

Lecture 12: Supply in a Competitive Market

Supply in a Not Competitive Market: Market Power

November 11, 2025

Course Administration

- ① Two lectures to go after today!
 - Lecture 13: At least half of Chapter 9, externalities
 - Lecture 14: Public goods
- ② Final exam December 16
 - Review Thursday December 11, 6 to 7:30, MPA 305
 - Previous final exam posted at bottom of lectures tab
- ③ Post-class office hours
 - December 8, regular times
 - December 12, 11:30 to 1:30
- ④ Any questions?

Next Week: Ripped from the Headlines

Send article by Wednesday midnight.

Afternoon

Finder	Presenter
Olivia	Natalia

Evening

Finder	Presenter
Daija	Aiyana

This Week: Ripped from the Headlines

Afternoon

Finder	Presenter
Grisha	Dylan
Harini	Grisha

Evening

Finder	Presenter
Charlotte	Raghan

Today

- Finish Chapter 8: Power of competitive markets
 - Profit maximization
 - Perfect competition in the short run
 - Perfect competition in the long run
- Start Chapter 9: When markets aren't competitive
 - Why markets may not be competitive
 - Marginal revenue with market power

Big Questions for Today

Big Questions for Today

- How does a firm choose how much to produce?
- How does long run behavior differ from short run behavior?
- Where does the market supply curve come from?
- Which firms get producer surplus?
- Why is competition so valuable?

Profit Maximization in a Perfectly Competitive Environment

What are Profits?

Profits =

What are Profits?

Profits = total revenue - total cost

$$\pi = TR - TC$$

What are Profits?

Profits = total revenue - total cost

$$\begin{aligned}\pi &= TR - TC \\ &= (P * Q) - (ATC * Q)\end{aligned}$$

Profit Maximization for Firms in a Competitive Market

Because competitive firms are price takers

$$P = MR$$

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Because competitive firms maximize profits

$$MR = MC$$

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To maximize profits, firms then set

$$MR = MC$$

$$P = MC$$

Profit Maximization for Firms in a Competitive Market

Because competitive firms are price takers

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Because competitive firms maximize profits

$$MR = MC$$

To maximize profits, firms then set

$$MR = MC$$

$$P = MC$$

Perfectly competitive firms maximize profits where $P = MC$

What are Profits When a Firm is Maximizing Profit?

Profits = total revenue - total cost

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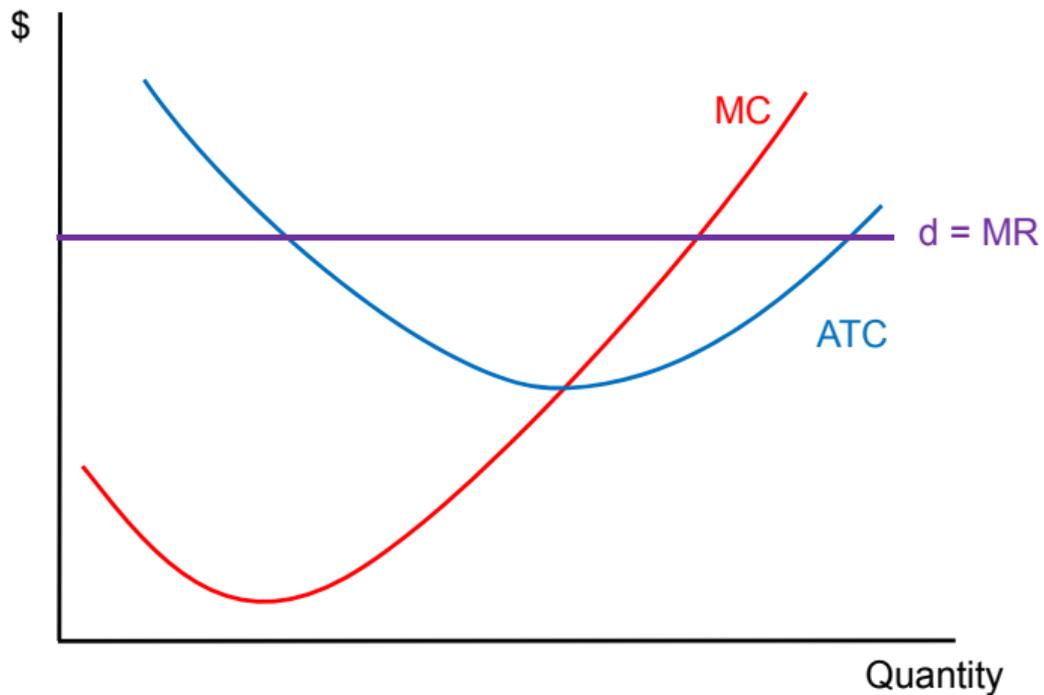
What are Profits When a Firm is Maximizing Profit?

Profits = total revenue - total cost

$$\begin{aligned}\pi &= TR - TC \\ &= (P * Q) - (ATC * Q) \\ &= Q(P - ATC)\end{aligned}$$

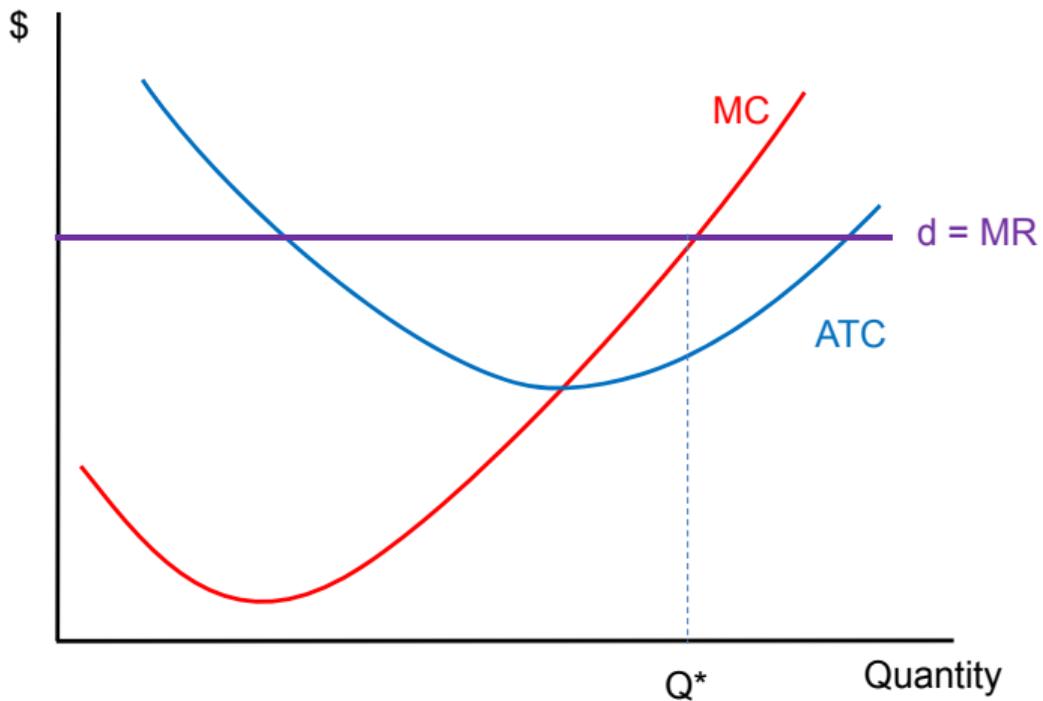
Finding Profit

What is the Profit-Maximizing Q ?



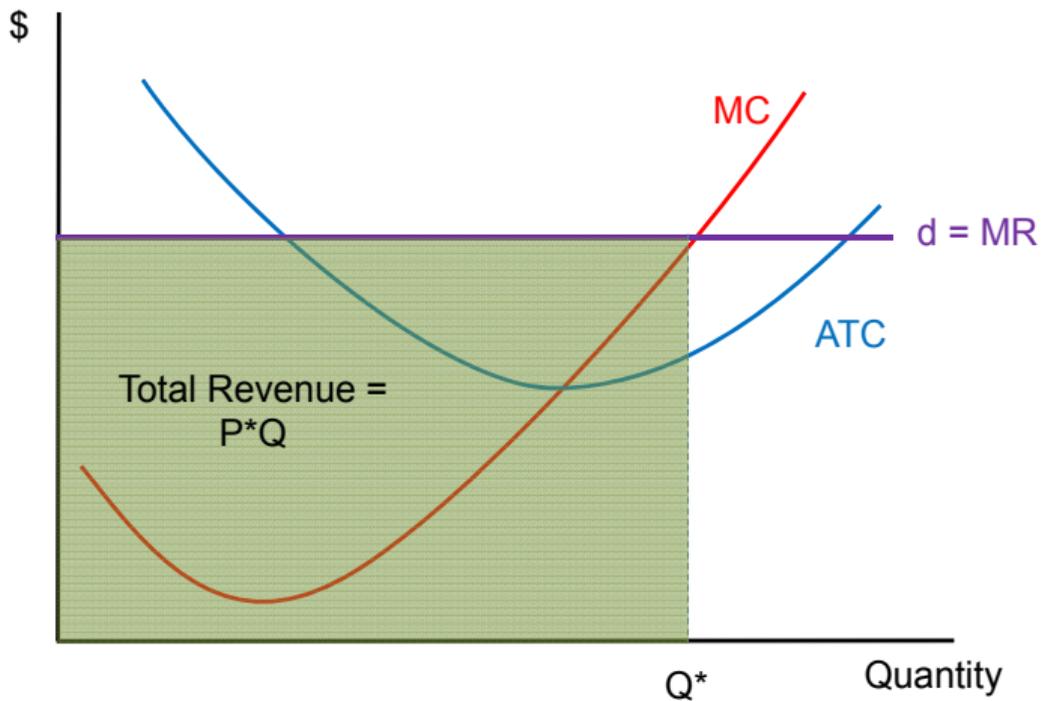
Finding Profit

Where is total revenue?



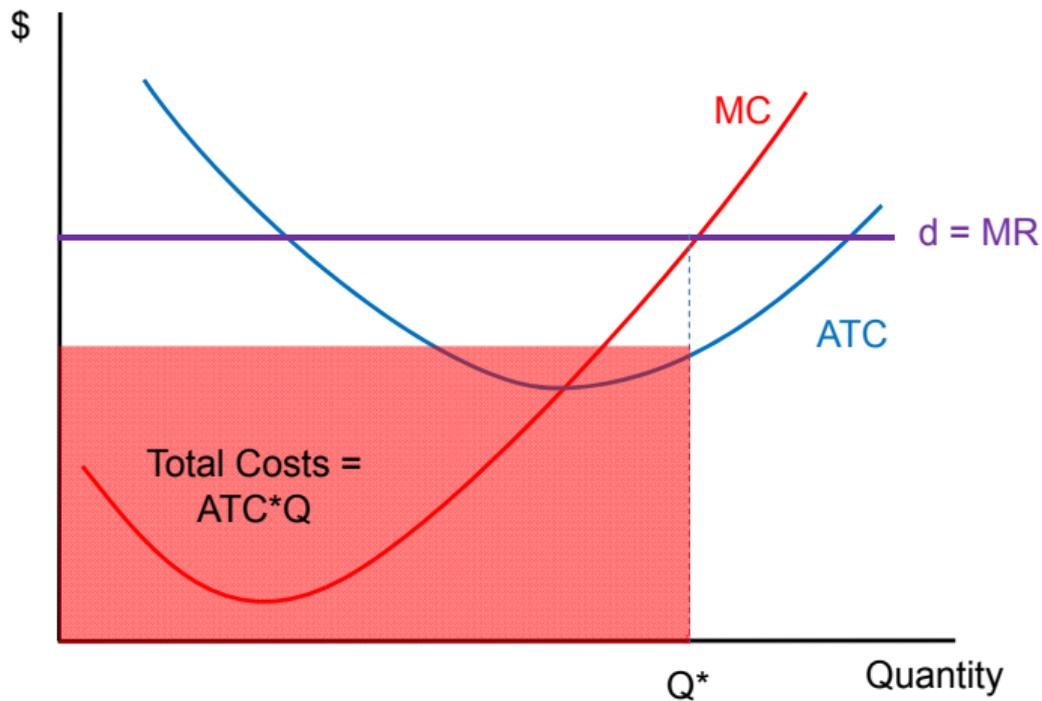
Finding Profit

Where are total costs?



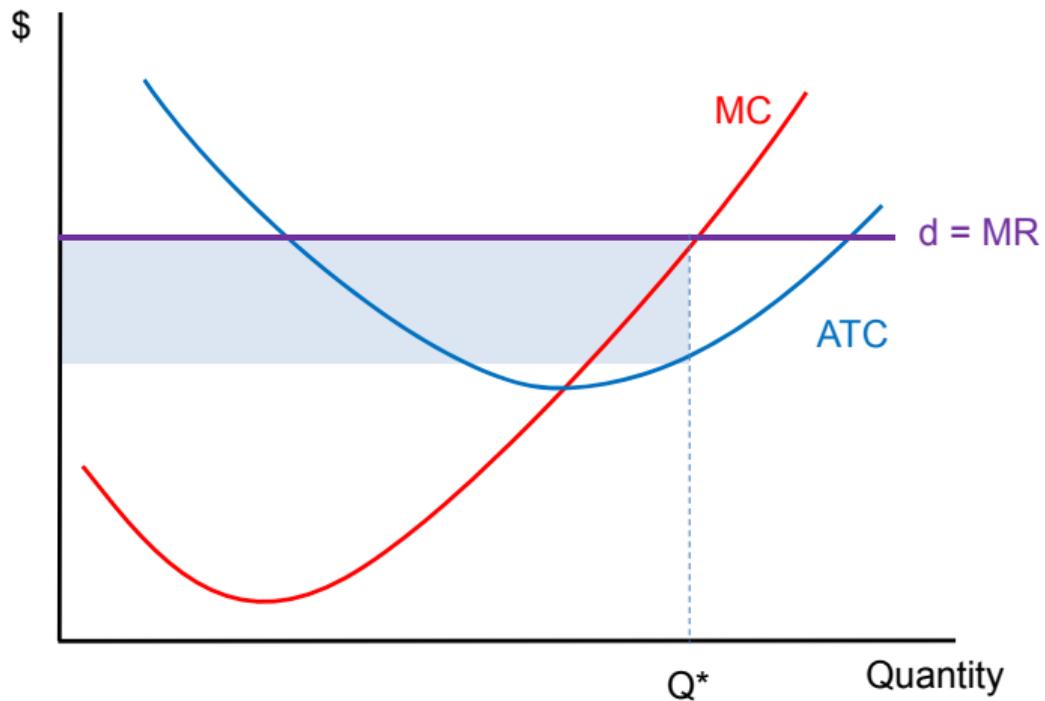
Finding Profit

How do you find profit?



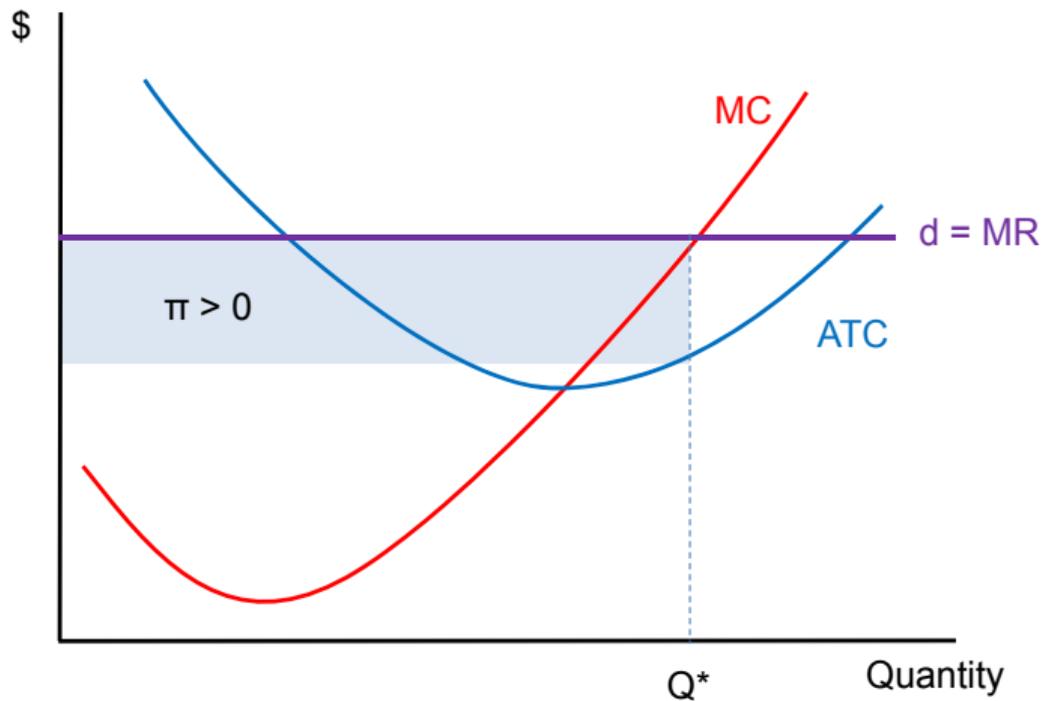
Finding Profit

Is $\pi > 0$ or < 0 ?



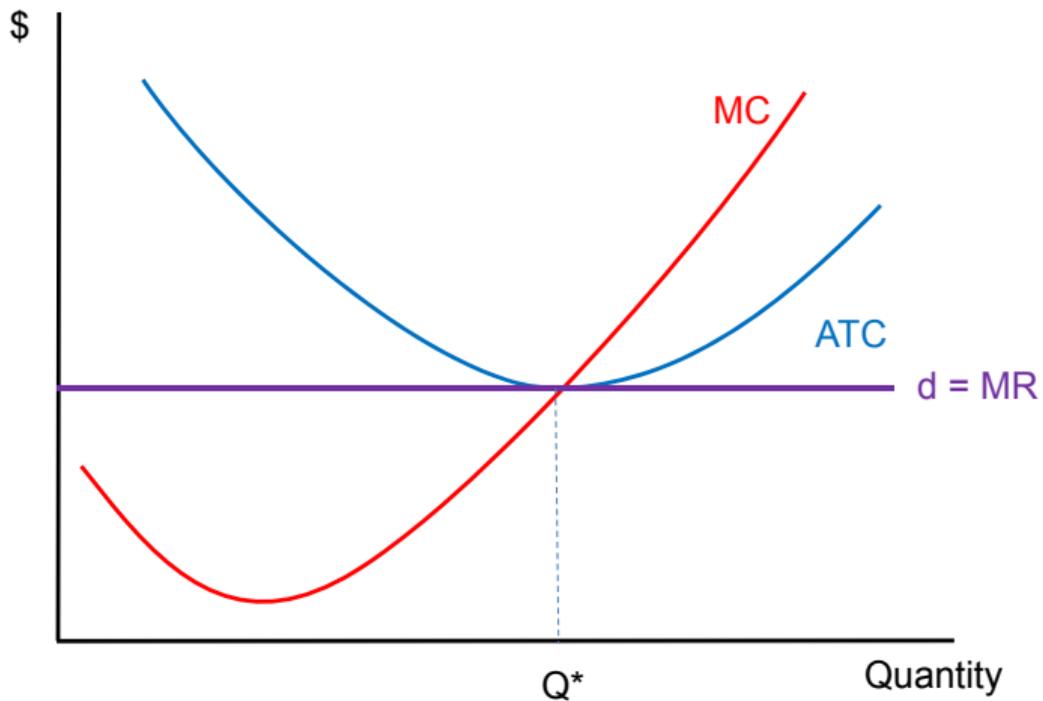
Finding Profit

$$\pi > 0$$



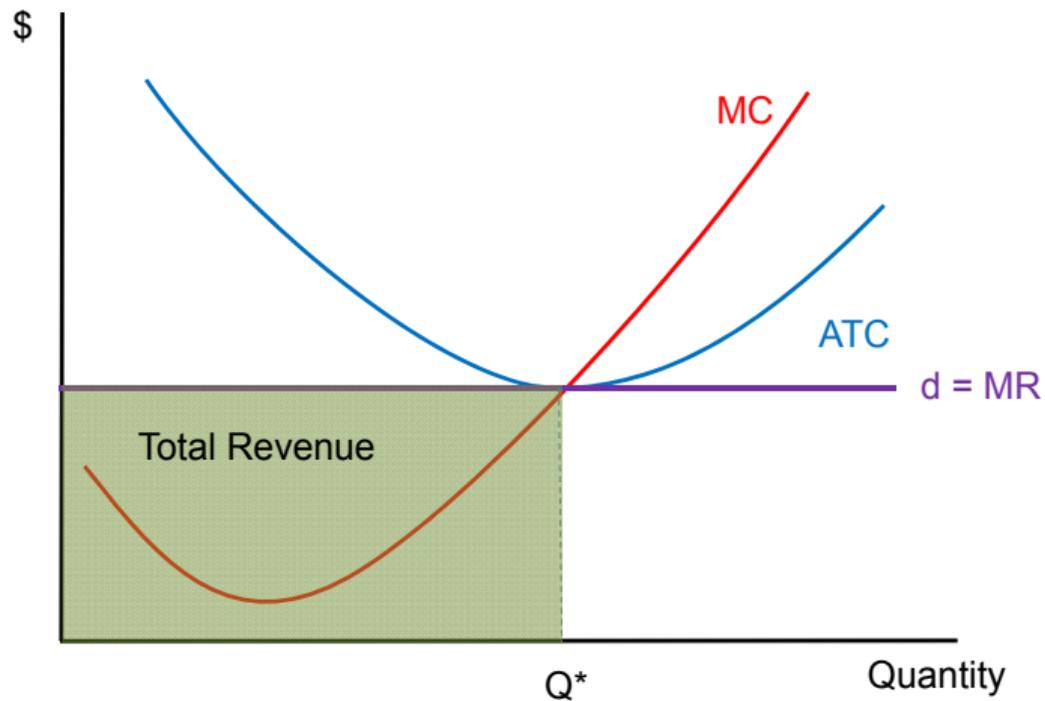
Finding Profit

Profits Now? First find revenues



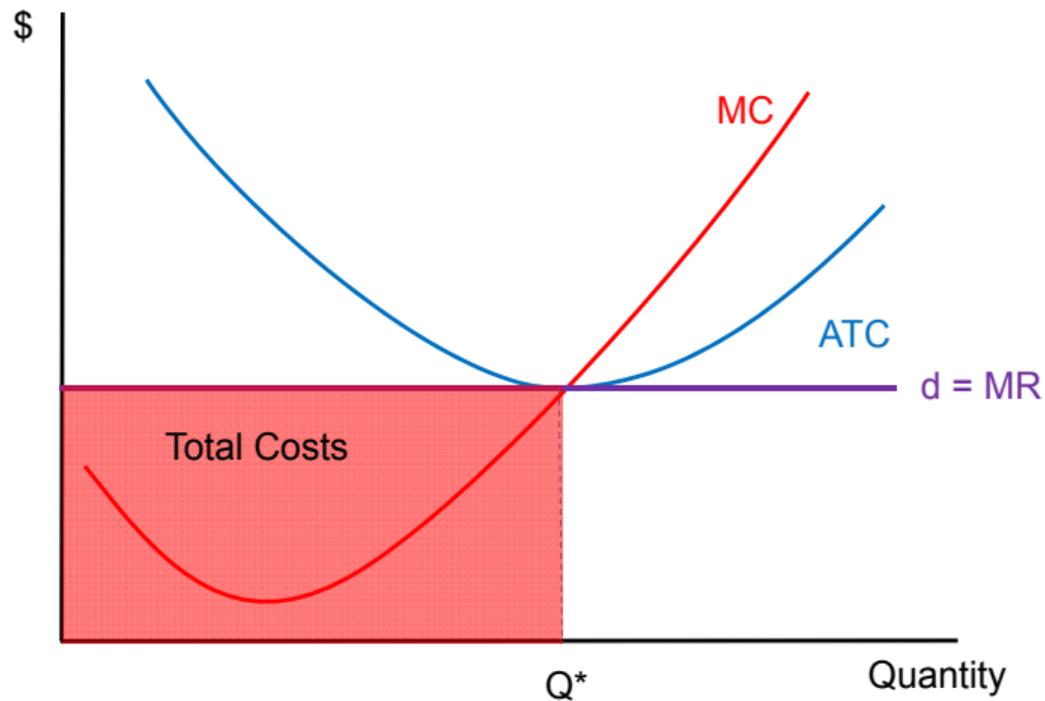
Finding Profit

Profits Now? Now find costs



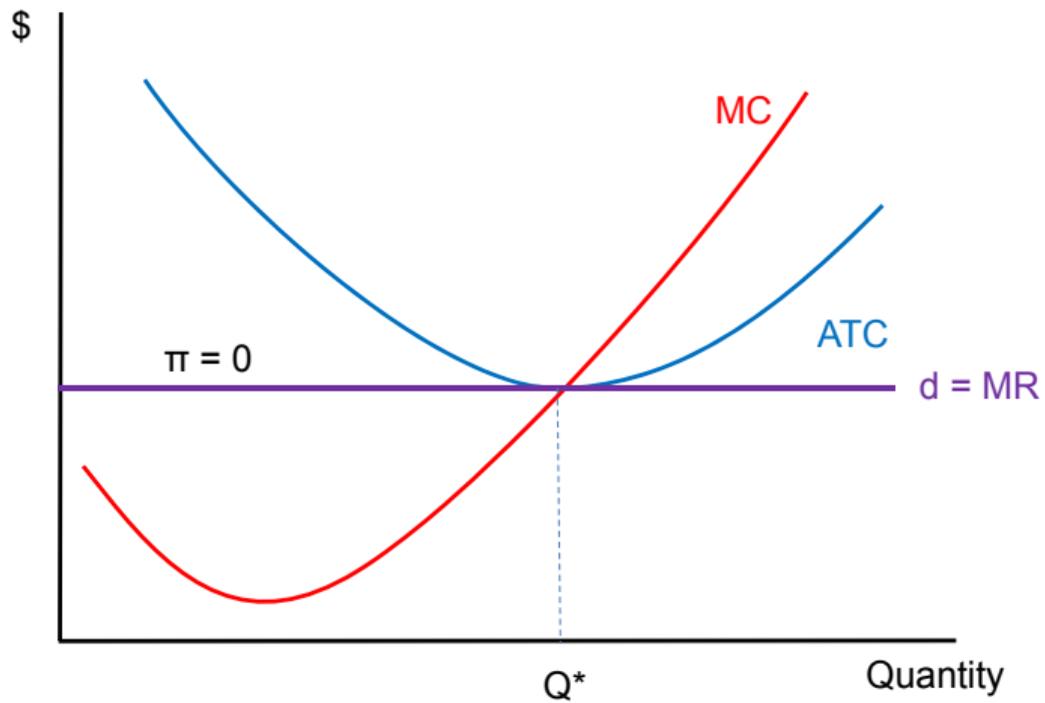
Finding Profit

Profits Now?



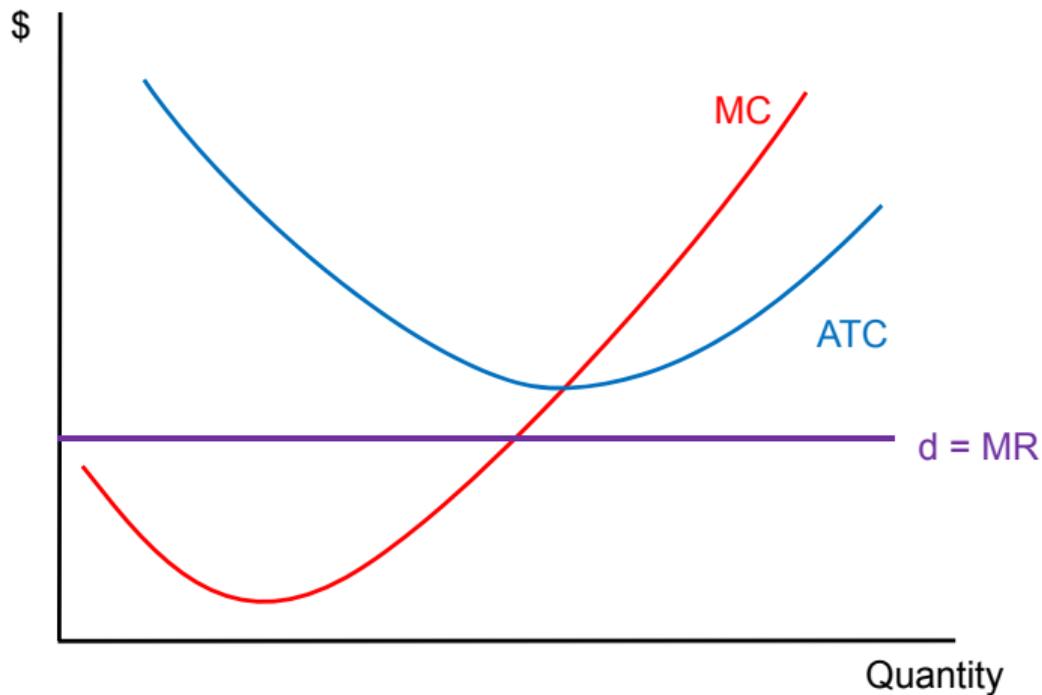
Finding Profit

No Profits to Be Found



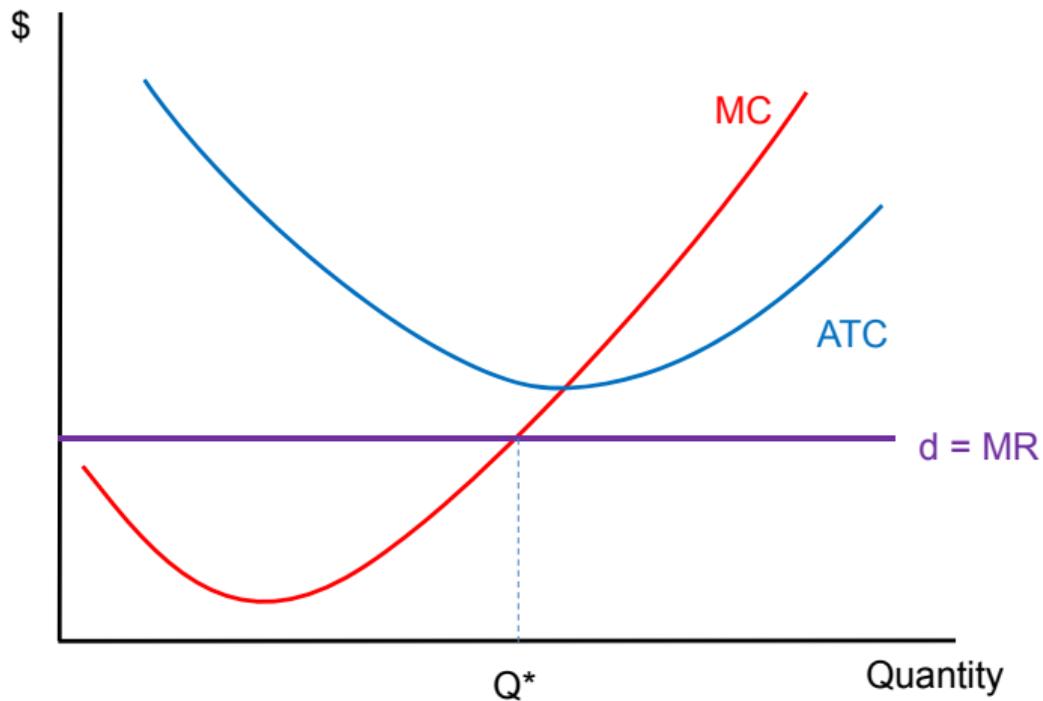
Finding Profit

Price Falls. Profits Now? What is profit maximizing Q ?



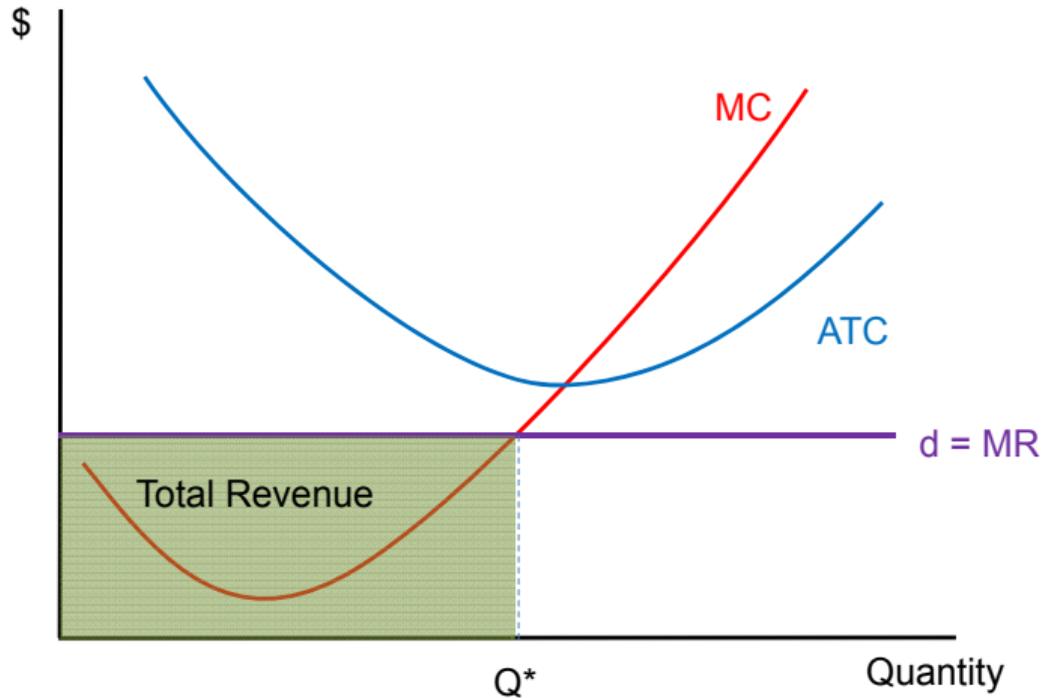
Finding Profit

Profits Now? Find total revenue



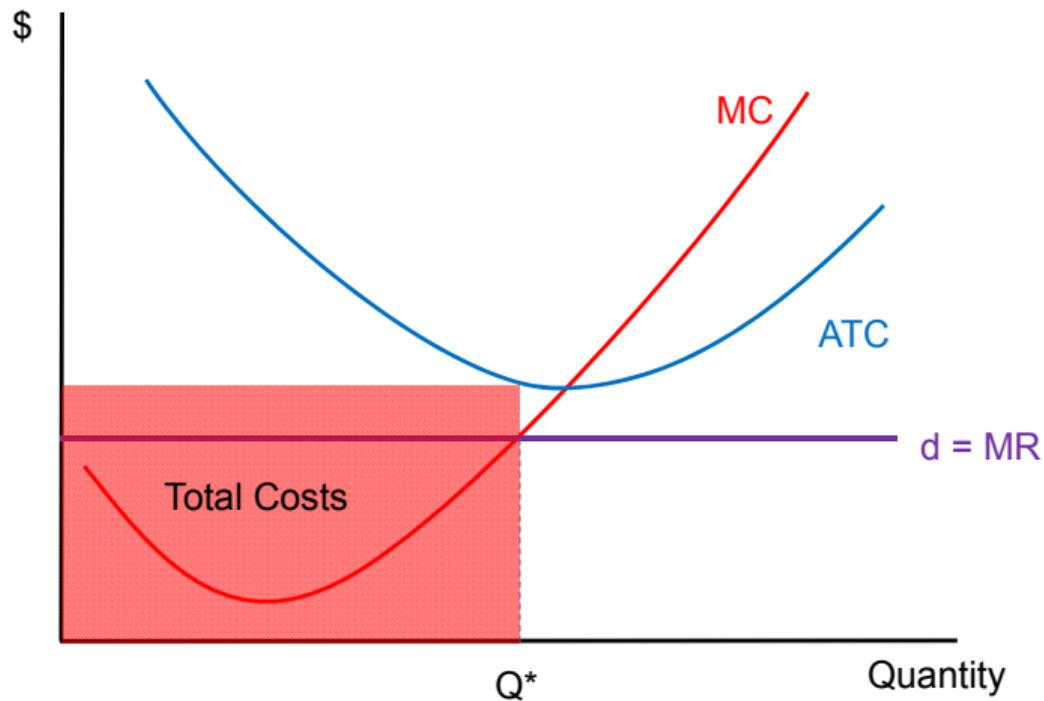
Finding Profit

Profits Now? Find total costs



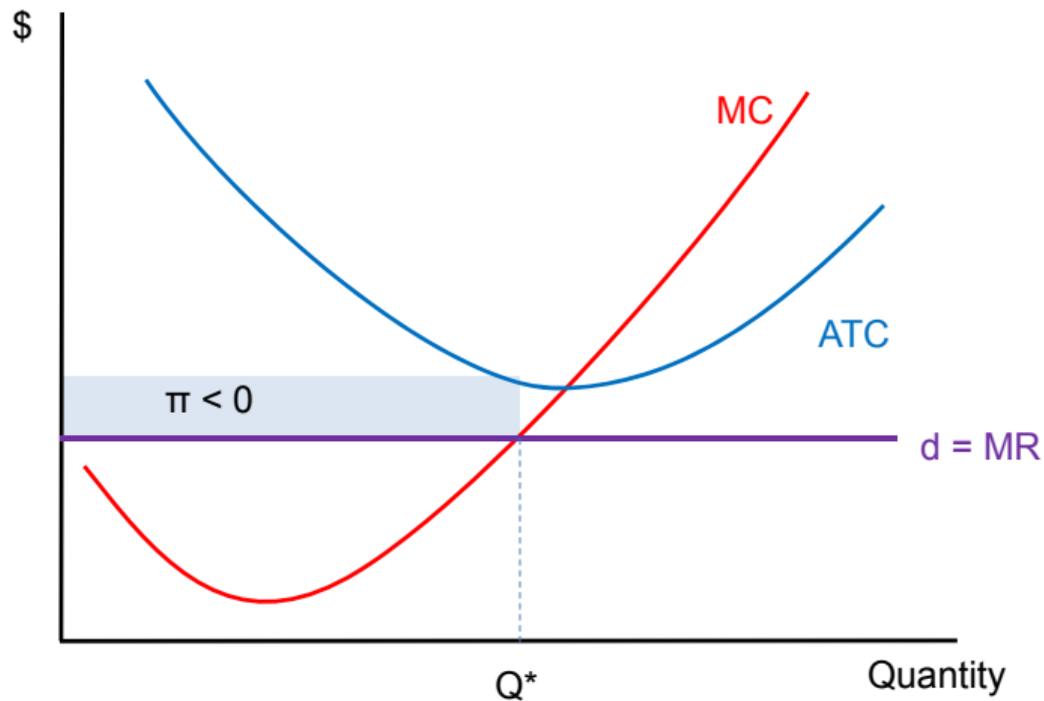
Finding Profit

$\pi > 0?$ or $\pi < 0?$



Finding Profit

Profits are negative



In the Short Run, Should the Firm Shut Down if $\pi < 0$?

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$$\pi_{shutdown} = -FC$$

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- Profits in the short run, with output is

$$\pi_{operate} =$$

In the Short Run, Should the Firm Shut Down if $\pi < 0$?

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- Profits in the short run, with output is

$$\pi_{operate} = TR - TC$$

In the Short Run, Should the Firm Shut Down if $\pi < 0$?

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- Profits in the short run, with output is

$$\pi_{operate} = TR - TC = TR - FC - VC$$

In the Short Run, Should the Firm Shut Down if $\pi < 0$?

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Firm should operate if

$$\pi_{operate} > \pi_{shutdown}$$

In the Short Run, Should the Firm Shut Down if $\pi < 0$?

Firm should operate if

$$\begin{aligned}\pi_{operate} &> \pi_{shutdown} \\ TR - FC - VC &> -FC\end{aligned}$$

In the Short Run, Should the Firm Shut Down if $\pi < 0$?

Firm should operate if

$$\begin{aligned}\pi_{operate} &> \pi_{shutdown} \\ TR - FC - VC &> -FC \\ TR - VC &> 0\end{aligned}$$

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In the Short Run, Should the Firm Shut Down if $\pi < 0$?

Firm should operate if

$$\begin{aligned}\pi_{operate} &> \pi_{shutdown} \\ TR - FC - VC &> -FC \\ TR - VC &> 0 \\ TR &> VC\end{aligned}$$

Examples of firms that sometimes operate?

Short Run Operations: Two Equivalent Statements

Operate if

$$TR > VC$$

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Operate if

$$TR > VC$$

We can re-write this as

$$TR > VC$$

Short Run Operations: Two Equivalent Statements

Operate if

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We can re-write this as

$$TR > VC$$

$$PQ > VC$$

Short Run Operations: Two Equivalent Statements

Operate if

$$TR > VC$$

We can re-write this as

$$\begin{aligned} TR &> VC \\ PQ &> VC \\ \frac{PQ}{Q} &> \frac{VC}{Q} \end{aligned}$$

Short Run Operations: Two Equivalent Statements

Operate if

$$TR > VC$$

We can re-write this as

$$\begin{aligned} TR &> VC \\ PQ &> VC \\ \frac{PQ}{Q} &> \frac{VC}{Q} \\ P &> AVC \end{aligned}$$

Short Run Operations: Two Equivalent Statements

Operate if

$$TR > VC$$

We can re-write this as

$$\begin{aligned} TR &> VC \\ PQ &> VC \\ \frac{PQ}{Q} &> \frac{VC}{Q} \\ P &> AVC \end{aligned}$$

Firm should operate when

$$P > AVC, \text{ equivalent to } TR > VC$$

Review: Keeping the Short-Run Curves Straight

- Maximize profit where $MR = MC$
- Profit is $TR - TC = Q * (P - ATC)$
- Operate if $P > AVC$, same as $TR > VC$

In Class Problem 1: Choosing Q

Cardboard boxes are produced in a perfectly competitive market. Suppose that for all firms in the market, $MC = 5Q$.

- 1 If the market price is 10, how many boxes does the firm produce if it is maximizing profit?
- 2 Suppose that there is a quantity Q at which $AVC = 6$. Should the firm produce at this Q ?

In Class Problem 1 Answer: Cardboard Boxes and Shutdown

- ① If the market price is 10, how many boxes does the firm produce?
To maximize profit, $MR = MC$. If the firm is competitive, then $MR = P$.
Therefore,

$$P = MC$$

$$10 = 5Q$$

$$Q = 2$$

In Class Problem 1 Answer: Cardboard Boxes and Shutdown

- ① If the market price is 10, how many boxes does the firm produce?
To maximize profit, $MR = MC$. If the firm is competitive, then $MR = P$.
Therefore,

$$P = MC$$

$$10 = 5Q$$

$$Q = 2$$

- ② Suppose that there is a quantity Q at which $AVC = 6$. Should the firm produce?
The firm should produce if

$$P > AVC$$

$$10 > 6$$

Yes, the firm should produce.

In Class Problem 1: Choosing Q , continued

Cardboard boxes are produced in a perfectly competitive market. Suppose that each identical firm has a short-run total cost curve of

$$TC = 3Q^3 - 18Q^2 + 30Q + 50$$

. The marginal cost of production is

$$MC = 9Q^2 - 36Q + 30$$

- 1 What are this firm's variable costs?
- 2 What is average variable cost?
- 3 What is the Q that gives the lowest possible AVC ? [Hint: Where is AVC at lowest?]
- 4 Below what price will firms in the market not produce anything? [Hint: What condition means firms don't want to operate?]

In Class Problem 1 Answer: Cardboard Boxes and Shutdown

- ① What are this firm's variable costs? Recall that $TC = FC + VC$ and that FC do not vary with Q . Therefore,

$$VC = 3Q^3 - 18Q^2 + 30Q$$

- ② What is average variable cost?

$$\begin{aligned} AVC &= \frac{VC}{Q} \\ &= \frac{3Q^3 - 18Q^2 + 30Q}{Q} \\ &= 3Q^2 - 18Q + 30 \end{aligned}$$

In Class Problem 1 Answer, part 3

- ③ What is the Q that gives the lowest possible AVC ?

$$\begin{aligned}AVC &= MC \\3Q^2 - 18Q + 30 &= 9Q^2 - 36Q + 30 \\18Q &= 6Q^2 \\18 &= 6Q \\3 &= Q\end{aligned}$$

- ④ Below what price will firms in the market not produce anything? Competitive firms set $P = MC$. Given that $Q = 3$, then

$$\begin{aligned}P &= MC \\&= 9Q^2 - 36Q + 30 \\&= 9(3^2) - 36(3) + 30 \\&= 81 - 108 + 30\end{aligned}$$

Perfect Competition in the Short Run

Describing Supply from First Principles

In the short run

- Firm's supply curve
- Industry's supply curve
- Producer surplus for a firm
- Producer surplus for the industry

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$
$$P * Q > VC$$

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$

$$P * Q > VC$$

$$MC * Q > VC$$

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$

$$P * Q > VC$$

$$MC * Q > VC$$

$$MC > VC/Q$$

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$

$$P * Q > VC$$

$$MC * Q > VC$$

$$MC > VC/Q$$

$$MC > AVC$$

Finding a Firm's Short Run Supply Curve

- We now know that the firm supplies only when $TR > VC$
- What does this imply about MC ?

$$TR > VC$$

$$P * Q > VC$$

$$MC * Q > VC$$

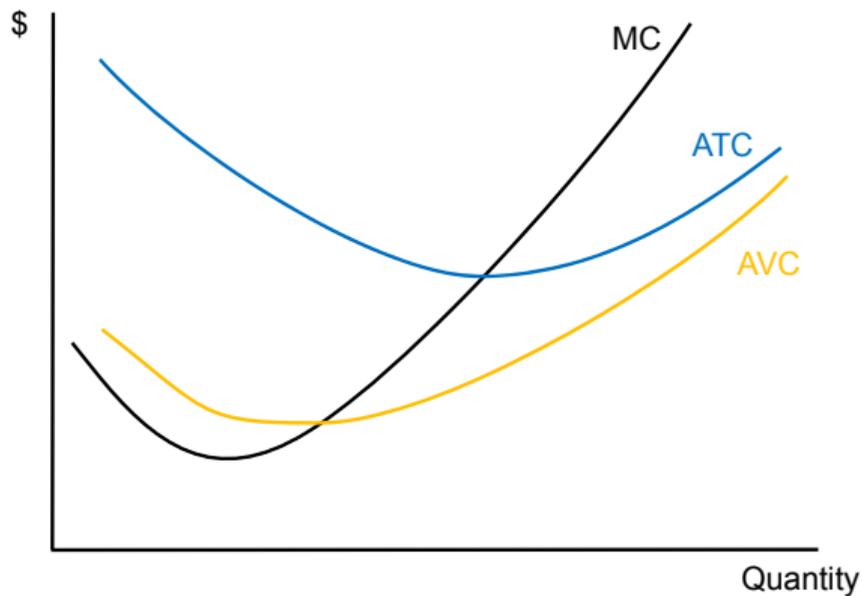
$$MC > VC/Q$$

$$MC > AVC$$

→ Firm supplies only when $MC > VC/Q$

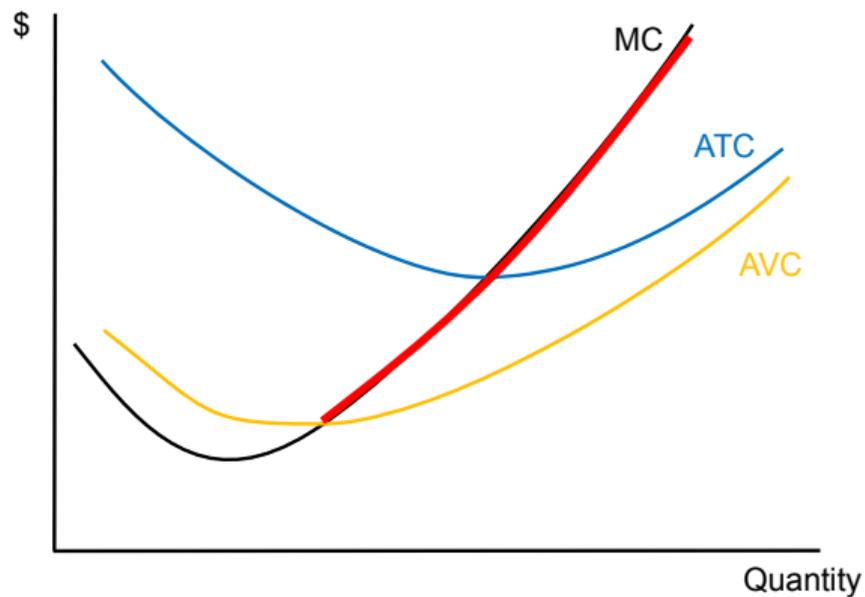
Finding a Firm's Short Run Supply Curve

What Quantities Would the Firm Produce?



Finding a Firm's Short Run Supply Curve

An Individual Firm's Supply Curve

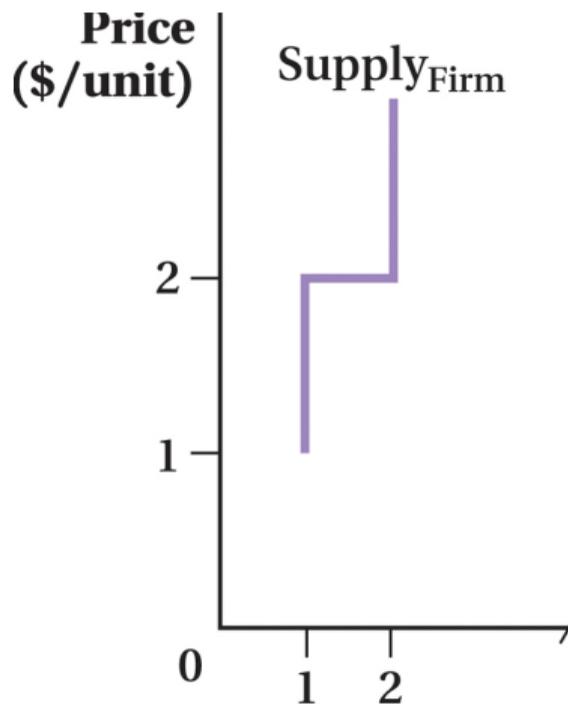


Finding Industry Supply

- Recall that we found market demand by summing individual demands
- Now we find market supply by adding firm supply, given prices
- Find market supply
 - Firm A: $Q_A = f(P)$
 - Firm B: $Q_B = g(P)$
 - Market supply: $Q_M = f(P) + g(P)$

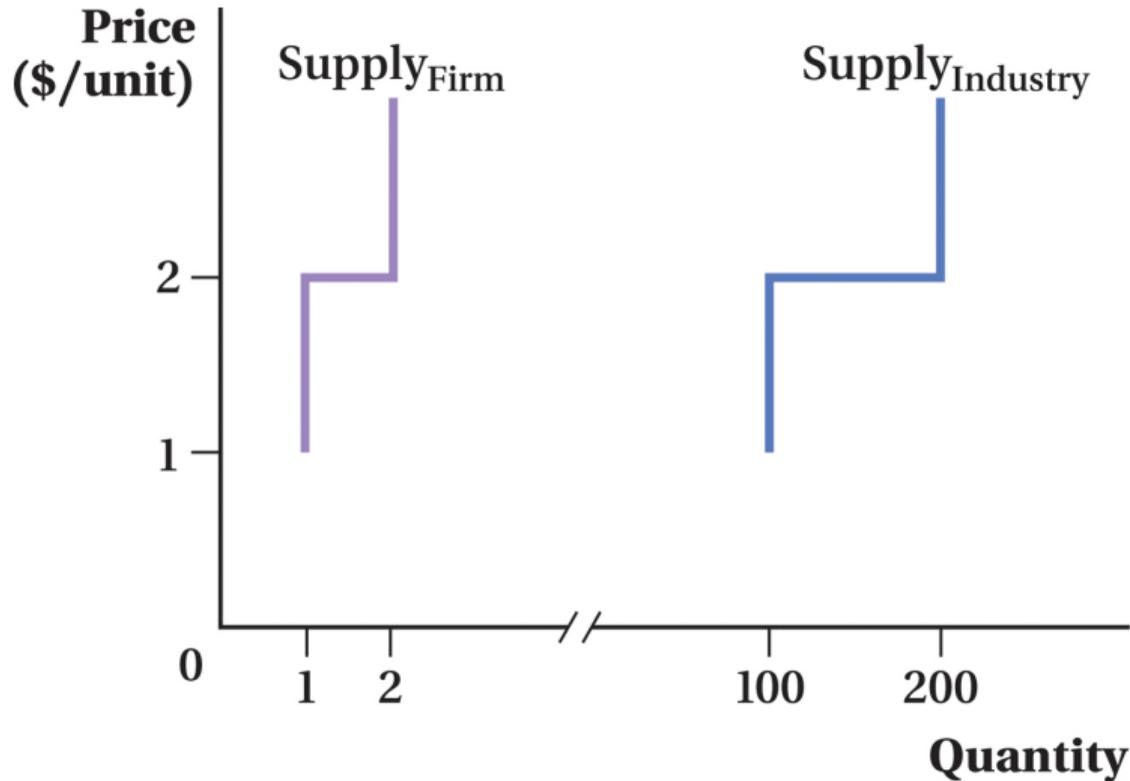
Finding Industry Supply in Pictures

When Firms Have the Same Supply Curve: What Would 100 Firms' Supply Be?



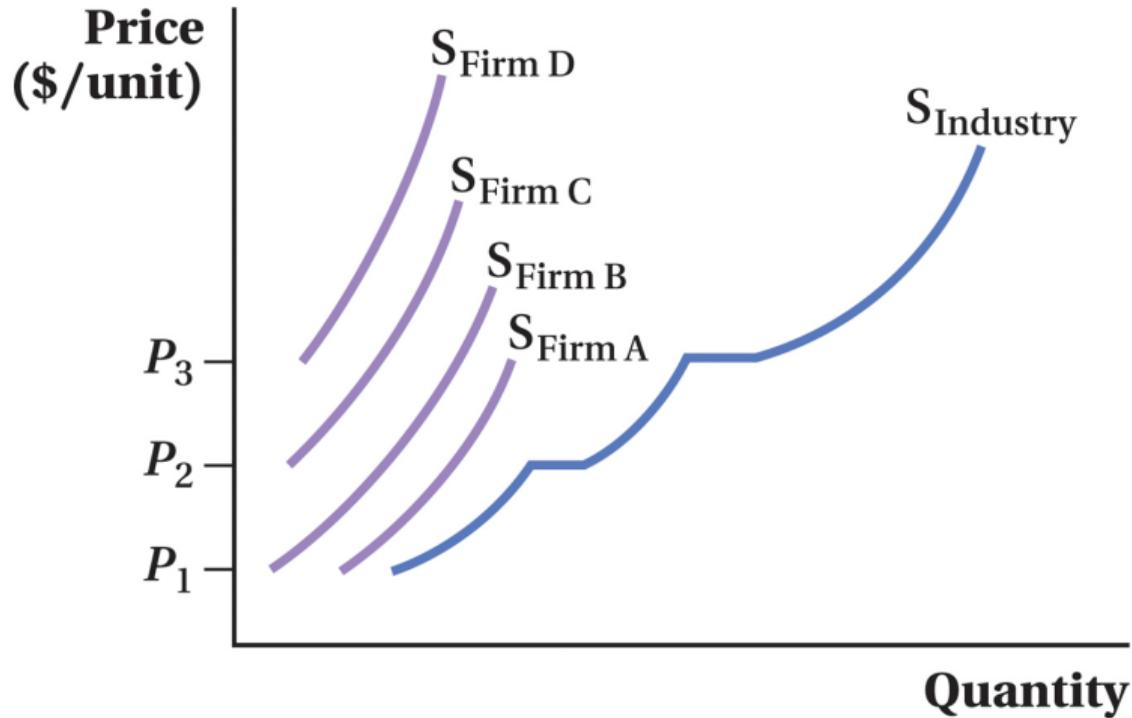
Finding Industry Supply in Pictures

When Firms Have the Same Supply Curve: Here 100 Firms



Finding Industry Supply in Pictures

When Firms Have Different Supply Curves



Adding Up Market Supply

- Supply starts at lowest price is that offered by any firm
- Total quantity at any price is Q offered by all firms

In-Class Problem 2: Tortillas

Assume the industry for flour tortillas in Denver is perfectly competitive. There are 200 firms. Seventy-five of the firms are “high-cost,” with short-run supply curves $Q_{hc} = 5P$. The others are “low-cost,” with short-run supply curves $Q_{lc} = 8P$.

- ① What is the short-run industry supply curve for tortillas Q_S ?
- ② Assume the market demand curve for tortillas is given by $Q_D = 10,000 - 625P$. Find the market equilibrium price and quantity.
- ③ At this price, how many dozens of tortillas are produced by the high- and low-cost firms, respectively?
- ④ Determine total industry surplus at the equilibrium.

In-Class Problem 2: Tortillas

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- 1 What is the short-run industry supply curve for tortillas Q_S ?

$$\begin{aligned} S_{sr} &= 125 * Q_{lc} + 75 * Q_{hc} \\ &= 125(8P) + 75(5P) \\ &= 1000P + 375P \\ &= 1375P \end{aligned}$$

In-Class Problem 2: Answer, Cont'd

- ② Assume the market demand curve for tortillas is given by $Q_D = 10,000 - 625P$. Find the market equilibrium price and quantity.

$$Q_S = Q_D$$

$$1375P = 10,000 - 625P$$

$$2000P = 10000$$

$$P = 5$$

Find quantity using either curve

$$Q_D = 10,000 - 625P$$

$$= 10000 - 625(5)$$

$$= 10000 - 3125$$

$$= 6875$$

In-Class Problem 2: Answer, Cont'd

- ③ At this price, how many dozens of tortillas are produced by the high- and low-cost firms, respectively? Use their supply curves

$$Q_{hc} = 5P = 5(5) = 25$$

$$Q_{lc} = 8P = 8(5) = 40$$

- ④ Determine total industry surplus at the equilibrium. Area above the supply curve and below market price. Q intercept is at zero, so

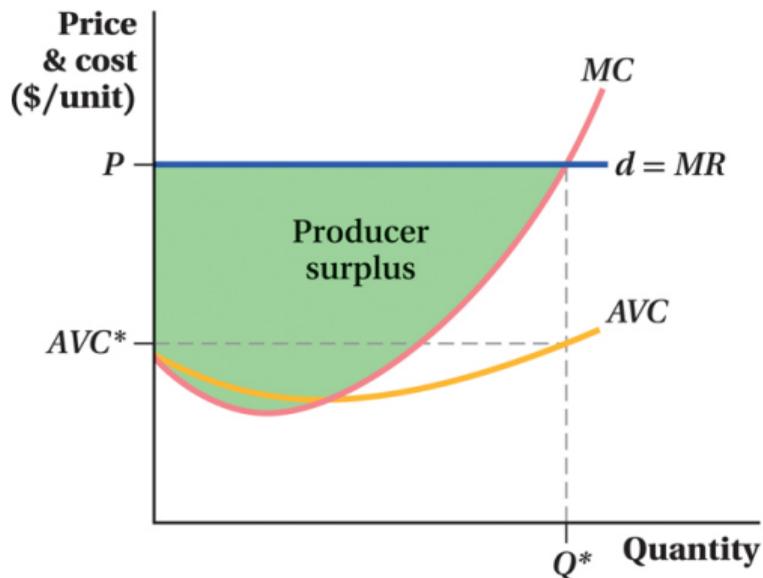
$$\begin{aligned} PS &= \frac{1}{2}bh \\ &= \frac{1}{2}6875(5) \\ &= 17,187.50 \end{aligned}$$

Producer Surplus from a Competitive Firm

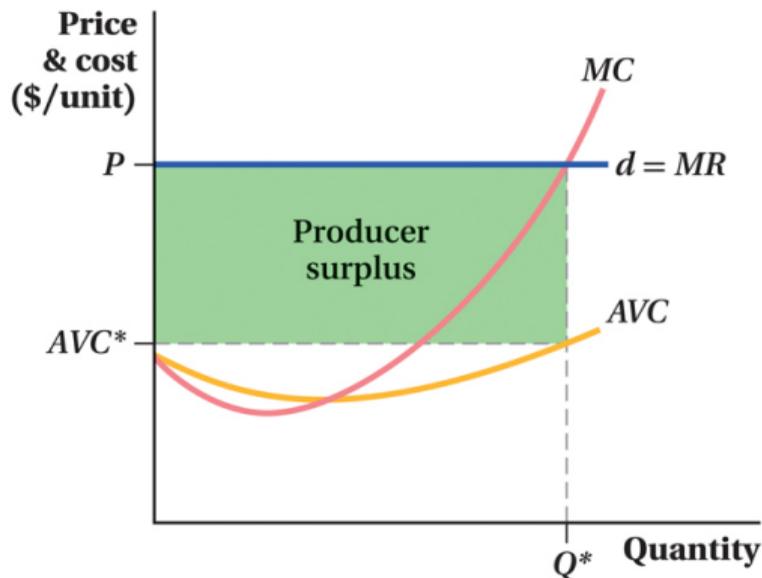
- Like before, the sum of the benefit from each unit
- Two equivalent ways to think about this
 - The difference between market price and supply
 - The difference between $Q * AVC$ and PQ

Producer Surplus for a Firm: Pictures

(a) Producer Surplus: Adding All of the Price-Marginal Cost Markups



(b) Producer Surplus: Total Revenue Minus Variable Costs



Producer Surplus vs. Profit

- Profit

$$\pi =$$

Producer Surplus vs. Profit

- Profit

$$\pi = TR - TC = TR - (FC + VC)$$

Producer Surplus vs. Profit

- Profit

$$\pi = TR - TC = TR - (FC + VC)$$

- Surplus

$$PS = TR - VC$$

Producer Surplus vs. Profit

- Profit

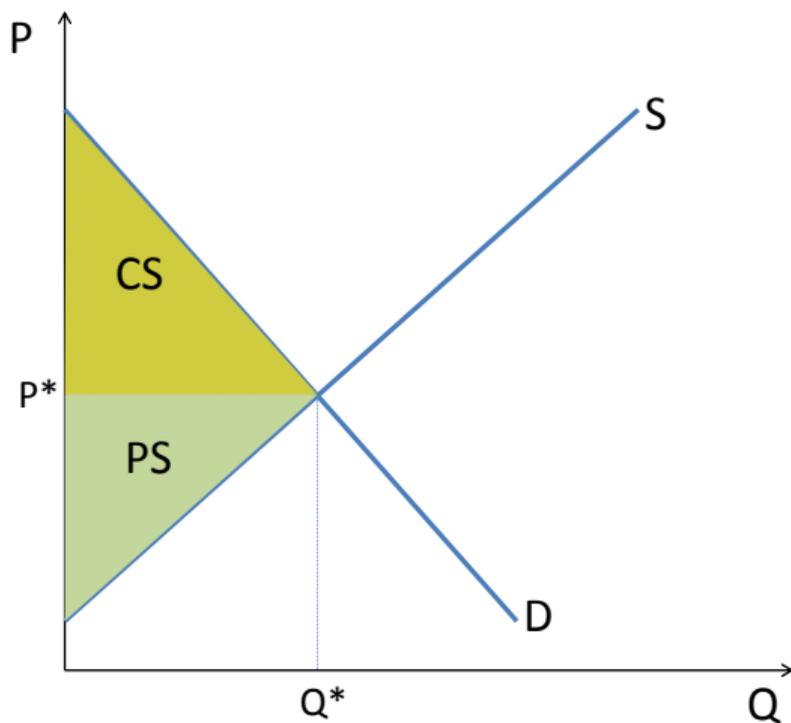
$$\pi = TR - TC = TR - (FC + VC)$$

- Surplus

$$PS = TR - VC$$

Remember, $\pi \neq PS$

Producer Surplus for a Competitive Industry



Perfect Competition in the Long Run

What Makes the Long Run Different?

- All costs are variable
- Firms enter
- Firms exit

Entry in the Long Run

- Free entry \equiv when firms can easily enter the market
 - No legal barriers
 - No technical barriers

Entry in the Long Run

- Free entry \equiv when firms can easily enter the market
 - No legal barriers
 - No technical barriers
- Long run profits
 - Difference between price and long-run total cost
 - $\pi = P * Q - LATC * Q = Q * (P - LATC)$

Entry in the Long Run

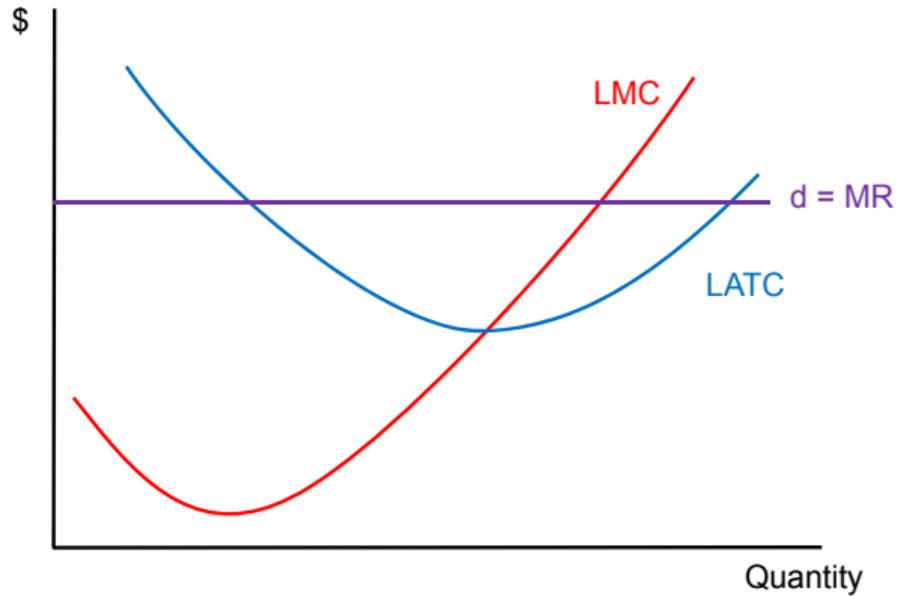
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- When $\pi > 0$, we anticipate entry by new firms, until $\pi = 0$

Entry in the Long Run

- Free entry \equiv when firms can easily enter the market
 - No legal barriers
 - No technical barriers
- Long run profits
 - Difference between price and long-run total cost
 - $\pi = P * Q - LATC * Q = Q * (P - LATC)$
- When $\pi > 0$, we anticipate entry by new firms, until $\pi = 0$
- Long-run competitive equilibrium \equiv point at which $P = LATC$, and there are no gains to entry for additional firms

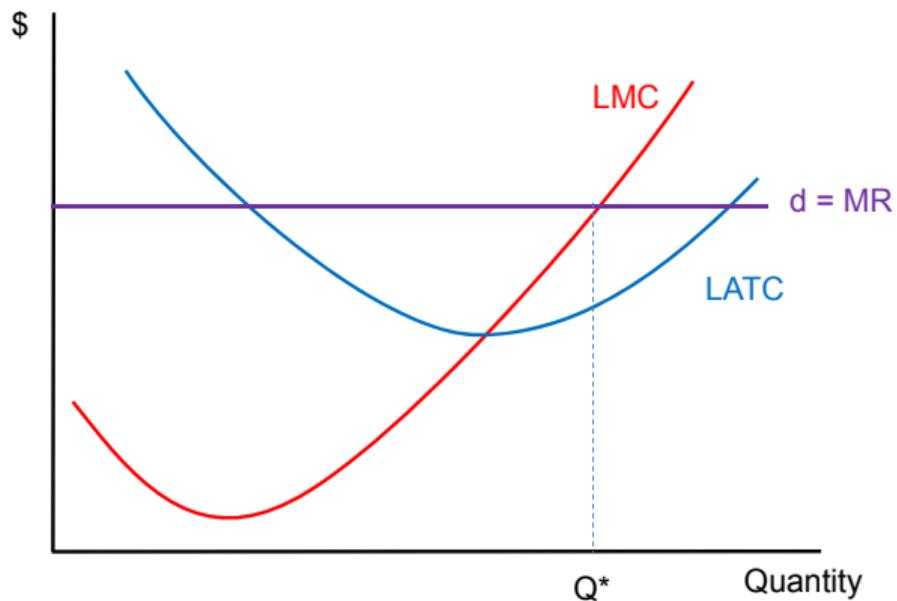
Profits and Entry

What is the long-run profit-maximizing Q ?



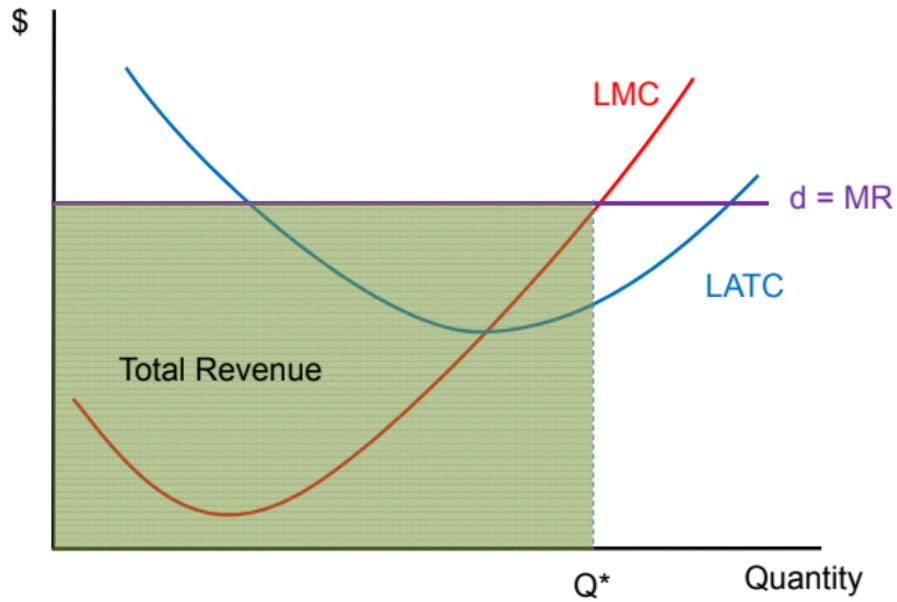
Profits and Entry

And where are total revenues?



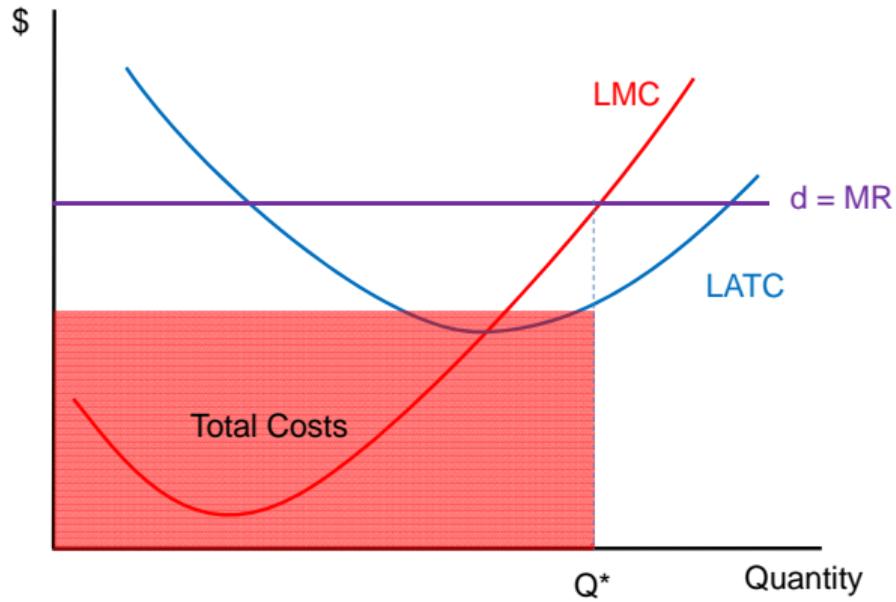
Profits and Entry

Total costs?



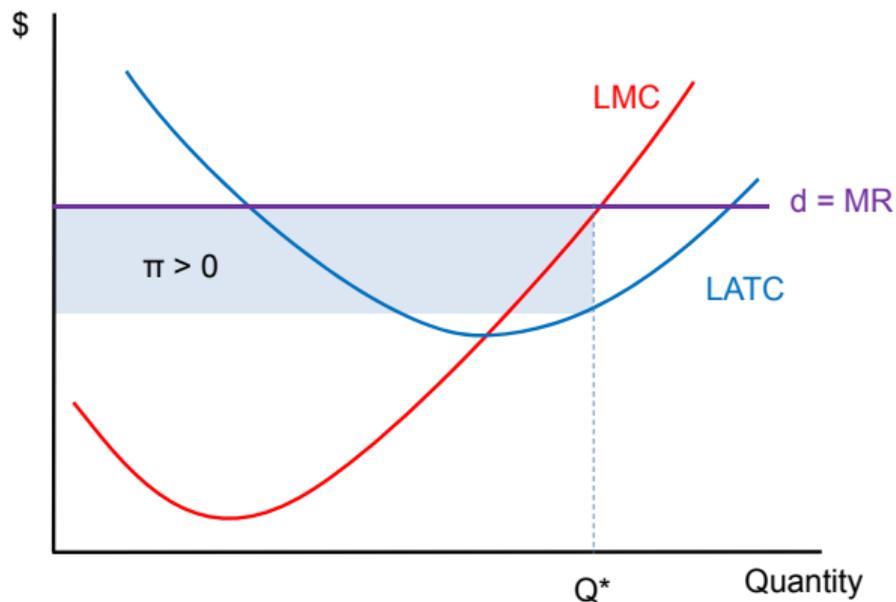
Profits and Entry

Where is profit?



Profits and Entry

Positive profits: Stay in business



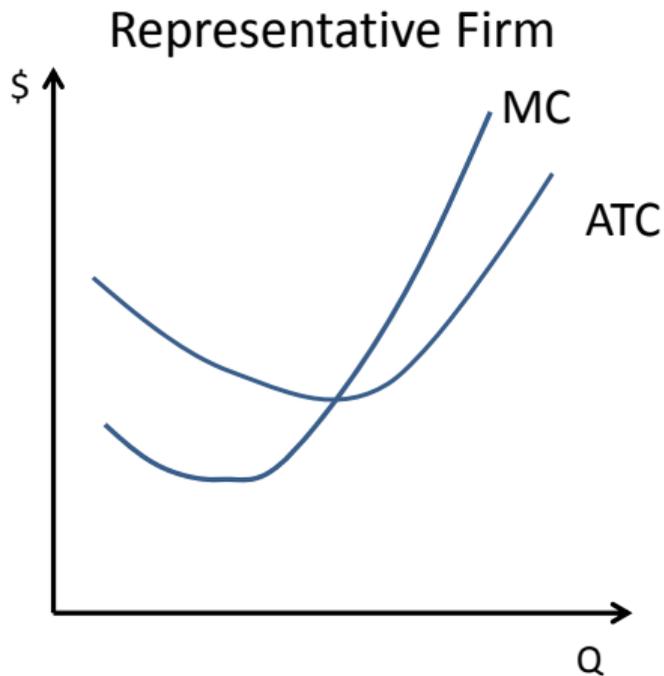
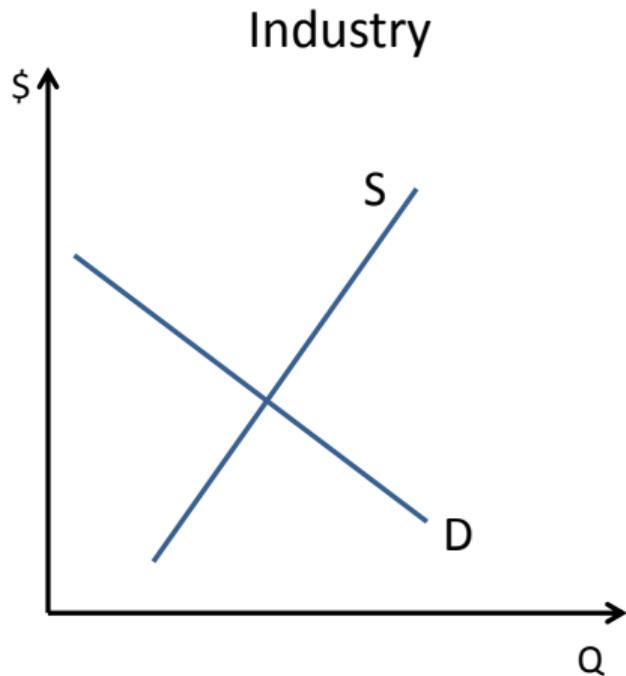
If economic profit exists, what should other firms do?

Long-Run Exit

- Free exit \equiv ability of firm to exit an industry without legal or technical barriers
- When should a firm exit the market? When $P < LATC$

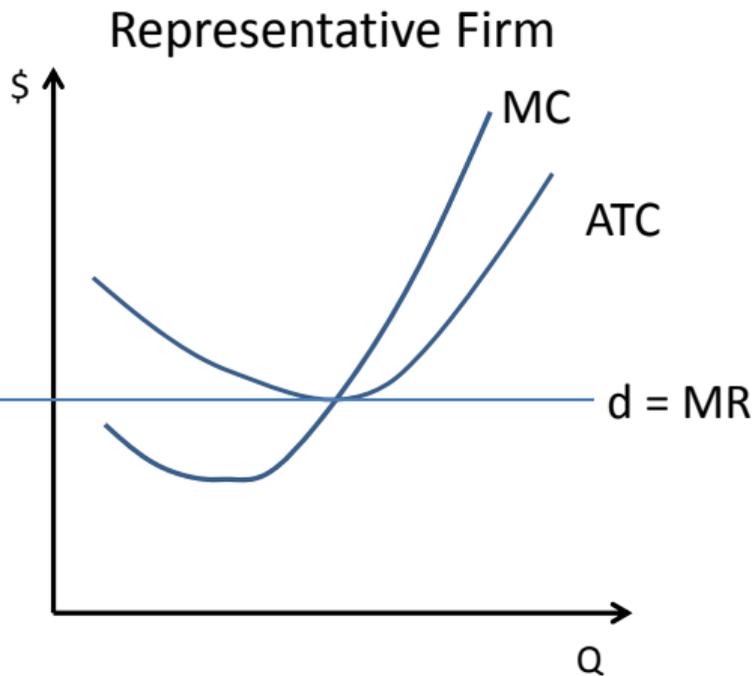
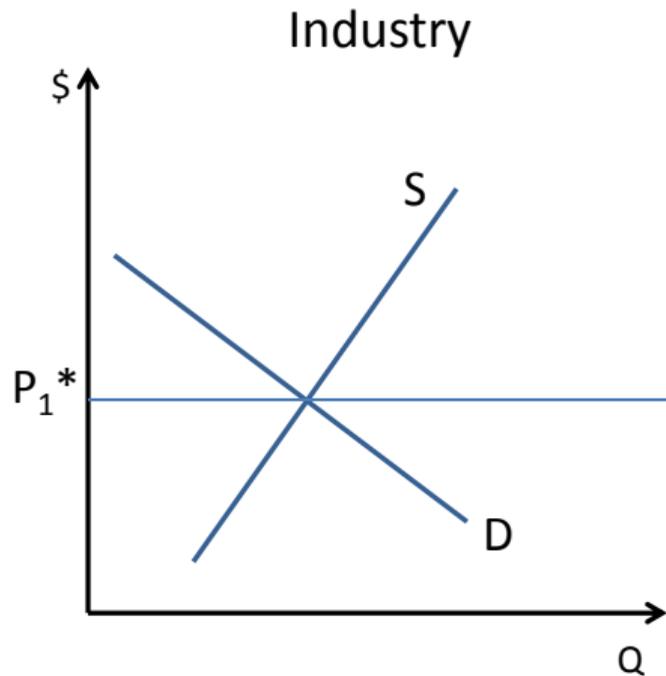
What Happens When Demand Increases?

Original Equilibrium



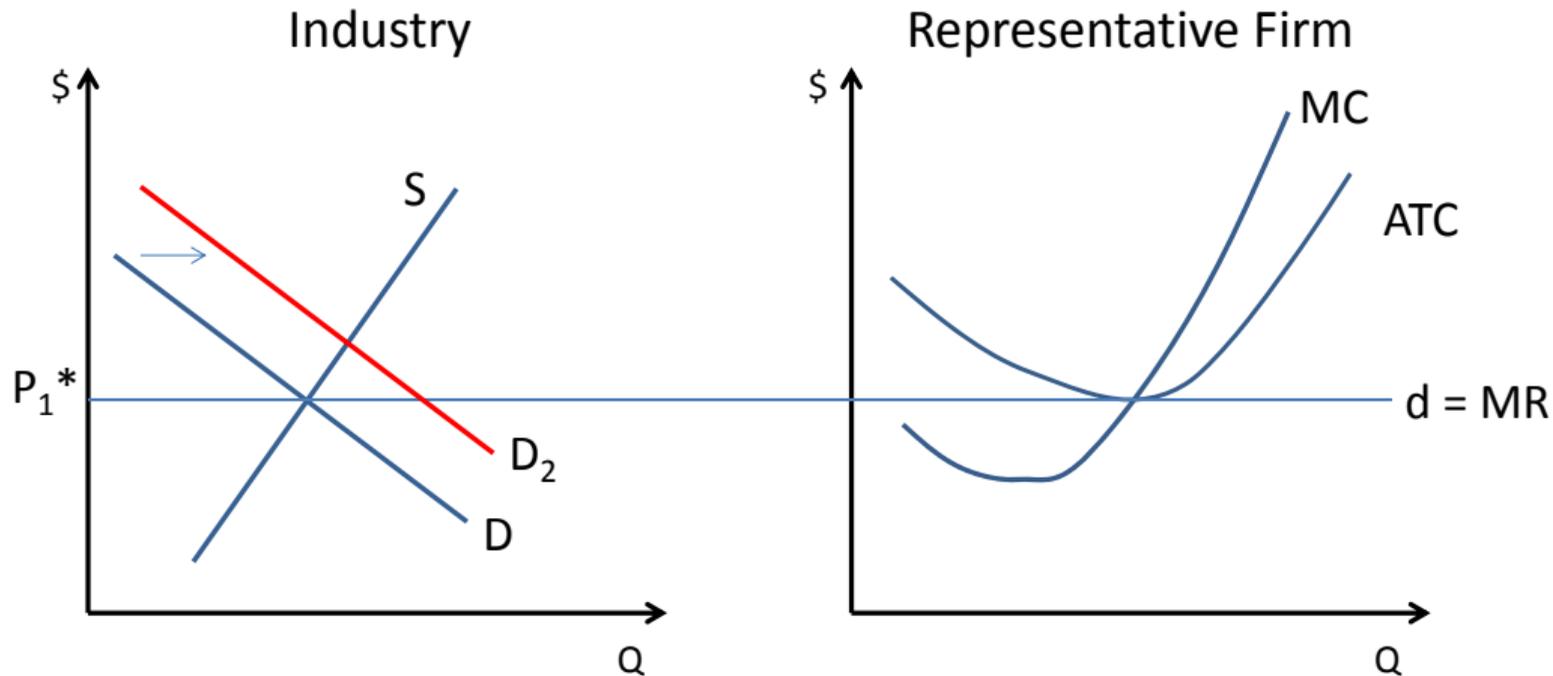
What Happens When Demand Increases?

Note Zero Profits



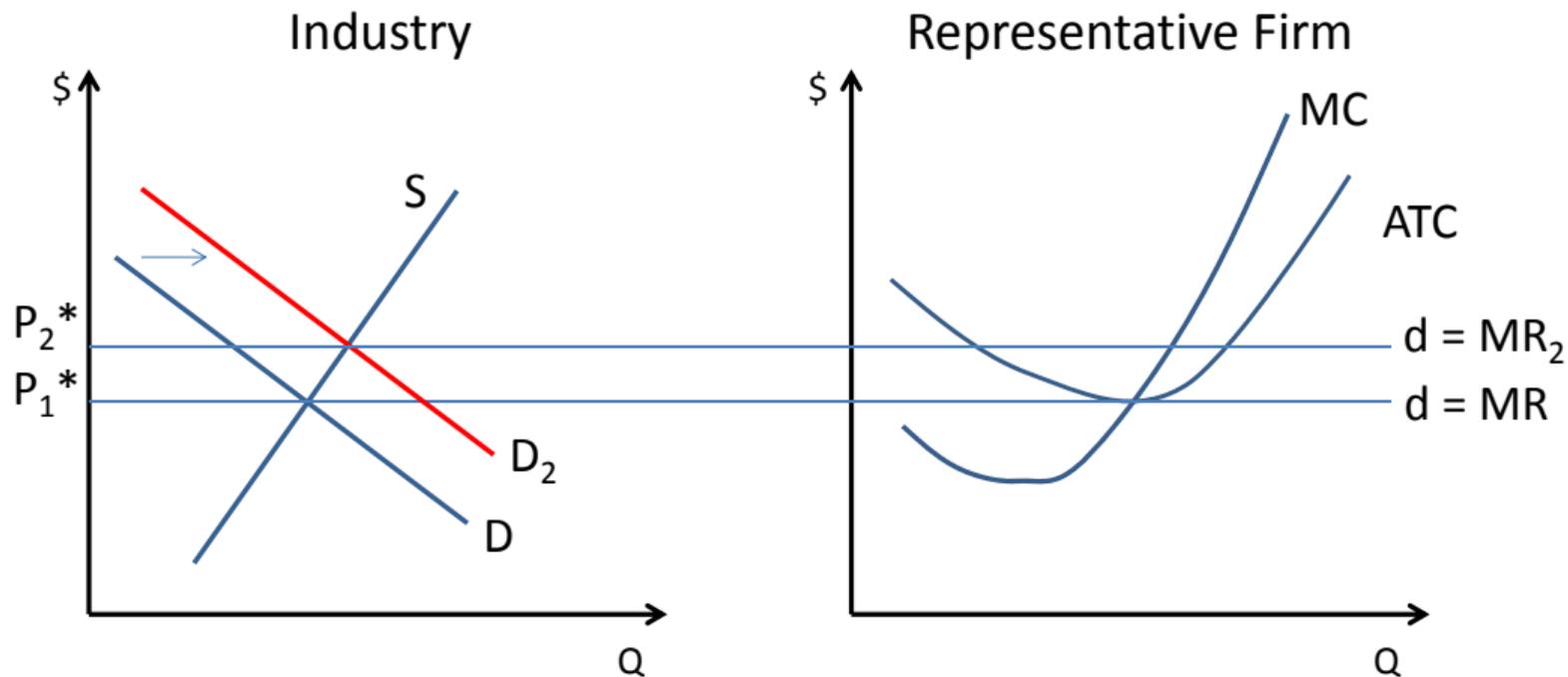
What Happens When Demand Increases?

Demand Increases. New MR?



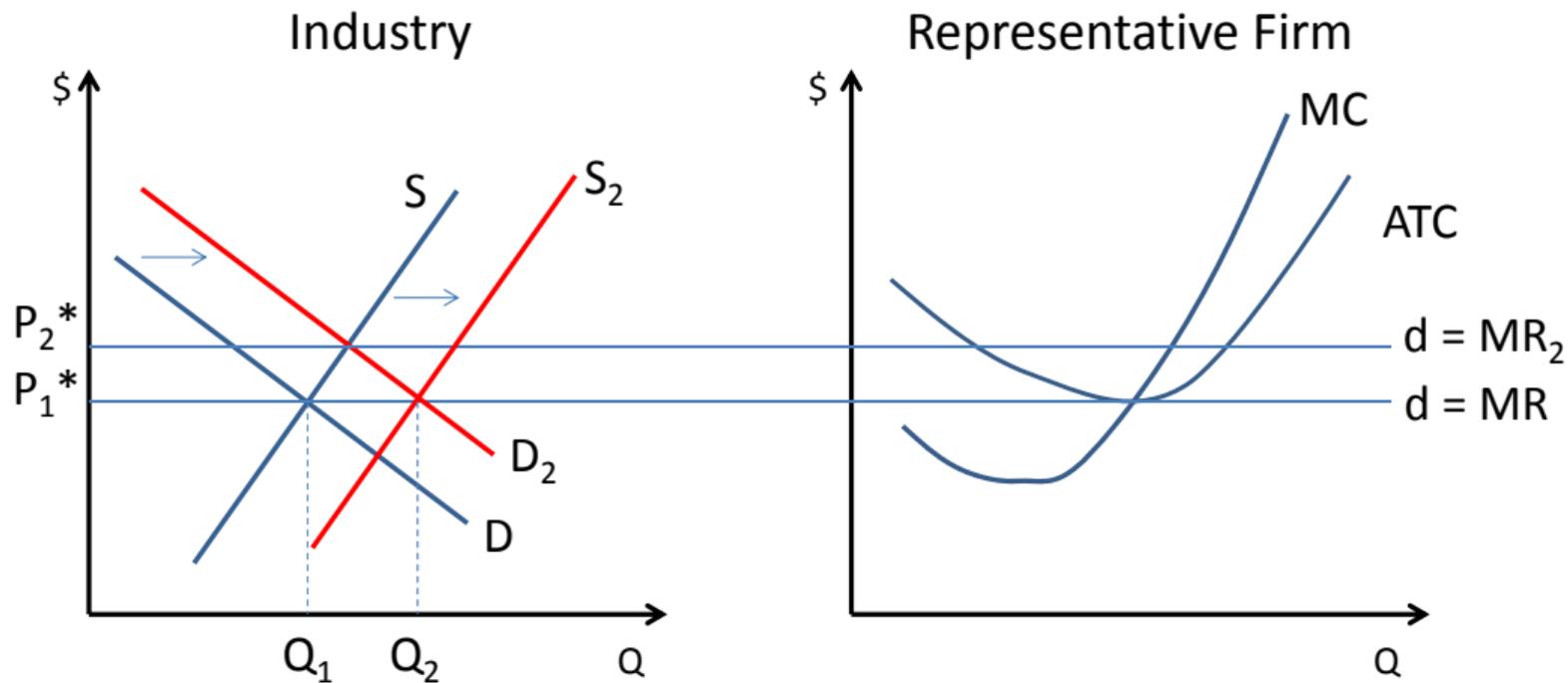
What Happens When Demand Increases?

What happens to profits? What happens to entry?



What Happens When Demand Increases?

Supply Increases to Offset Change in Demand



Finding the Long-Run Supply Curve

Recap: Suppose demand increases. What happens

- in the short run to prices?

Finding the Long-Run Supply Curve

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- in the long run to firm entry?

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- and in the long run to prices? return to market equilibrium

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→ the long-run supply curve is perfectly elastic

Finding the Long-Run Supply Curve

Suppose costs fall. What happens

- in the short run to prices?

Finding the Long-Run Supply Curve

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- in the short run to firm profits?

Finding the Long-Run Supply Curve

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Finding the Long-Run Supply Curve

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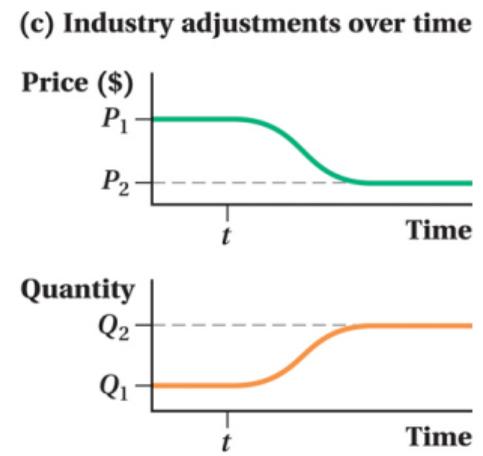
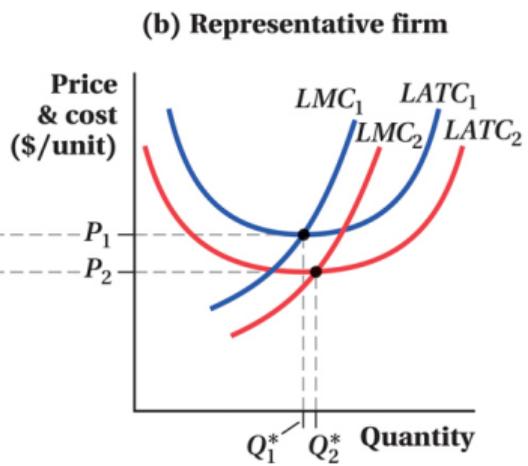
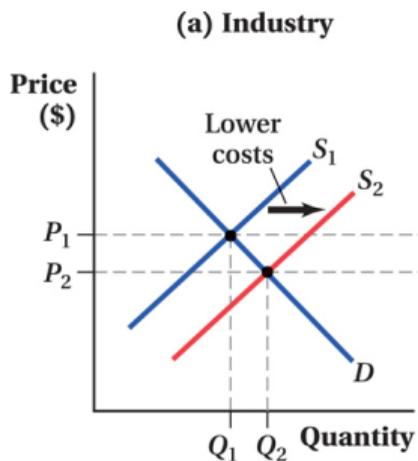
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→ **the long-run supply curve is perfectly elastic**

When Costs Fall



In Sum, In the Long Run

- Firms can enter
- Firms can exit
- Profits are zero
- $P = LATC$
- Supply is perfectly elastic

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In Sum, In the Long Run

- Firms can enter
- Firms can exit
- Profits are zero
- $P = LATC$
- Supply is perfectly elastic

If supply is perfectly elastic, do producers have surplus? **No**

Big Idea: What Does Perfect Competition Get You?

- Products sold at marginal cost
- Everyone who wants the product at market price can buy it
- Consumer surplus high
- Consumer demand drives firm decisions
- Social welfare – producer plus consumer surplus – maximized

Why Is Competition Important?

Martin Shkreli, CEO, Turing Pharmaceuticals

- business plan is to buy out-of-patent medications
- increase prices
- Dataprim is an AIDS drug
- “But what Shkreli recognized was that, even with a generic drug, regulatory barriers and a lack of competition can make big price hikes possible. ” *New Yorker*, October 5, 2015
- lots of media chat about antitrust response

Drug Goes From \$13.50 a Tablet to \$750, Overnight

By Andrew Pollack

Sept. 20, 2015



From *New York Times*

While the Antitrust Wheels of Government are Grinding Along

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Daraprim competitor to market \$1 pill after Turing chief Martin Shkreli hikes price

Shkreli has said the price hike was not the result of corporate greed

Next Class

- Turn in Problem Set 11
- Chapter 9
- Externalities – will update readings tonight or tomorrow AM