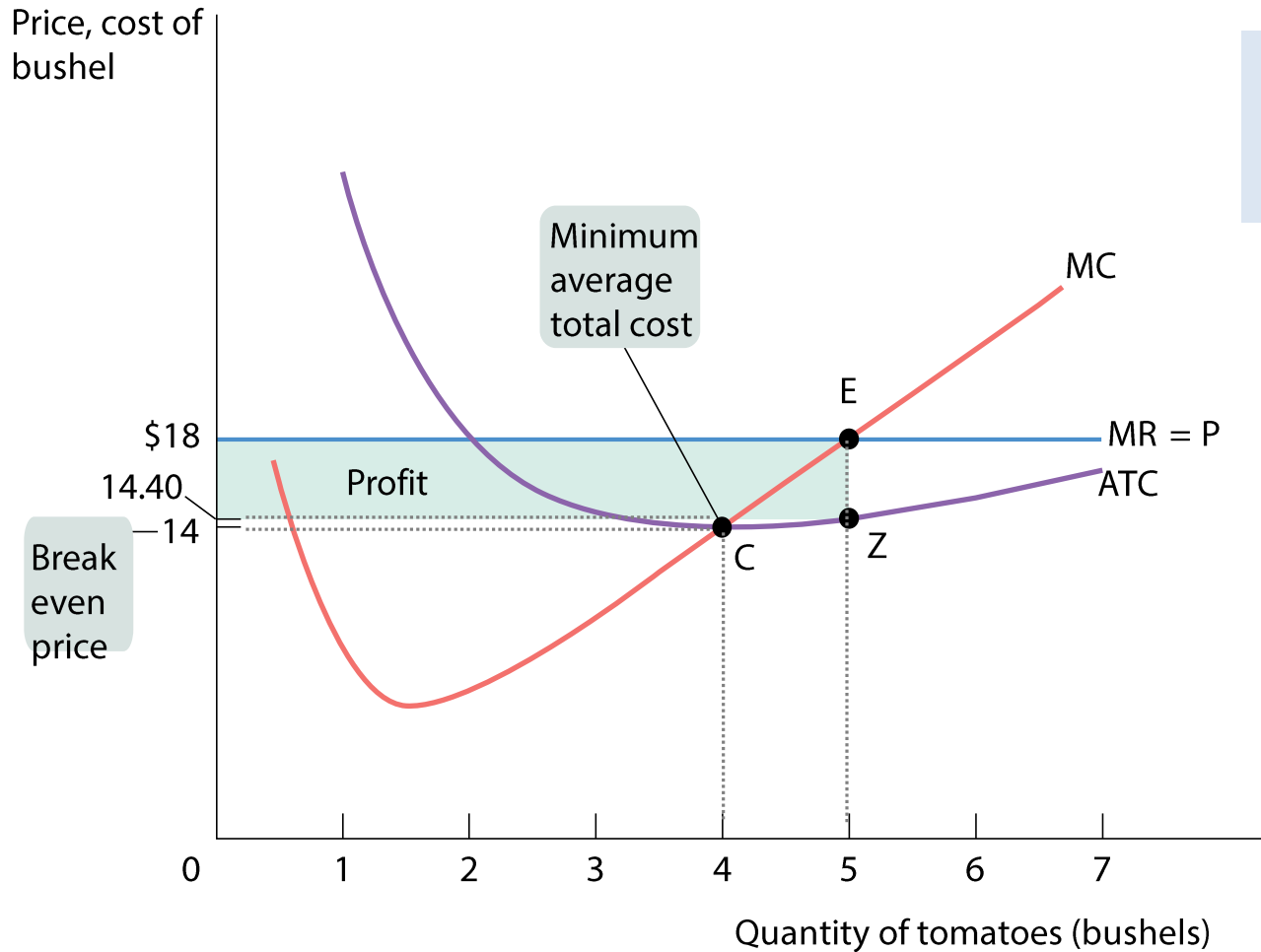
$$\text{Profit} = (P - ATC) \times Q$$

- First determine the Q^* (when $MR=MC$),
- then locate the ATC at that Q^*
- When the Price equals to ATC minimum point, we have a "break even"

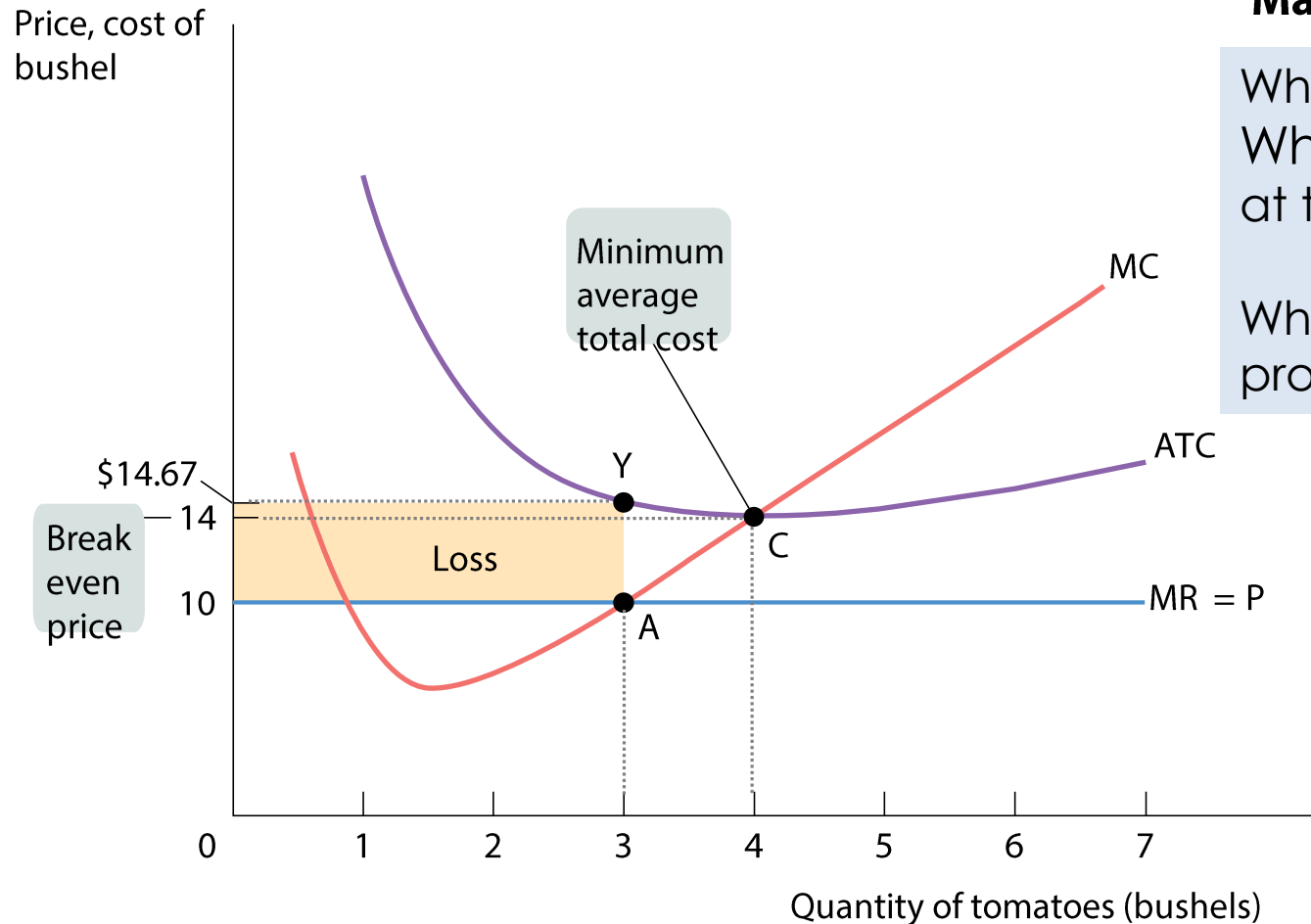
Profit: when $TR > TC$ or when $P > ATC$

Market Price = \$18

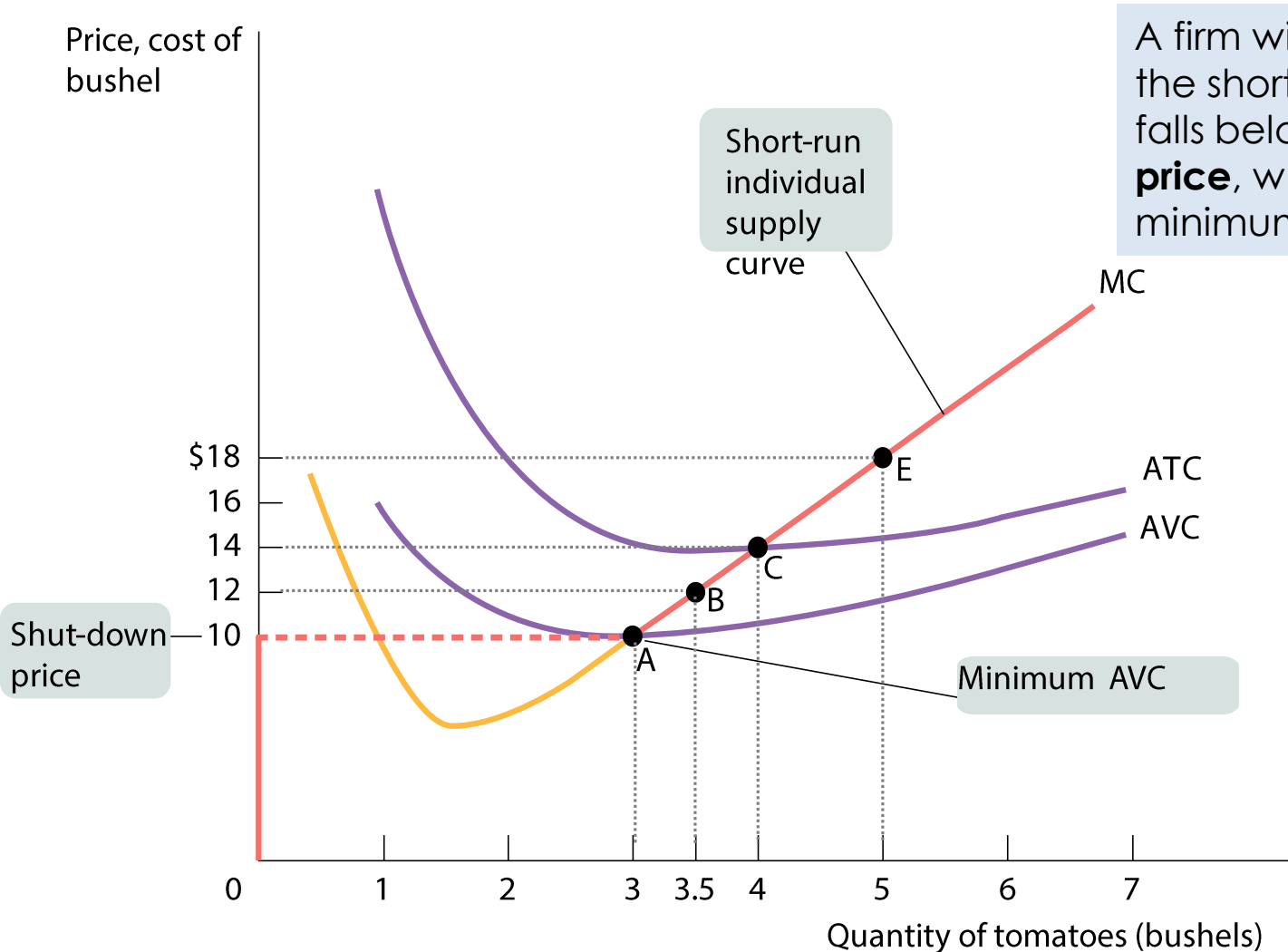
What is the optimal output level (Q^*)?
What is the Max. Profit?



Loss: when $TR < TC$ or when $P < ATC$



Shut-down: when $P < AVC_{\text{minimum}}$



A firm will cease production in the short run if the market price falls below the **shut-down price**, which is equal to minimum AVC

Remember what AVC is, and what it represents.

Should I stay in or should I go?

Summary:

In the short run, a firm will produce if $P > \text{shutdown price (min AVC)}$.



A firm will NOT produce if $P < \text{min AVC}$.



Active Learning:



If Gnomes-R-Us (a competitive firm) produces where the marginal cost curve intersects with the average total cost curve at its minimum point, the firm will earn:

- a) positive economic profits.
- b) zero economic profits.
- c) a short-run loss.

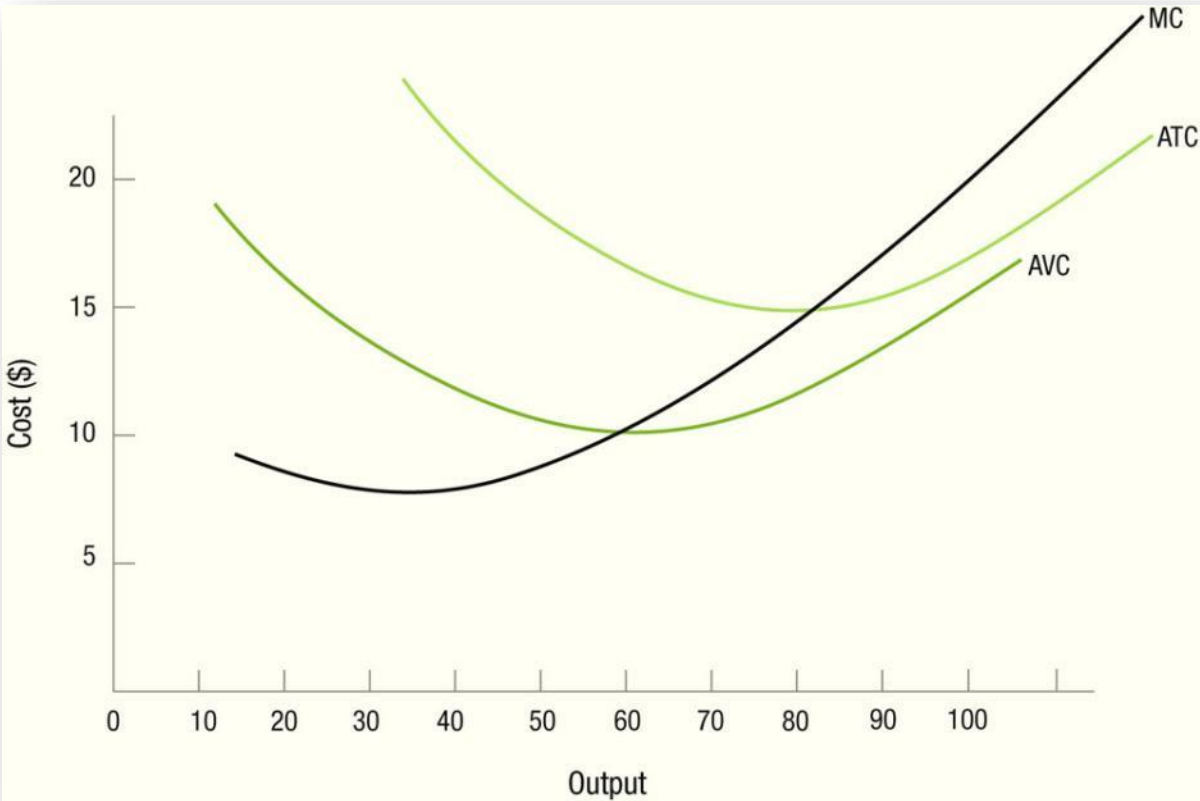
Active Learning: Practice



Should a competitive firm keep producing even if it faces short-run losses (and is producing at a point on its MC curve that is above the minimum AVC curve)?

- a) Yes, it is earning normal profits.**
- b) Yes, because it covers its variable costs and some fixed costs.**
- c) No, it should never incur losses.**

Active Learning: Practice



If the market price is \$5, about how much will this firm produce?

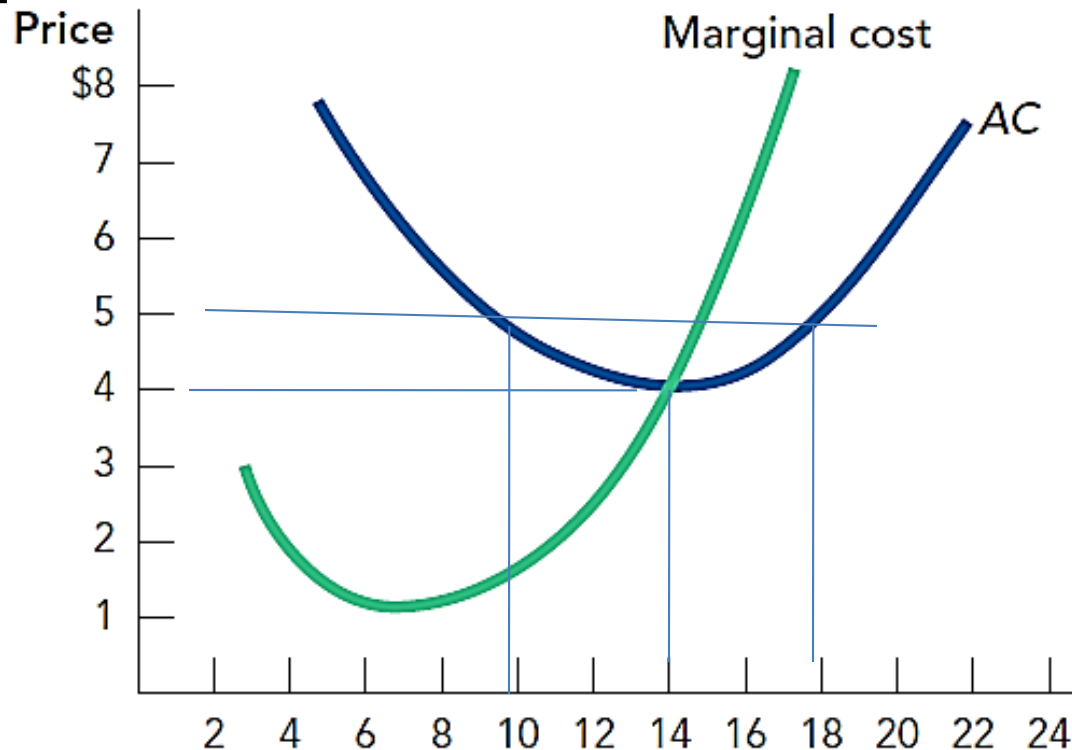
- a) 0
- b) 30
- c) 60
- d) 95
- e) As much as it can

Active Learning: Practice



Ralph opened a small shop selling bags of trail mix. The price of the mix is \$5, and the market for trail mix is very competitive. At what quantity will Ralph produce?

- a) 7
- b) 10
- c) 16
- d) 18



Active Learning: Practice



If a firm is earning positive economic profit, it must be the case that:

- a) price is less than average cost.**
- b) price is equal to average cost.**
- c) price is equal to total cost.**
- d) price is greater than average cost.**

The Short-Run Production Decision: A Simple Example

A firm should stay open in the short run if the revenue still can cover its variable costs.

<i>Decision</i>	<i>Fixed Costs</i>	<i>Variable Costs</i>	<i>Revenue</i>	<i>Profit</i>
Week1	\$100	0	0	-\$100
Week 2	100	50	75	-75



He'll stay in business... for now.

The Industry Supply Curve

If $P > \text{break-even (at min ATC)}$, firms are profitable.

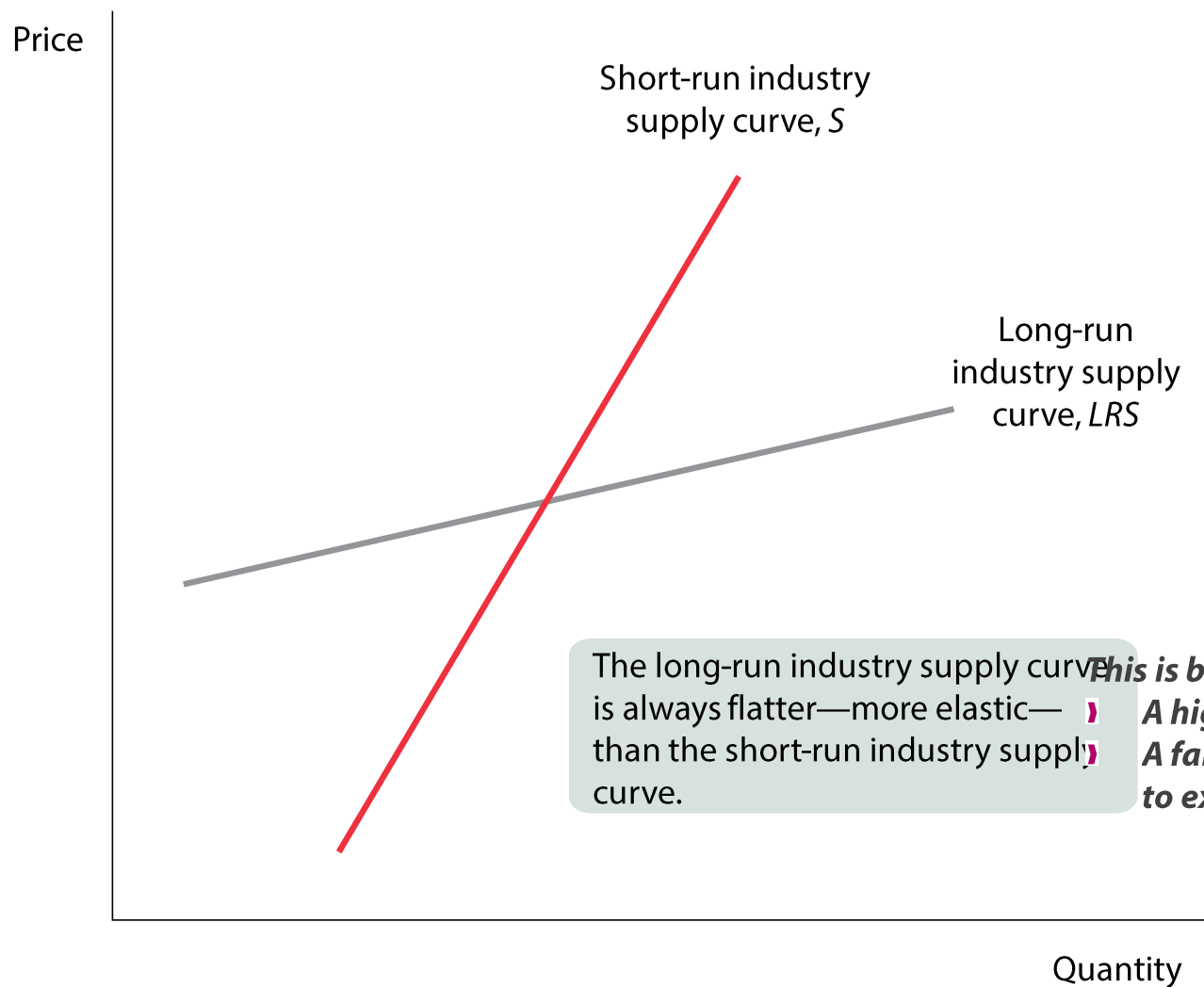
This profit attracts new entrants/firms.

Industry Supply will increase.

When the industry becomes
less profitable,
some firms will exit
the industry.

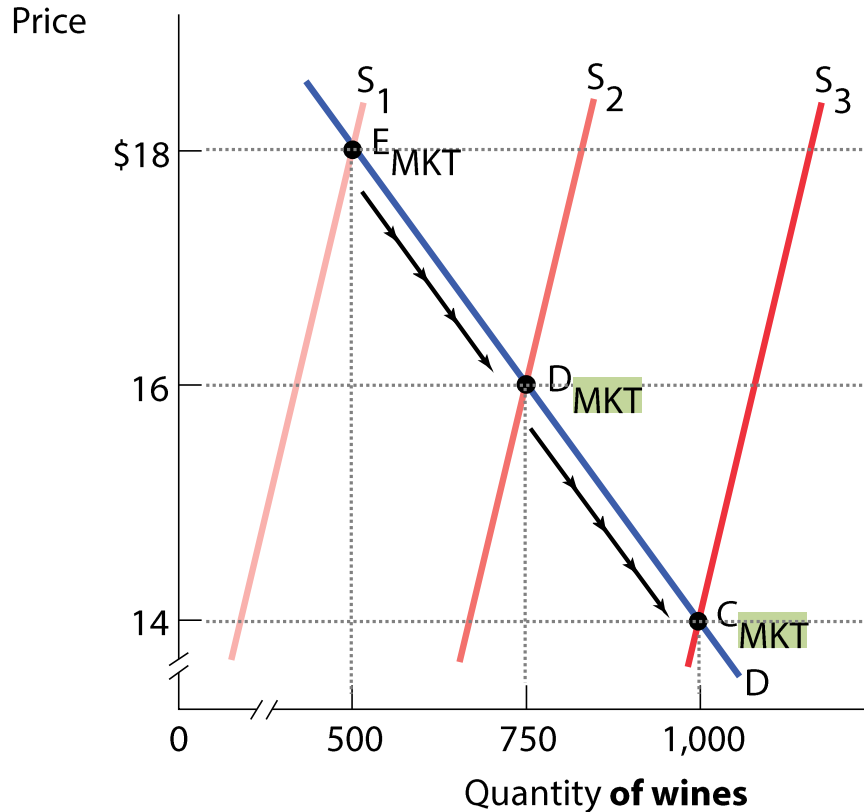


Short-Run and Long-Run Industry Supply Curves

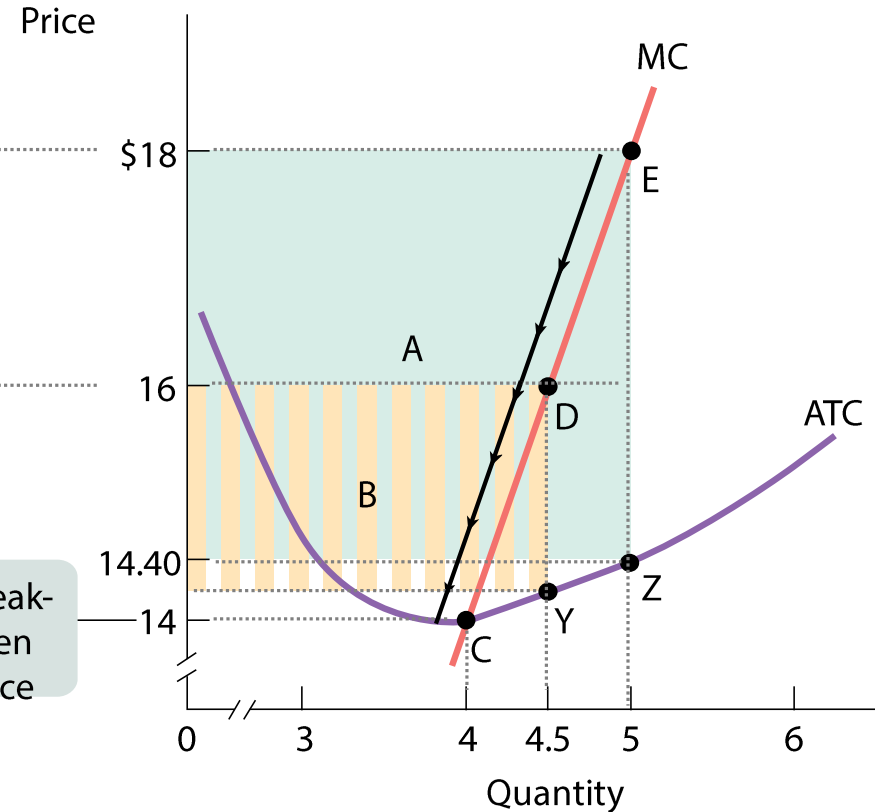


Why a competitive firm will have Zero economic profit in the long-run

(a) **Market**



(b) **Individual Firm**



As long as there is a “positive profit”, new entries into the market and supply curve shifts. It reduced the price, and reduced profits, until the market reaches “zero-profit”.

Active Learning: Practice



The long-run market equilibrium in a perfectly competitive industry with identical firms results in all firms:

- a) earning zero economic profit.**
- b) producing the quantity associated with their break-even price.**
- c) producing the profit-maximizing quantity at which $MR = MC$.**
- d) All of the above statements are true.**

Practice What You Know

Steve runs a competitive sandwich shop. Right now, he is producing output at a level where $MR > MC$. To increase his profits, Steve should

- A. Try to use more capital in his production**
- B. Try to use more labor in his production**
- C. Produce less output**
- D. Produce more output**

Practice What You Know

If a competitive industry is making positive economic profits, what will eventually happen in this industry?

- A. The market supply will shift to the left**
- B. The market supply will shift to the right**
- C. The market demand will shift to the left**
- D. The market demand will shift to the right**

Practice What You Know

Suppose a competitive firm is faced with a price in the short run that is below ATC but above AVC. In the short run, this firm should

- A. Shut down**
- B. Exit the industry**
- C. Raise the price of the good**
- D. Produce at the output level where $MR = MC$**

Practice What You Know

What do you suppose is one of the main reasons that competitive firms all earn zero economic profits in the long run?

- A. Each firm has a lot of market power**
- B. Firms all want to earn zero profits**
- C. Free entry and exit in the industry**
- D. The cost curves are U-shaped**

Practice What You Know

A competitive firm will shut down if:

A. $\text{Price} < \min(\text{ATC})$

B. $\min(\text{AVC}) < \text{Price} < \min(\text{ATC})$

C. $\text{Price} < \min(\text{AVC})$

D. $P = MR$

Let's Try This

“Kate’s Katering” business is in a perfectly competitive market. The machines cost **\$100** per day and is the only fixed input. The variable cost consists of wages and food ingredients, as follows at the table below.

- a) Calculate TC, AVC, ATC, and MC
- b) What is the break-even price? What is the shut-down price?
- c) Suppose the price at which Kate can sell catered meals is \$21 per meal. In the short run, will Kate earn a profit? In the short run, should she produce or shut down?
- d) Suppose that the price at which Kate can sell falls to \$17 per meal (due to new competition). Will Kate earn a profit? Should she produce or shut down in the short run?
- e) Due to fierce competition, the price even falls further to \$13 per meal. Will Kate earn a profit? Should she produce or shut down in the short run?

<u>Qty (meals)</u>	<u>VC</u>
0	0
10	200
20	300
30	480
40	700
50	1,000

In-Class Exc: Multiple Choice

- 1. In a competitive market which of the following is the firm's demand curve?
 - a) The marginal revenue curve
 - b) The marginal cost curve
 - c) The average total cost curve
 - d) The average revenue curve
- 2. If a firm is producing at an output level at which:
 - a) MR exceeds MC, then the firm should reduce its output level to maximize profits
 - b) MR is less than MC, then the firm should expand its output level to maximize profits
 - c) Price exceeds ATC then the firm is earning an economic profit
 - d) Price is less than minimum ATC but greater than AVC then the firm should shut down.
- 3. Draw a graph where a firm's MC curve is crossing ATC curve at \$35, and is crossing AVC curve at \$18. How low must the price fall before the firm will decide to shut down approximately?
 - a) \$40
 - b) \$35
 - c) \$18
 - d) \$12
- 4. Draw a graph where price is at \$90, and the MC curve is crossing the MR curve at quantity of output 200 units; the ATC and AVC at 200 units output level are, subsequently, at \$80 and \$50. What can we tell about this firm:
 - a) The firm is earning an economic profit equal to \$2,000.
 - b) The firm should produce 100 units of output and charge a price of \$40 instead.
 - c) The firm is incurring total cost equal to \$80
 - d) Should shut down because price is less than the minimum average variable cost.

Additional exercise

Bob produces DVD movies for sale. Bob rents a building for \$30,000 per month and rents a machine for \$20,000 per month. His variable costs per month is as the following table.

a. Calculate Bob's AVC, ATC, and MC; There is free entry into the industry, and anyone who enters will face the same costs as Bob. Suppose that currently the price of a DVD is \$25. What will be Bob's profit? Is this a long-run equilibrium? If not, what will the price of DVD movies in the long run? What is Bob's break-even price? What is his shut-down price?

b. Suppose the price falls to \$12, what should Bob do in the short run?

c. Suppose the price falls further to \$7. What is the profit-maximizing quantity of DVDs that Bob should produce? What is his profit? Will he shut-down in the short run, or exit/stay in the long run?

d. Suppose instead that the price is \$20. Now, what is the profit-maximizing quantity of DVDs that Bob should produce? What is his profit? Will he produce or shut-down in the short run, or exit/stay in the long run?

<u>Qty (DVDs)</u>	<u>VC</u>
1,000	5,000
2,000	8,000
3,000	9,000
4,000	14,000
5,000	20,000
6,000	33,000
7,000	49,000
8,000	72,000
9,000	99,000
10,000	150,000