Lecture 10:
Returns to Scale, Economies of Scale & Economies of Scope
Supply in a Competitive Market

November 3, 2026

Course Administration

Four lectures to go after today!

1. Lecture 11: Competition 2 of 2
2. Lecture 12: Market power & Quiz 2
3. Lecture 13: Externalities
4. Lecture 14: Public goods

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Course Administration

1. Midterms
   - Brought for return after class
   - Please see me if your score is < 62
   - Added office hours Nov. 12 10:15 to 11:30
2. Final
   - Exam December 15, see webpage for dates and location
   - Will post last year's exam this week or next
   - Review session December 10, 6 to 8 pm

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Next Week: Ripped from the Headlines

Send article by Wednesday midnight.

Afternoon

Finder	Presenter
Bridget V.	Michelle G.
Jimmy G.	Nash K.
Kendell Y.	Or Nash G.

Evening

Finder	Presenter
Muriel A.	Dejau T.
Tucker B.	Dylan W.
Dejau T.	Shoshana M.

This Week: Ripped from the Headlines

Afternoon

Finder	Grapher	Summarizer
Ali W.	Tom E.	Anders S.
Beylie I.	Kendell Y.	Liz T.
Toni W.	Bridget V.	Sydney W.

Evening

Finder	Grapher	Summarizer
Ben J.	Devan K.	Emily S.
Emma L.	Fatima Y.	Olivia F.
Emily S.		

Today

The benefits and costs of getting big

- Returns to scale
- Economies of scale
- Economies of scope

Today

The benefits and costs of getting big

- Returns to scale
- Economies of scale
- Economies of scope

How perfectly competitive firms behave

- Defn: perfect competition
- Profit maximization
- Short run perfect competition
- Long run perfect competition

Scale: Returns, Economies, and Scope

Economies of Scale, Returns to Scale, and Economies of Scope

Returns to scale

- Does proportional increase in inputs increase output? By how much?

Economies of Scale, Returns to Scale, and Economies of Scope

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Economies of Scale

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Economies of Scale, Returns to Scale, and Economies of Scope

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Economies of Scale

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Economies of Scope

- Does increasing the number of products the firm produces lower costs for the production of any product?

Returns to Scale

- You use 5 units of K and 3 units of L
- This costs \$100
- Gives output of 20

Returns to Scale

- You use 5 units of K and 3 units of L
- This costs \$100
- Gives output of 20
- Increase scale! Double inputs

Returns to Scale

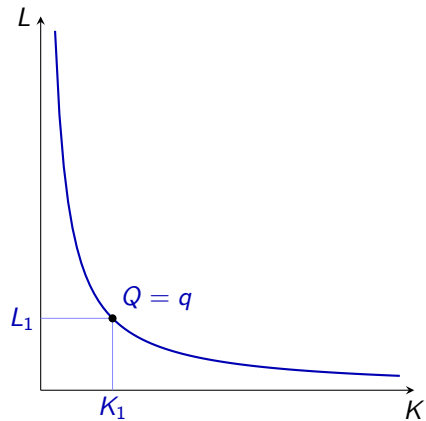
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- Now you use 10 units of K and 6 units of L
- Do you make more or less than 40 units of output?

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Constant returns to scale

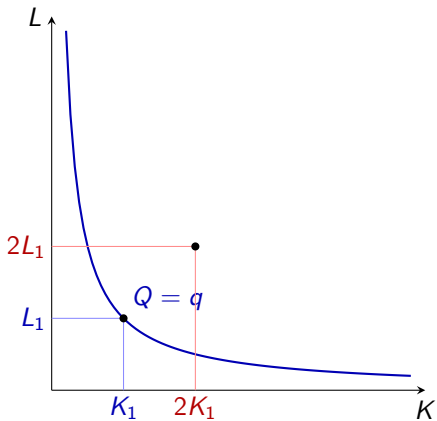


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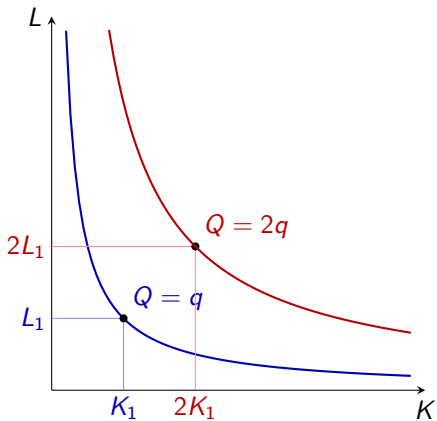


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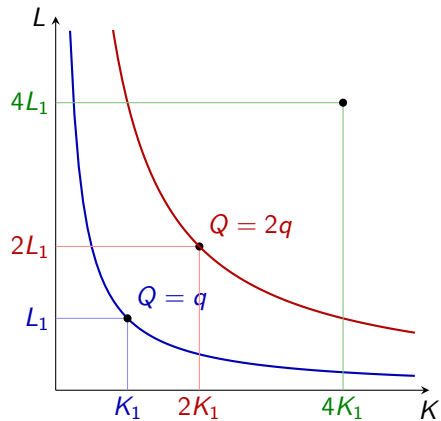


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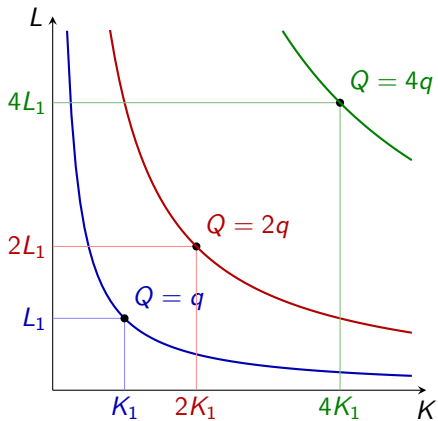


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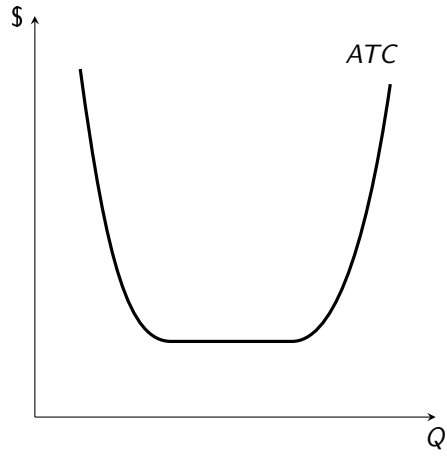
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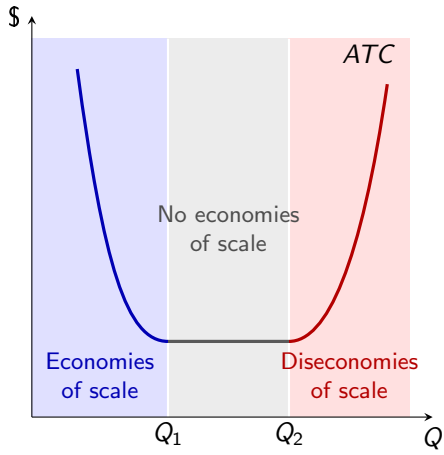
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What Drives Returns to and Economies of Scale?

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  - Fixed costs
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  - Learning by doing – if the firm gets bigger and better at production by producing
- Decreasing returns
  - Regulation
  - Limited low cost/high quality inputs (violates one of our assumptions)

Returns to Scale Examples

Think here about doubling inputs. Do you double outputs?

Decreasing returns to scale

Returns to Scale Examples

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Decreasing returns to scale

- Restaurant that gets too big
- Projects that become too big to manage

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Decreasing returns to scale

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- Projects that become too big to manage

Increasing returns to scale

- Cooking, frequently (but labor is a complication)
- Library system
- Example with big fixed cost and low *MC*

Economies of Scale Examples

Decreasing economies of scale

Economies of Scale Examples

Decreasing economies of scale

- Very high end food
- Artisan manufacturing
- Data center build out

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Increasing economies of scale

- Social networks
- Library system

Economies of Scale and Returns to Scale

Returns to scale

- Does increase in inputs increase output? By how much?

Economies of Scale

- Does increase in total costs increase output? By how much?

Therefore

- Increasing returns to scale $\implies$ economies of scale
- Economies of scale $\not\implies$ returns to scale

Economies of Scope

- Economies of scope $\equiv$ firm produces multiple outputs more cheaply together than it would each individual output
- Diseconomies of scope $\equiv$ firm produces multiple outputs at a higher cost than it would if it produced each output individually
- Where do economies of scope come from?

Economies of Scope

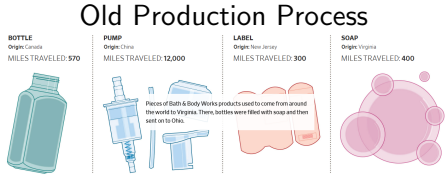
- Economies of scope $\equiv$ firm produces multiple outputs more cheaply together than it would each individual output
- Diseconomies of scope $\equiv$ firm produces multiple outputs at a higher cost than it would if it produced each output individually
- Where do economies of scope come from?
- From sharing common inputs or knowledge

Economies of Scope: Bath and Body Works

BBW produces at lower average cost when it produces more soap/body wash/other products flavors

Bath & Body Works®

Thanks to the *Wall Street Journal*



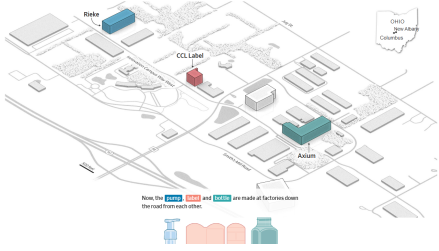
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New Production Process Allows for Quicker Product Updates



// Required luring producers to Ohio

Bath and Body Works Scope from *WSJ*

Nguyen estimates that production in the U.S. employs around 10 people and required $12 million in capital investment, versus employing around 50 people with under $2 million in investment for similar production capacity in China.

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The automation and proximity means that pumps and their parts can arrive and be fully created in under a month, compared with five months previously. Rieke sells around 300 million pumps to Bath & Body Works a year.

Why Should Policymakers Care About Economies of Scale or Scope?

- Mergers
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- Complementary investments to scope
  - Firms may need workforce or public infrastructure to achieve economies of scope
  - $\rightarrow$ Public ports, nodes, etc.
  - $\rightarrow$ Investments in workforce

Big Questions for Today

Big Questions for Today and Next Week

- 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?
- Next week: Which firms get producer surplus?
- Next week: Why is competition so valuable?

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  - Inhibit: limit prices or promote or limit firm behavior
- Weigh benefits of policy against harms to competition

Where We're Going

1. Perfect competition
2. Profit maximization
3. Short run perfect competition
4. Long run perfect competition

Market Structure and Perfect Competition

Market Characteristics and Types

Key Characteristics of Markets

- Number of firms
- Substitutability of products
- Barriers to entry

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Types of Markets

- Perfectly competitive
- Monopolistic competition
- Oligopoly
- Monopoly

Market Characteristics by Type

	Number of firms	Substitutability of Products	Barriers to Entry
Perfectly Comp.	many	entirely	none
Monopolistic Comp.	many	not entirely	yes
Oligopoly	few	either	some
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Elements of a Perfectly Competitive Market

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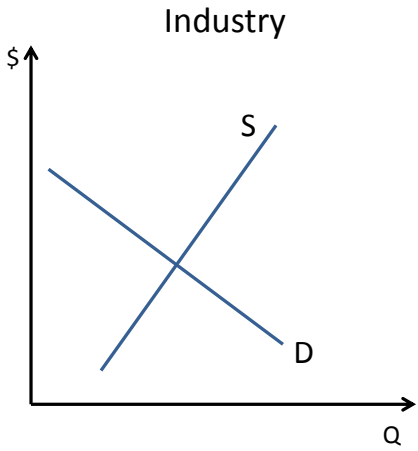
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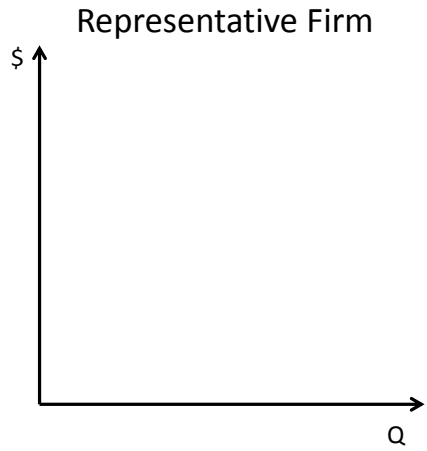
- Very rare
- The closer we get to this, the better off consumers are
- Serves as a baseline "best case scenario"

Demand Curve as Seen By a Price-Taker

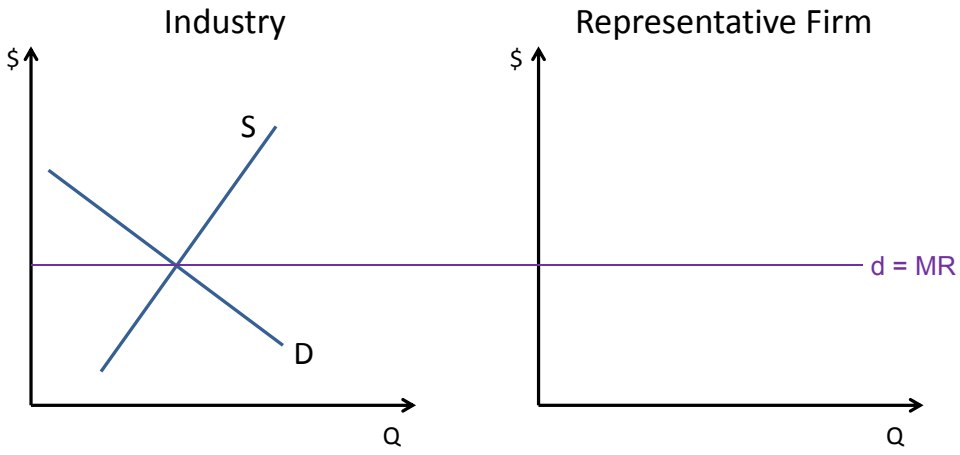
- **Call a perfectly competitive firm a price-taker**
- This firm can't impact price
- To this firm, demand is infinite at market price
- In other words, the firm perceives demand as perfectly elastic at the equilibrium market price

Market Demand vs Demand Perceived by Firm

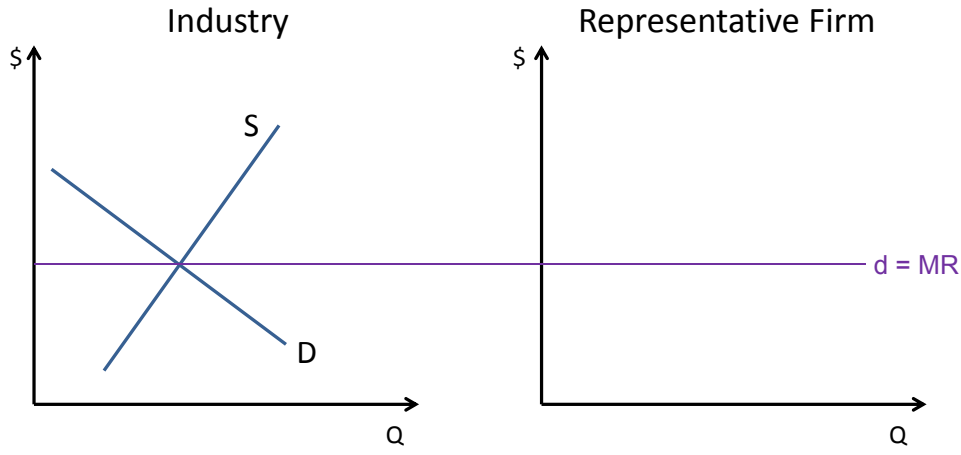




Market Demand vs Demand Perceived by Firm



Market Demand vs Demand Perceived by Firm



Perfectly competitive firm perceives demand as horizontal

Profit Maximization in a Perfectly Competitive Environment

What are Profits?

Profits = total revenue - total cost

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$$\pi = TR - TC$$

What are Profits?

Profits = total revenue - total cost

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

Reminder: Accounting vs. Economic Costs and Profits

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    - revenues: flower sales
    - costs: salaries, flowers, building upkeep
  - economic profit
    - add opportunity cost of structure to total costs
    - one-story building in a booming area

Marginal Revenue for a Perfectly Competitive Firm

- Marginal revenue $\equiv$ additional revenue from an additional unit of output

Marginal Revenue for a Perfectly Competitive Firm

- Marginal revenue $\equiv$ additional revenue from an additional unit of output
- If the firm perceives the demand curve as constant, then $MR = P$
- Firm cannot affect P

Profit Maximization for All Types of Firms

- Additional cost from an additional unit is MC
- If $MC > MR$...

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all types of firms maximize profit where $MR = MC$

Profit Maximization for Firms in a Competitive Market

Because competitive firms are price takers

$$P = MR$$

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To maximize profits, firms then set

$$\begin{aligned} MR &= MC \\ \mathbf{P} &= \mathbf{MC} \end{aligned}$$

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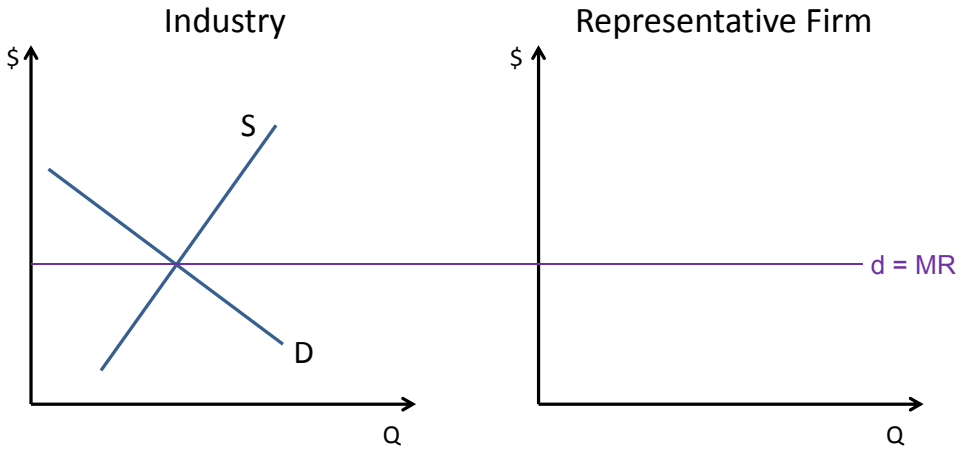
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Perfectly competitive firms maximize profits where $P = MC$

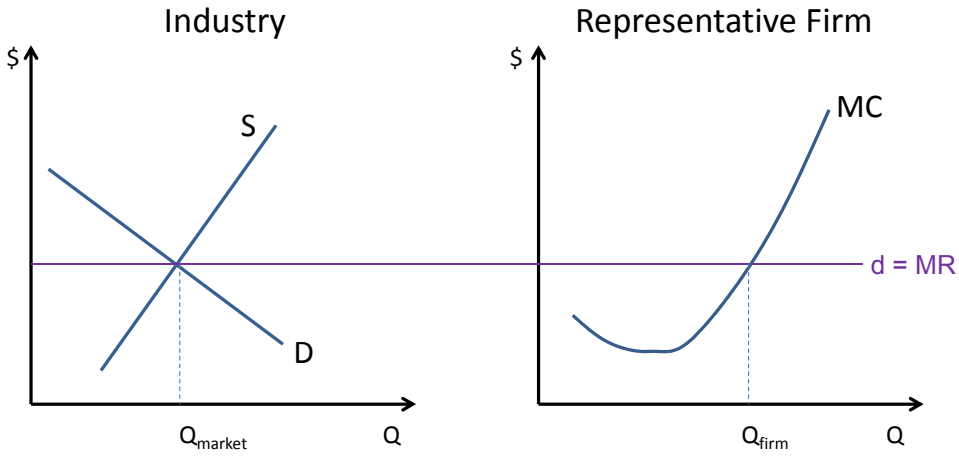
$MR = MC$ in Pictures

Firm's View of Demand



$MR = MC$ in Pictures

Intersecting with Firm's Costs



What are Profits When a Firm is Maximizing Profit?

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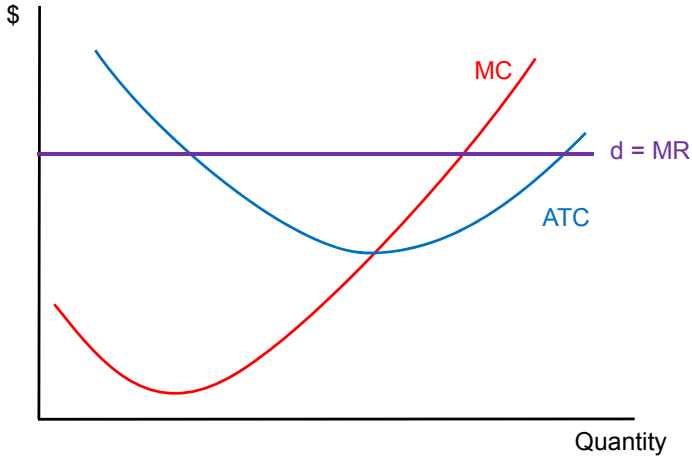
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Profits = total revenue - total cost

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

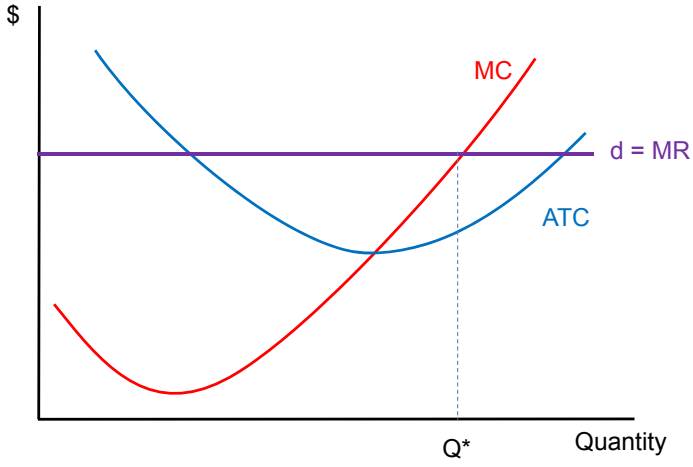
Finding Profit

What is the Profit-Maximing Q?



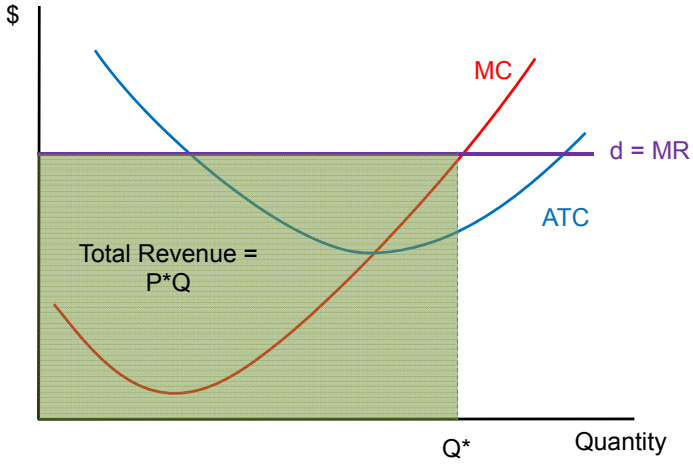
Finding Profit

Where is total revenue?



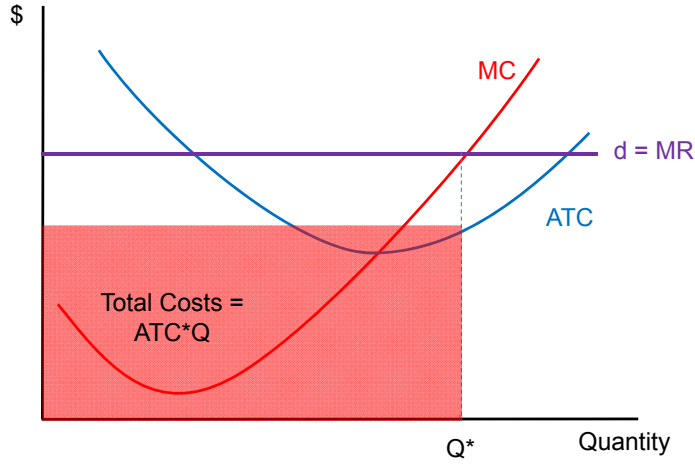
Finding Profit

Where are total costs?



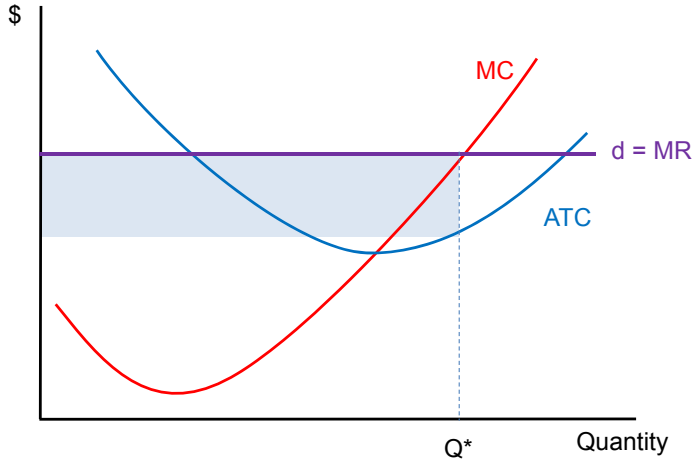
Finding Profit

How do you find profit?



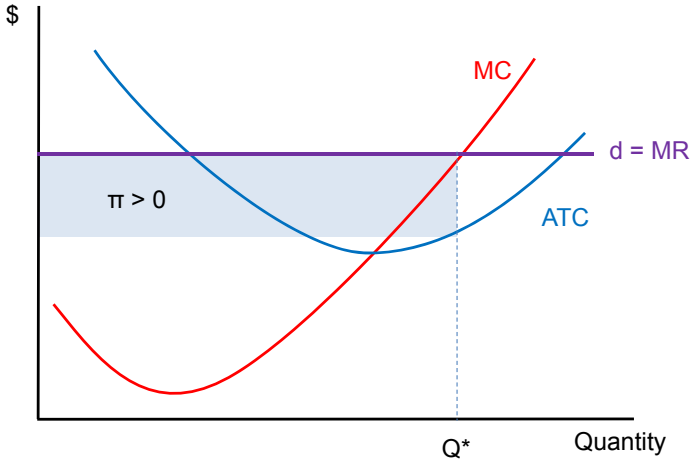
Finding Profit

Is $\pi > 0$ or < 0?



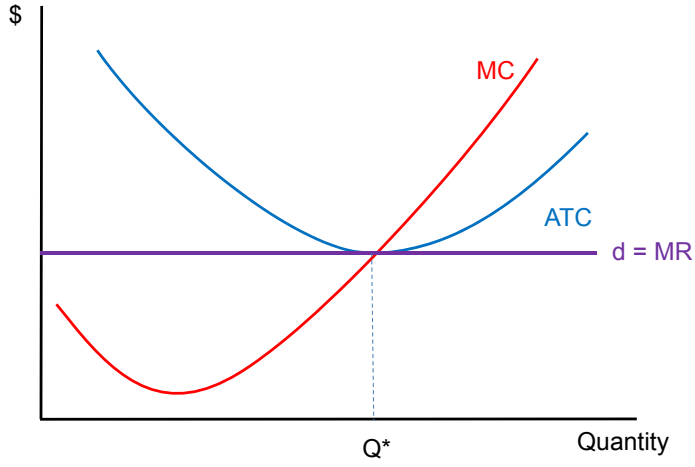
Finding Profit

$\pi > 0$



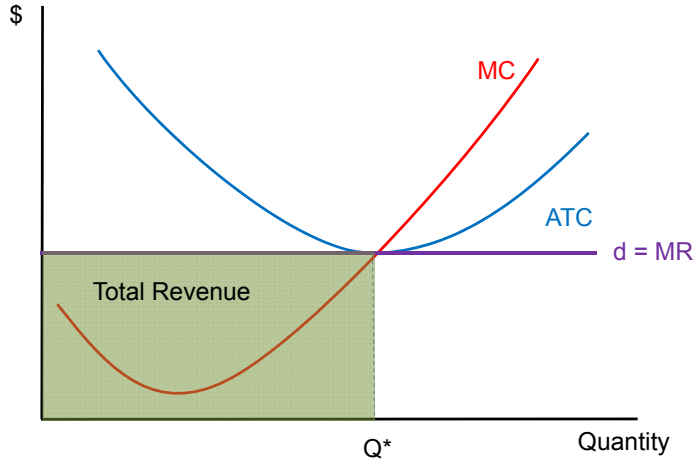
Finding Profit

Profits Now? First find revenues



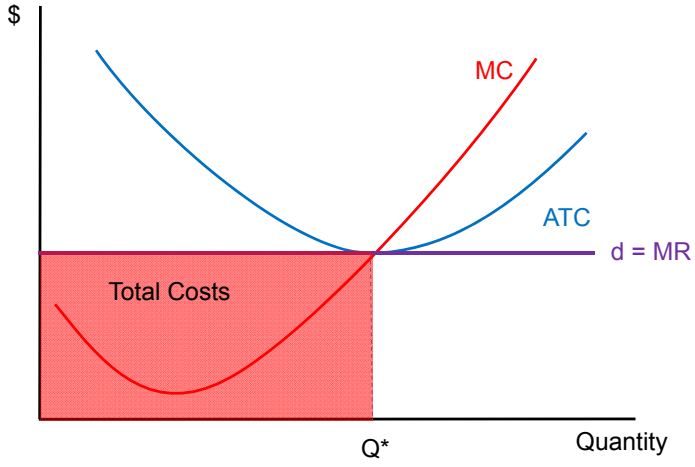
Finding Profit

Profits Now? Now find costs



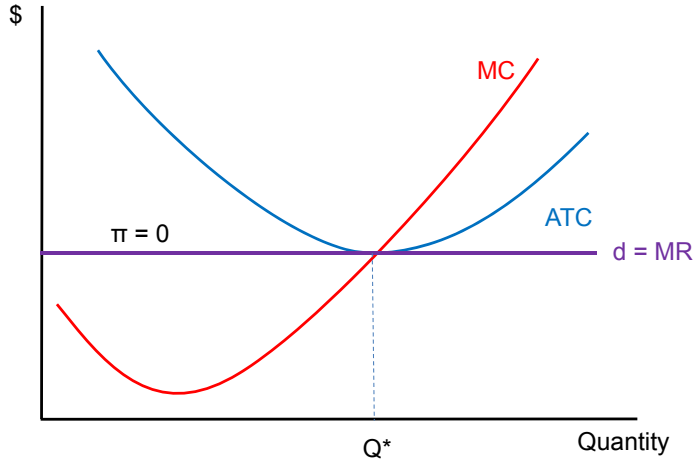
Finding Profit

Profits Now?



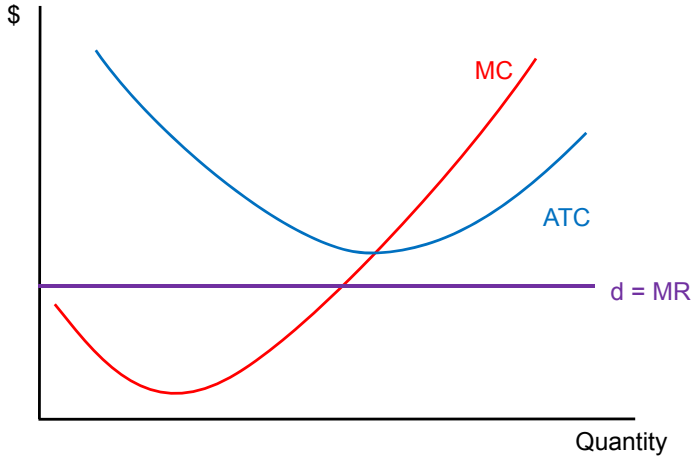
Finding Profit

No Profits to Be Found



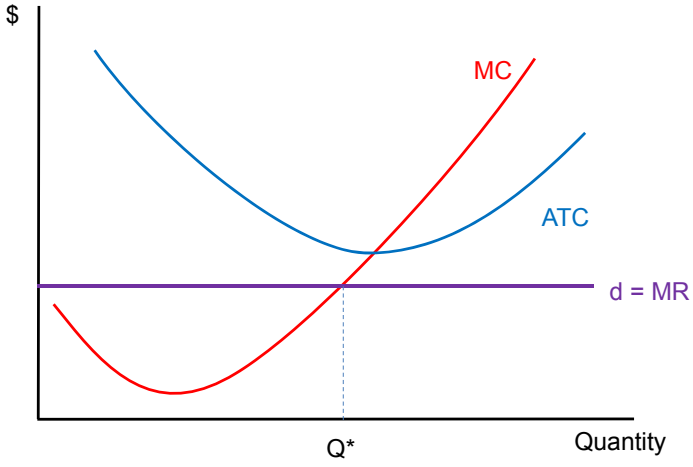
Finding Profit

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



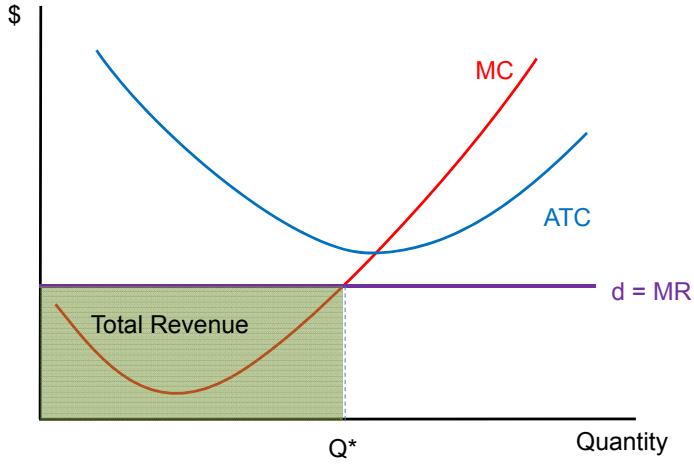
Finding Profit

Profits Now? Find total revenue



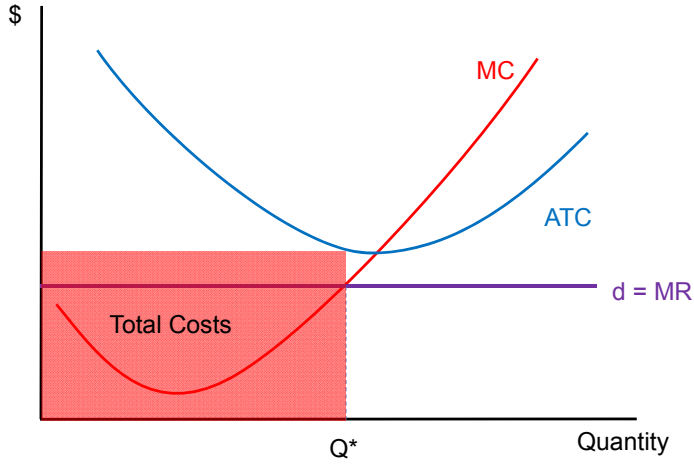
Finding Profit

Profits Now? Find total costs



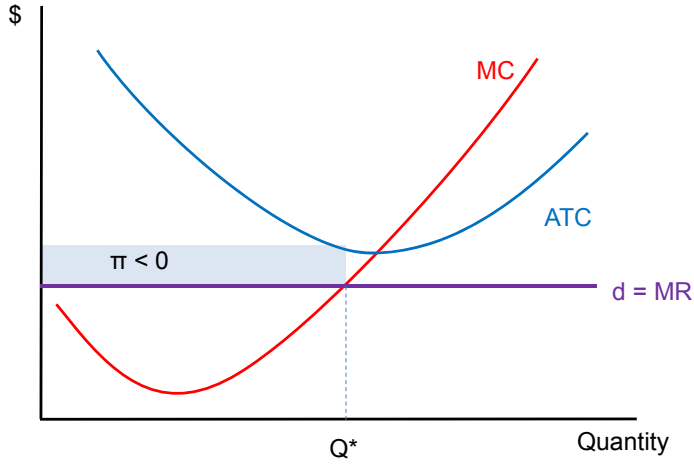
Finding Profit

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



Finding Profit

Profits are negative



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

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- In the short run, what does the firm have to pay if it runs or not? fixed costs
- So profits in the short run, with no output is

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

- 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 $\pi < 0$?

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 $\pi < 0$?

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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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We can re-write this as

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Operate if

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

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 $P > AVC$, equivalent to $TR > VC$.

Review: Keeping the Short-Run Curves Straight

- For perfectly competitive firms, $MR = P$
- Maximize profit where $MR = MC$
- Profit is $Q * (P - ATC)$
- 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,

$$\begin{aligned} P &= MC \\ 10 &= 5Q \\ Q &= 2 \end{aligned}$$

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,

$$\begin{aligned} P &= MC \\ 10 &= 5Q \\ Q &= 2 \end{aligned}$$

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

The firm should produce if

$$\begin{aligned} P &> AVC \\ 10 &> 6 \end{aligned}$$

Yes, the firm should produce.

Next Class

- Turn in Problem Set 9
- Second half of Chapter 8