1.1 - Intro to Economics

Monday, January 9, 2017 8:09 PM

What is Economics

- The study of how people seek to satisfy their need and **wants** by making **choices**.
- Scarcity
    - definition: the concept of having unlimited **wants** vs. having limited **resources**

Macroeconomics vs. Microeconomics

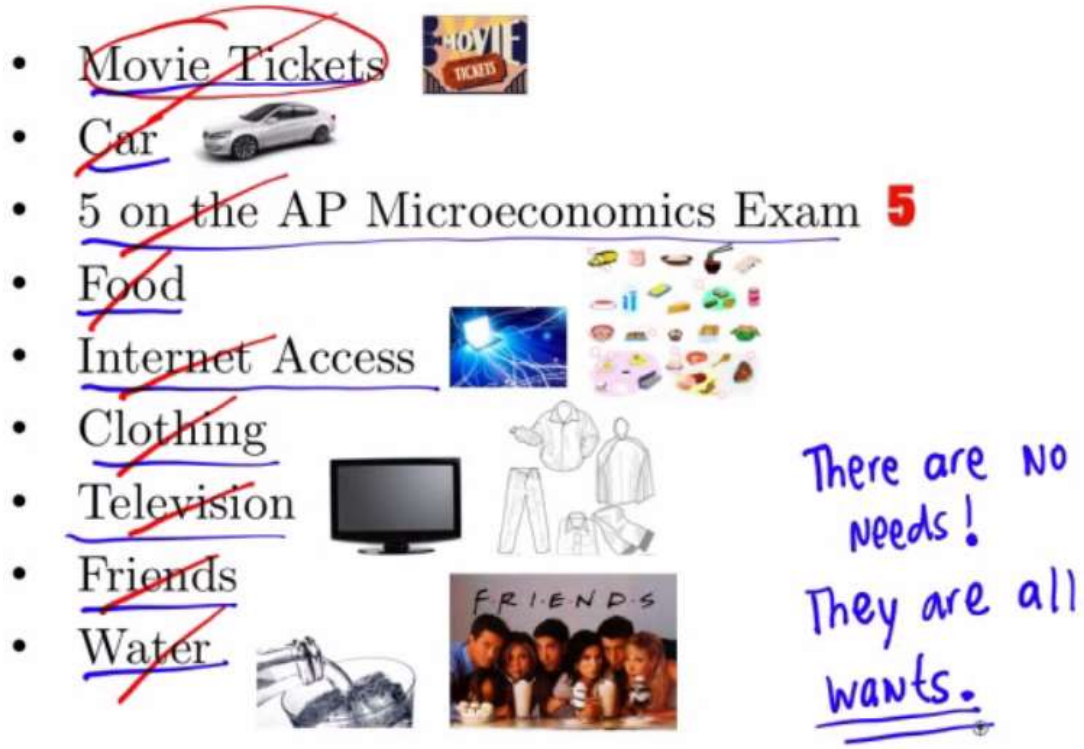
- Macroeconomics
    - involves economic problems encountered by the nation as a whole
- Microeconomics
    - concerned with the economic problems faced by individual unites within the overall economy

Four Factors of Production (Resources)

- Land
    - definition: **natural** resources that are used to make goods and services
- Labor
    - definition: the effort that **people** devote for a paid task
- Capital
    - definition: any human-made resource used to **create** other goods and services
    - Physical capital: tools and buildings
    - Human capital: skills and knowledge through education and experience
- Entrepreneurship
    - definition: a person who uses the three factors of production to create goods and services

Needs vs. Wants

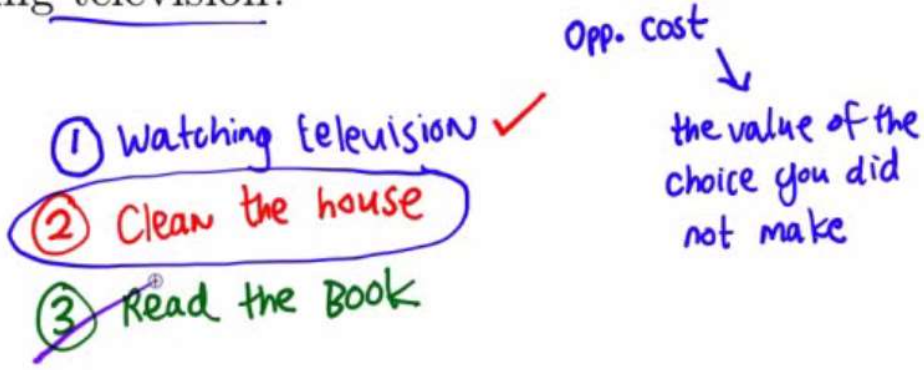
- Need - There is **no** other alternative
- **We do not NEED anything!**
- Economics is about placing value on the things that you WANT and making CHOICES based on these wants.



Every Choice Has a Cost

- **Nothing is free.**
- When you make a choice, the **best** alternative you gave up as a result is known as the **opportunity cost.**
- All the possible things that you give up would referred to a **trade-off**
- **Every choice**, however large or small, will incur an opportunity cost.

After school, you are faced with three options: *watching television*, *reading a book*, or *cleaning up the house*. You prefer cleaning up the house to reading a book, but prefer watching television to cleaning up the house. What is the opportunity cost of watching television?



Positive Economics vs. Normative Economics

- Positive Economics
  - branch of economics analysis that **describes** the way the economy **actually works**
- Normative Economics
  - branch of economic analysis that **interjects** subjective claims on how the economy **should work**
- Positive statement:
  - **If** a new tax is implemented, the state **will** collect $1 million in new revenue.
  - **If** the government provides a safety net for citizens, income taxes **will** be increased.
  - **If** you spend 15 hours studying AP Microeconomics, you **will** get a 5 on Microeconomics.
- Normative statement:
  - The government **should** raise taxes on higher income families **in order to** raise more revenue.
  - The government **should** provide a safety net for those in society that are incapable of thinking care of themselves

- You **should** get a 5 on the AP Microeconomics Exam.

Marginal Analysis

- definition: deciding whether to do or use one **additional** unit of some **resource**
- Most decision are not "**all or nothing**" propositions
- Involves deciding whether or not to consume the next unit

marginal change
a small incremental adjustment to a plan of action

Rational people know that decisions in life are rarely black and white but usually involve shades of gray. At dinnertime, the question you face is not "Should I fast or eat like a pig?" More likely, you will be asking yourself "Should I take that extra spoonful of mashed potatoes?" When exams roll around, your decision is not between blowing them off and studying twenty-four hours a day but whether to spend an extra hour reviewing your notes instead of watching TV. Economists use the term **marginal change** to describe a small incremental adjustment to an existing plan of action. Keep in mind that *margin* means "edge," so marginal changes are adjustments around the edges of what you are doing. Rational people often make decisions by comparing *marginal benefits* and *marginal costs*.

Economic Profit

- Economic Profit = Accounting Profit - Opportunity Cost

You make $75,000 a year at your current job as a teacher for XYZ School District. You are considering a job offer from ABC School District in which the pay is $100,000 a year. Should you accept the new job?

Normative issue.

Benefits / Costs:

XYZ	ABC
$75,000	$100,000

Economic Profit = Accounting Profit − Opportunity Cost

−$25,000 = $75,000 − $100,000

1.2 - Production Possibilities Frontier

Monday, January 9, 2017 9:32 PM

Production Possibilities Frontier

- **Graph** that shows the combinations of amounts of **two items** that could be produced using the **same resources**
- All points on the graph are points of **efficiency**
- If you don't use all resources, then you have points of **underutilization** (or **inefficiency**)
- PPF Graph show alternative ways to use resources but does not show the **best** way because that is a **normative issue**.
- Famous "Guns or Butter" Analogy
    - Government could use its resources to produce "guns" or military goods.
    - Government could use its resources to produce "butter" or domestic goods.
    - It highlights the **trade-offs** an economy faces in using **scare resources**.

The production possibilities frontier is the graphical portrayal of the information contained in Table 2.1. It shows the combinations of two goods that can be produced if the economy uses all of its resources fully and efficiently. Figure 2.1 is the production possibilities frontier that corresponds to Table 2.1. Points A through G

are plotted with gun production measured on the vertical axis and butter production along the horizontal axis.

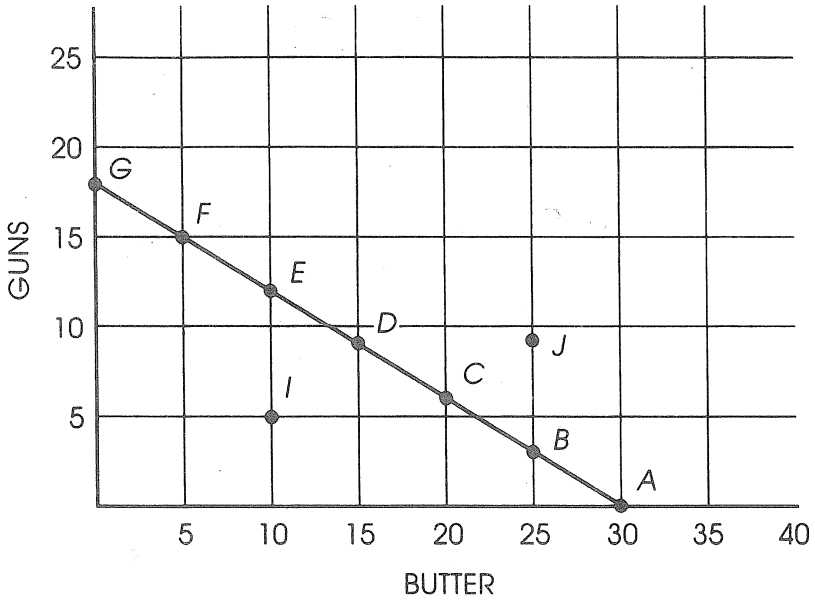


Fig. 2.1 Production Possibilities Frontier

The economy has the option of producing any combination of guns and butter along the frontier. At Point B most of the economy's resources are devoted to butter production. Only three guns are produced. At Point F gun production is predominant. Still, the economy is using its resources fully and efficiently at both points. A normative analysis is required to determine which point is preferred. On efficiency grounds all the points along the frontier are equal.

Points inside the frontier (Point I) are possible also. However, if the economy is operating at a point inside the frontier, resources are not being used fully or efficiently. Consider Point I, where 10 pounds of butter and six guns are being produced per year. By the definition of the production possibilities frontier we know that when the economy produces 10 pounds of butter, 12 guns could be produced if resources were used fully and efficiently (Point E). Point I represents a combination of guns and butter that does not require full or efficient resource utilization. The economy could do better by producing some combination of the two goods that lies on the frontier.

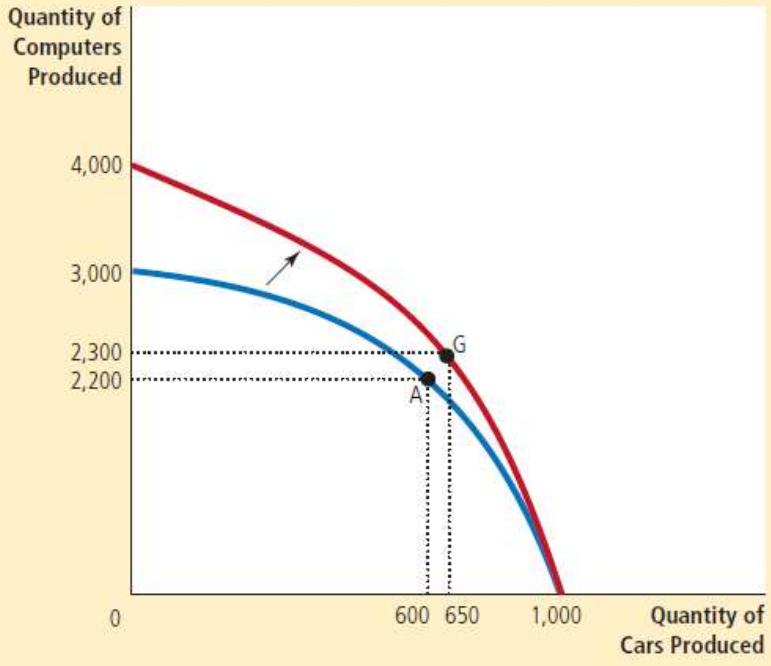
Points outside the production possibilities frontier (Point J) are unobtainable. Point J represents a combination of 25 pounds of butter and nine guns per year. By the definition of the production possibilities frontier we know that if 25 pounds of butter are produced, only three guns can be produced (Point B) if resources are used fully and efficiently. Therefore, points outside the frontier cannot be attained at this time.

Shift in the Production Porribilities Frontier

- Points outside the PPF may be attained at some future date because the frontier may shift so that points like J lie along the new frontier.
- The frontier can also shift **inward** representing a change for the **worse**.
- **Factors** that cause the PPF to shift:
    - changes in the amount **resources** in the economy
    - change in **technology** and **productivity**

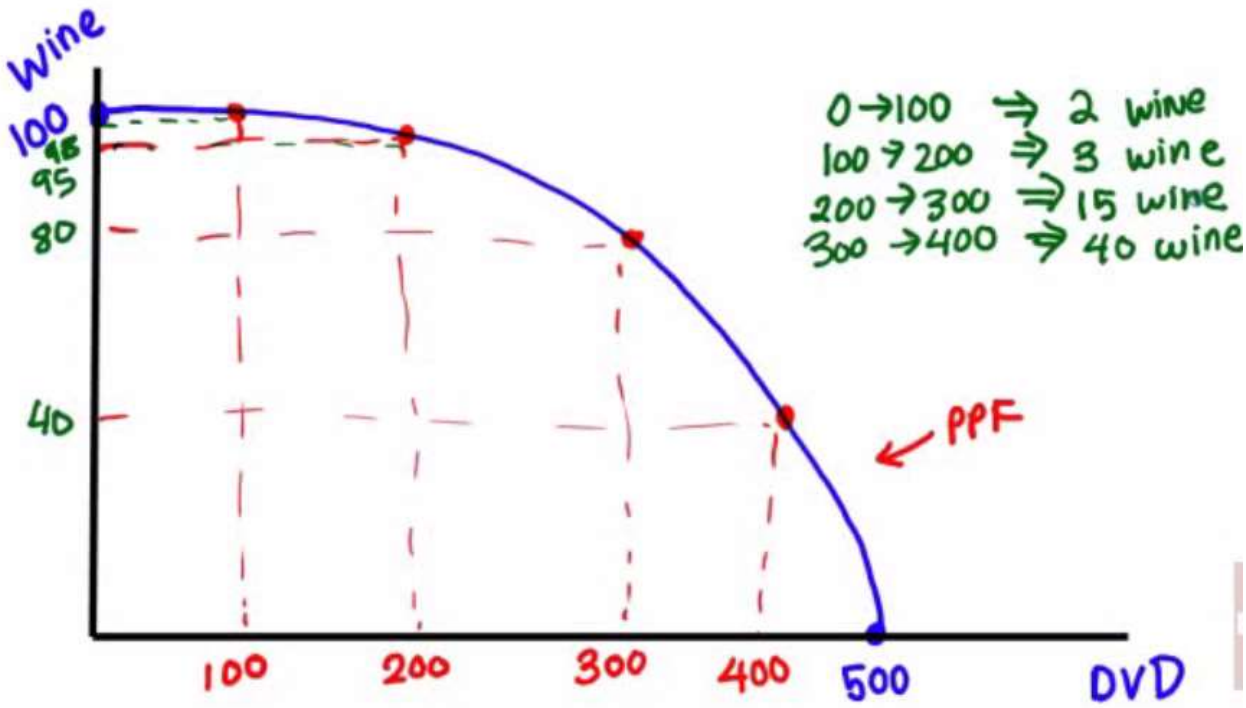
FIGURE 3

A Shift in the Production Possibilities Frontier
A technological advance in the computer industry enables the economy to produce more computers for any given number of cars. As a result, the production possibilities frontier shifts outward. If the economy moves from point A to point G, then the production of both cars and computers increases.



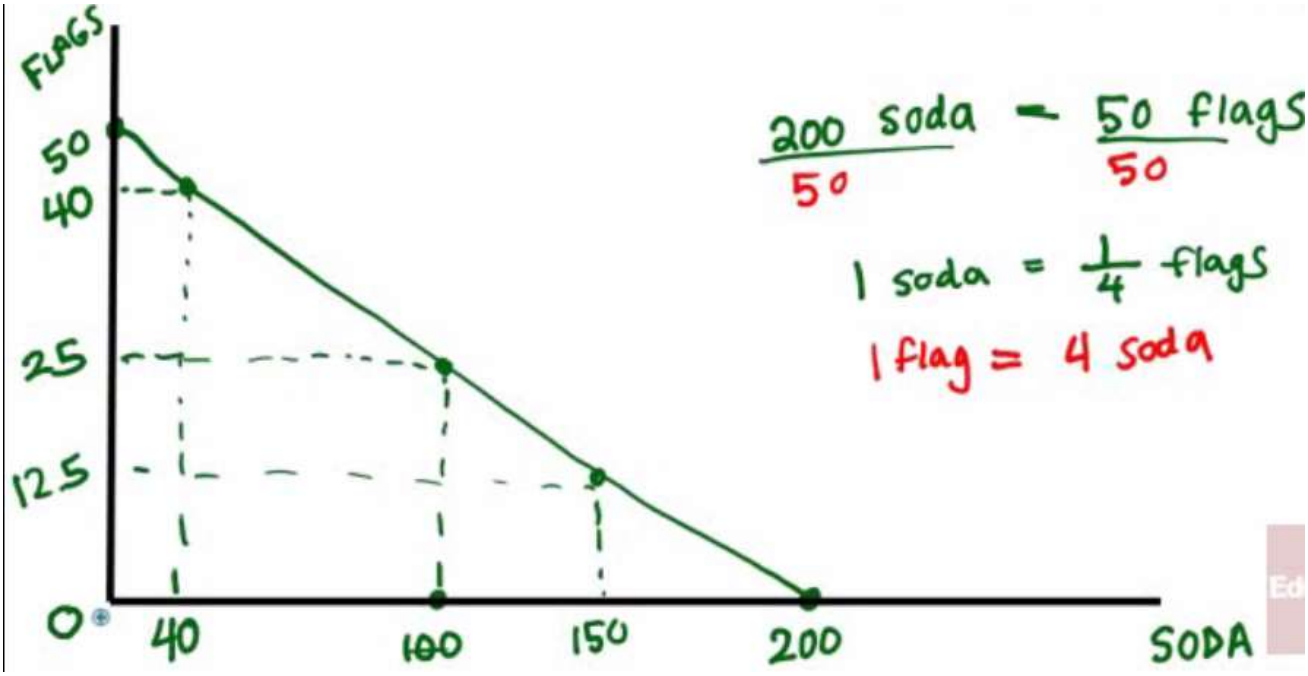
Increasing Opportunity Cost

- **More and more** resources are required to produce the **same** amount of a product
- Curve for this type of PPF graph will be **concave**.



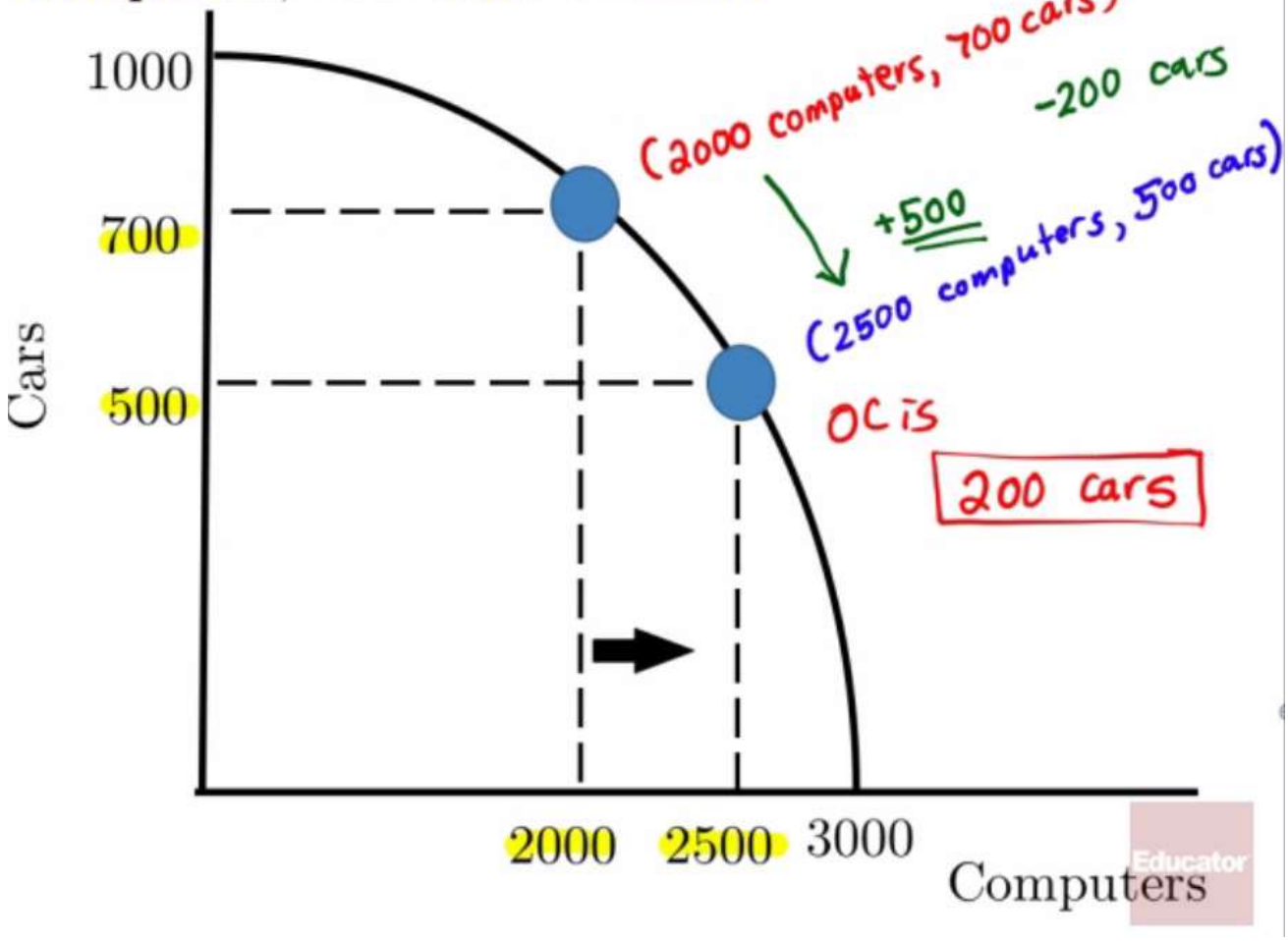
Constant Opportunity Cost

- **Same** resources are required to produce a certain amount of a product
- Product Possibilities frontier will be a **downward-sloping line**.

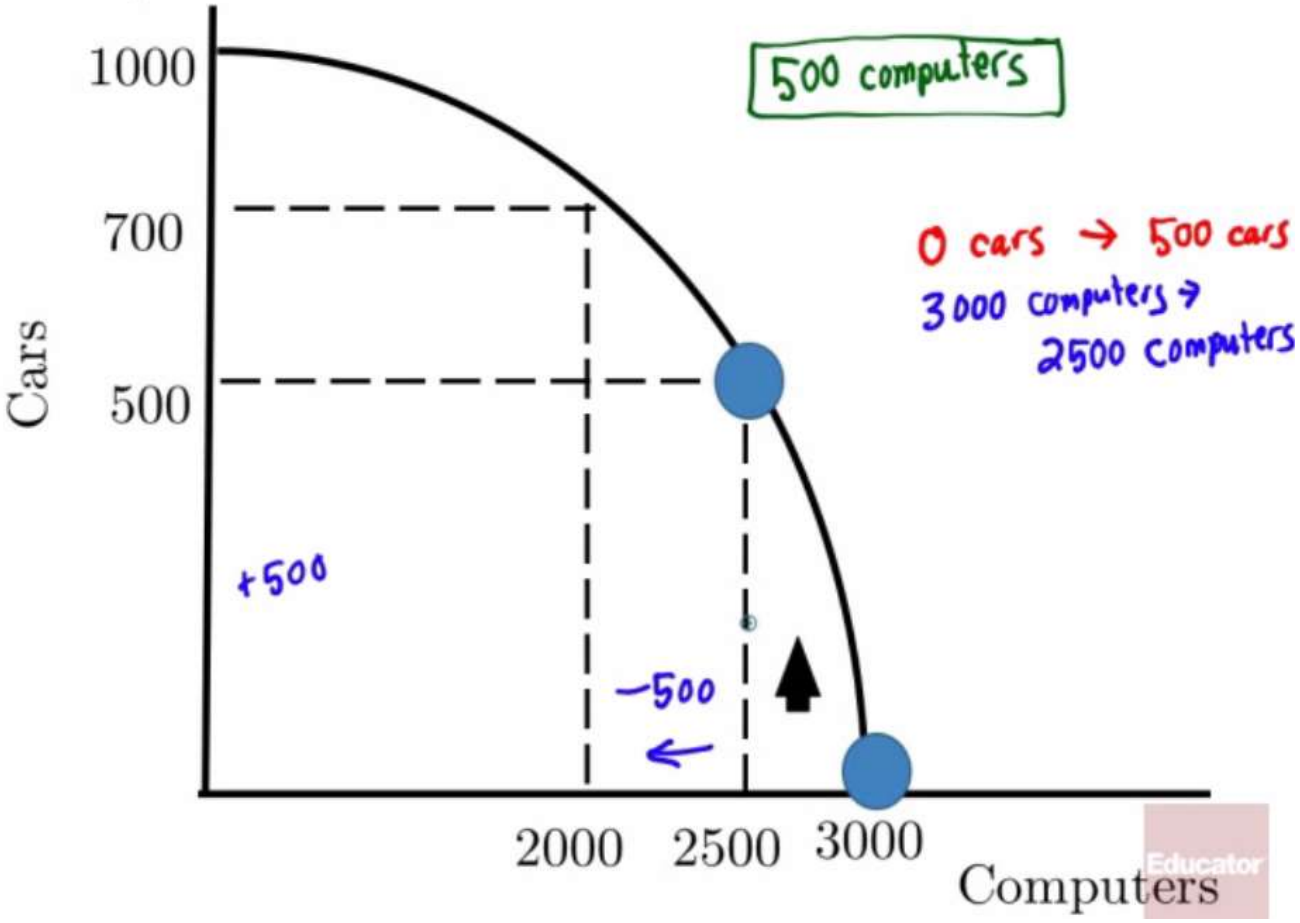


Opportunity cost and PPF graph

What is the opportunity cost of building 500 more computers, from 2000 to 2500?



What is the opportunity cost of building 500 more cars, from 0 to 500?



1.3 - Comparative Advantage & Trade

Monday, January 9, 2017 10:08 PM

Trade and Specialization

- **Adam Smith** in ***Wealth of Nations***, written in 1776, writes about the **benefits of specialization**.
    - One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a particular business, to whiten the pins is another; it is even a trade by itself to put them into paper; and the important business of making a pin is, in this mannar, divided into about eighteen **distinct operations**… Those ten persons, therefore, could make among them upwards of **48,000 pins in a day**. But if they had all wrought **separtely and independently**… they certainly could not each of them have made **twenty**, perhaps **not one pin** in a day.
- Modern example: I, Pencil: The Movie

Market Economy vs. Command Economy

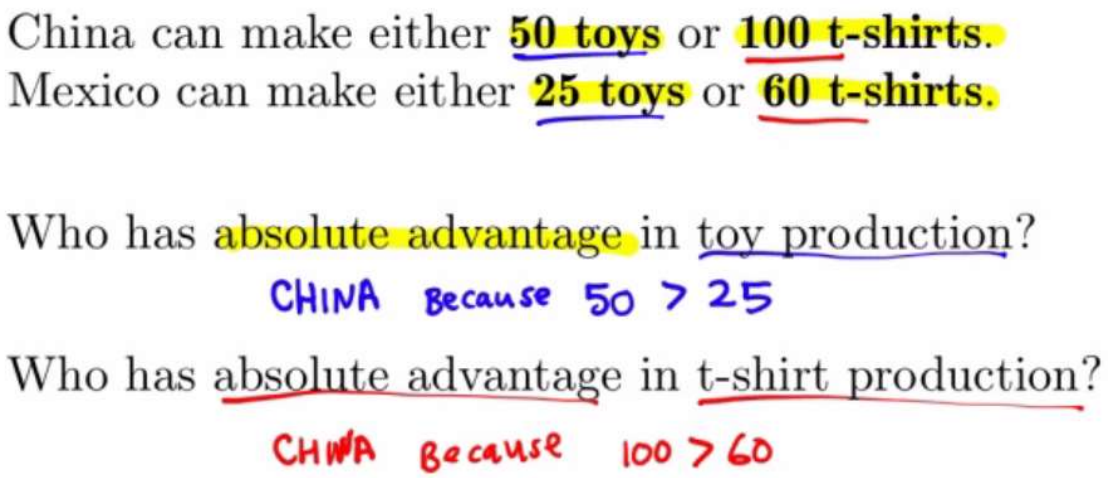
- In a **market economy**, production and consumption decisions are the result of **decentralized** decisions by individuals and firms.
- In a **command economy**, industry is **publicly owned** and the **government makes**

decisions on the allocation of goods and services.

- Most economies are **mixed**. Specialization and trade are what makes countries prosper.

Absolute Advantage

- A coutry or individual is simply **better** than another country or individual in **producing a particular product**.



Comparative Advantage

- A country or individual has a **LOWER opportunity cost** than another country or individual in **producing a particular product**.

Economists use the term **comparative advantage** when describing the opportunity costs faced by two producers. The producer who gives up less of other goods to produce Good X has the smaller opportunity cost of producing Good X and is said to have a comparative advantage in producing it. In our example, Frank has a lower opportunity cost of producing potatoes than Rose: An ounce of potatoes costs Frank only ¼ ounce of meat, but it costs Rose ½ ounce of meat. Conversely, Rose has a lower opportunity cost of producing meat than Frank: An ounce of meat costs Rose 2 ounces of potatoes, but it costs Frank 4 ounces of potatoes. Thus, Frank has a comparative advantage in growing potatoes, and Rose has a comparative advantage in producing meat.

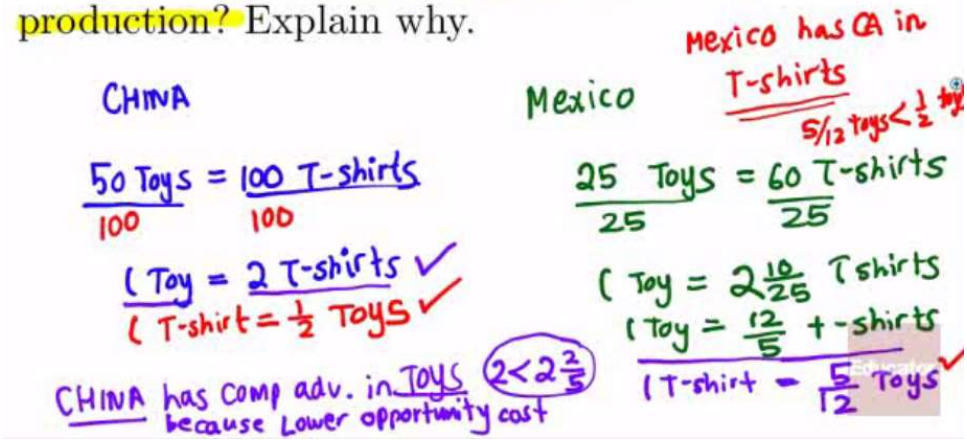
Although it is possible for one person to have an absolute advantage in both goods (as Rose does in our example), it is impossible for one person to have a comparative advantage in both goods. Because the opportunity cost of one good is the inverse of the opportunity cost of the other, if a person's opportunity cost of one good is relatively high, the opportunity cost of the other good must be relatively low. Comparative advantage reflects the relative opportunity cost. Unless two people have the same opportunity cost, one person will have a comparative advantage in one good, and the other person will have a comparative advantage in the other good.

- Examples 1

Remember, China can make either **50 toys** or **100 t-shirts**. Mexico can make either **25 toys** or **60 t-shirts**.

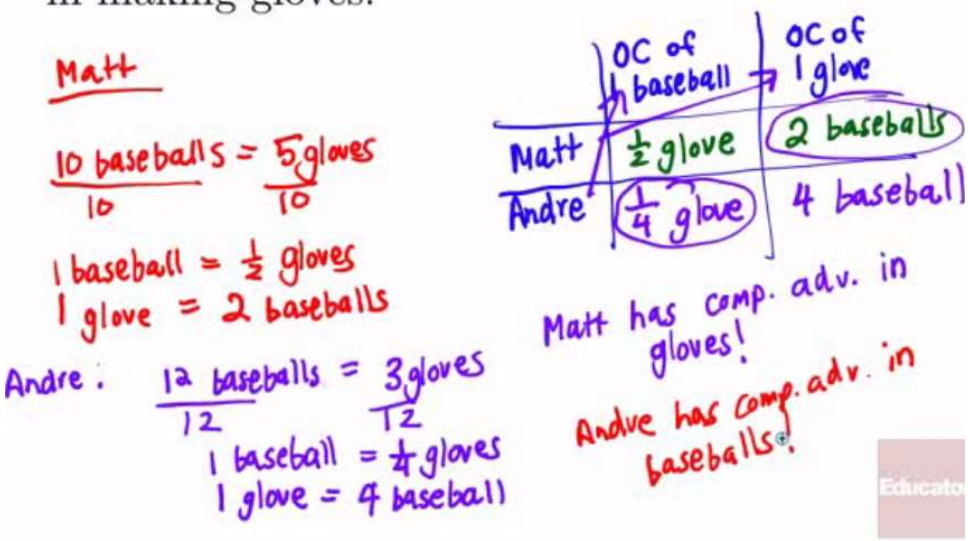
Who has comparative advantage in toy production?

Who has comparative advantage in t-shirt production? Explain why.



- Examples 2

- Matt can make 10 baseballs or 5 gloves in one hour while Andre can make 12 baseballs or 3 gloves in an hour. Determine who has comparative advantage in making baseballs and in making gloves.



- Examples 3

  - In India, a car can be produced by 8 workers in one day and a computer by 3 workers in one day. In the US, a car can be produced by 8 workers in one day, and a computer by 2 workers in one day. Which of the following statements is FALSE?

    → US has a comp. adv in computers
    → India has a comp. adv. in cars

    False ✓ – Neither country has absolute advantage in making computers. ✓

    False ✓ – The US has absolute advantage in making cars.

    False ✓ – The US has comparative advantage in making cars.

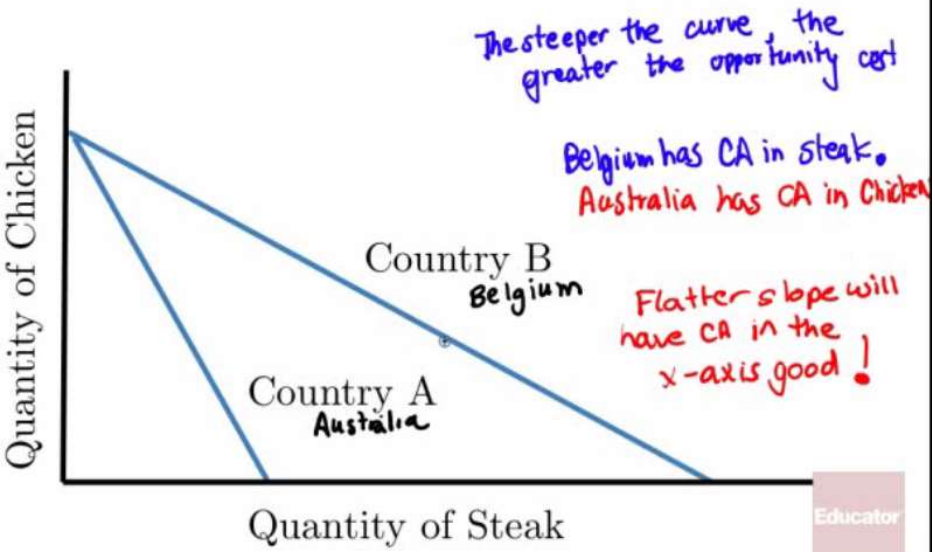
    True – The US has comparative advantage in making computers.

    True – India has comparative advantage in making cars.

Comparative Advantage & PPF Graph

- Flatter slope will have comparative advantage in the x-axis good.
- Steeper slope will have comparative advantage in the y-axis good.

– Below is the Production Possibilities Frontier for Country A and Country B. Who has comparative in steak and in chicken?



1.4 - Utility Maximization

Monday, January 9, 2017 11:43 PM

Utility vs. Marginal Utility

- Utility
  - **arbitrary** measure of benefit one receives from an activity (measured in utils)
- Marginal Utility
  - **change** in total utility generated by consuming **one additional unit** of that good or service
  - Air, for example, is necessary for survival but tends to have little value in terms of marginal utility.
  - Diamonds, on the other hand, provides lots of marginal utility for many consumer.

Marginal Utility Per Dollar

- The **marginal utility per dollar** spent on a good considers budge constrains
- Formula:
  - $\frac{MU_{good}}{P_{good}}$
- We are constrained by a **budget**.
- The role of **scarcity** comes into play when making consumer choices.
- Example:
  - We prefer a vacation to Hawaii over a movie, but we must consider the cost of each decision.
  - If Hawaii's marginal utility is 500 but costs $500, and a movie's marginal utility is 50 but costs $10, what do we choose?
  - Marginal Utility Per Dollar for Hawaii:

    $$\frac{MU_{good}}{P_{good}} = \frac{500}{500} = 1$$

  - Marginal Utility Per Dollar for movie:

    $$good$$

$$\frac{MU_{good}}{P_{good}} = \frac{50}{10} = 5$$

- Since 5 > 1, choose movie

Diminishing Marginal Utility

- As a person **increases consumption**, there is a **decline** in the **marginal utility** from consuming each additional unit of that product.
- You get less "bang for your buck"
- Applies to most, if not all, products at a certain point.
- All You Can Eat restaurant can stay in business because of this principle.

Optimal Consumption Bundle

- Marginal utility **per dollar** must be **equal** for both products
- Formula:
  - $\frac{MU_A}{P_A} = \frac{MU_B}{P_B}$
- Consumers instinctively follow this rule.
- Within a limited budget, we are required to make choices based on **what we value.**
- Keep on selecting the item that has the **HIGHER marginal utility per dollar**.
- Due to diminishing marginal utility, that value begin to **fall until equals** the marginal utility per dollar for the **other item**.
- Example 1

Zach spends all his money on wine and cheese. A bottle of wine costs $30. A pound of cheese costs $10. At his current consumption, Zach's marginal utility of a bottle of wine is 90 utils while it's 50 utils for a pound of cheese. In order to maximize utility, what should Zach do?

Optimal Consumption Bundle: $\frac{MU_A}{P_A} = \frac{MU_B}{P_A}$

$\frac{MU_W}{P_W} = \frac{MU_C}{P_C}$

wine cheese

$\frac{90}{\$30} \neq \frac{50}{\$10}$

$3 \neq 5$ ✓

Since 5>3, Zach will increase consumption of cheese and less wine!

- Example 2

Find the marginal utility and marginal utility per dollar for the following if apples cost $1 and oranges $2.

$\frac{MU_A}{P_A} = \frac{MU_B}{P_B}$

Apples				Oranges			
Quantity	Total Utility	MU	MU/$	Quantity	Total Utility	MU	MU/$
0	0			0	0		
1	20	20	20	1	30	30	15
2	35	15	15	2	50	20	10
3	45	10	10	3	65	15	7.5
4	50	5	5	4	75	10	5
5	52	2	2	5	80	5	2.5

- Example 3

Find the optimal consumption bundle for steak and chicken with a $25 budget. Steak is $10. Chicken is $5.

3 chicken, 1 steak

Steak		Chicken	
Quantity	MU per $	Quantity	MU per $
1	10 ✓	1	15 ✓
2	8	2	10 ✓
3	6	3	9 ✓
4	4	4	7
5	2	5	5

$25 Budget
−10 1 steak
10 2 chicken
5 1 chicken 10
$0

5
10
15

- Example 4

	Cookies	Brownies
Quantity of Purchase	12 pounds	5 pounds
Price per Pound	\$2	\$4
MU of Last Pound	24	24

Penny spends all her money on two goods: cookies and brownies. In order to maximize her utility, should Penny purchase more cookies and less brownies, purchase more brownies and less cookies, or maintain her current consumption? Explain.

$$\frac{MU_C}{P_C} = \frac{MU_B}{P_B}$$

$\frac{24}{2} = 12$ cookie

$\frac{24}{4} = 6$ Brownie

Penny should consume more cookies, less brownies, $12 > 6$.

2.1 - Price & Quantity

Tuesday, January 10, 2017 6:05 PM

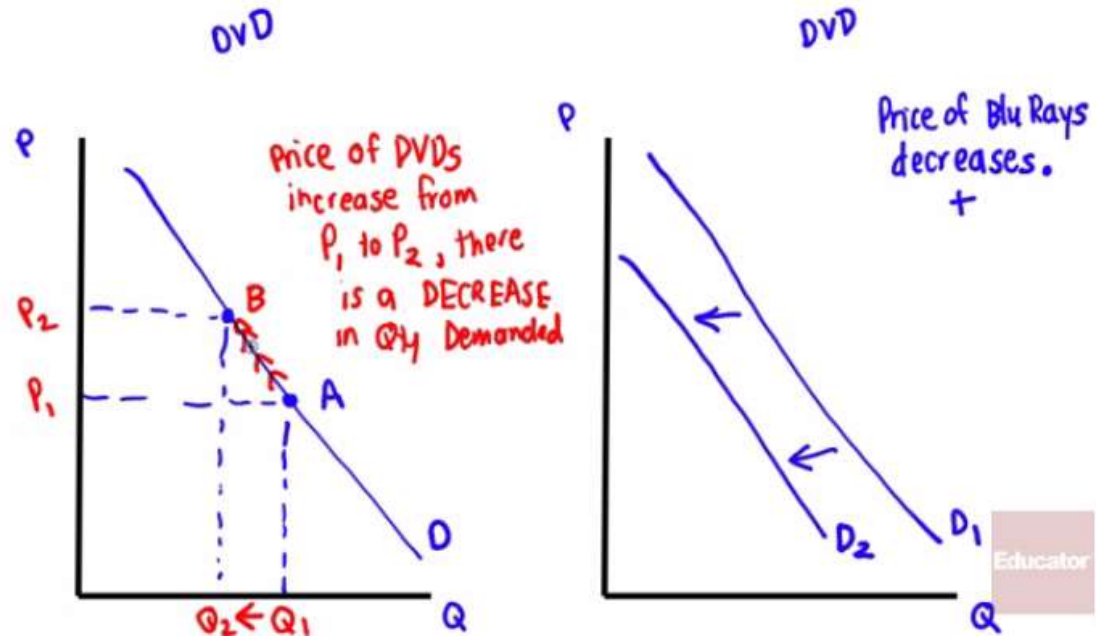
Supply and Demand

- Supply and demand model
  - a model of how a **competitive market** functions
- The demand curve
- The supply curve
- The **determinants** of demand and supply
- The **equilibrium** price and quantity

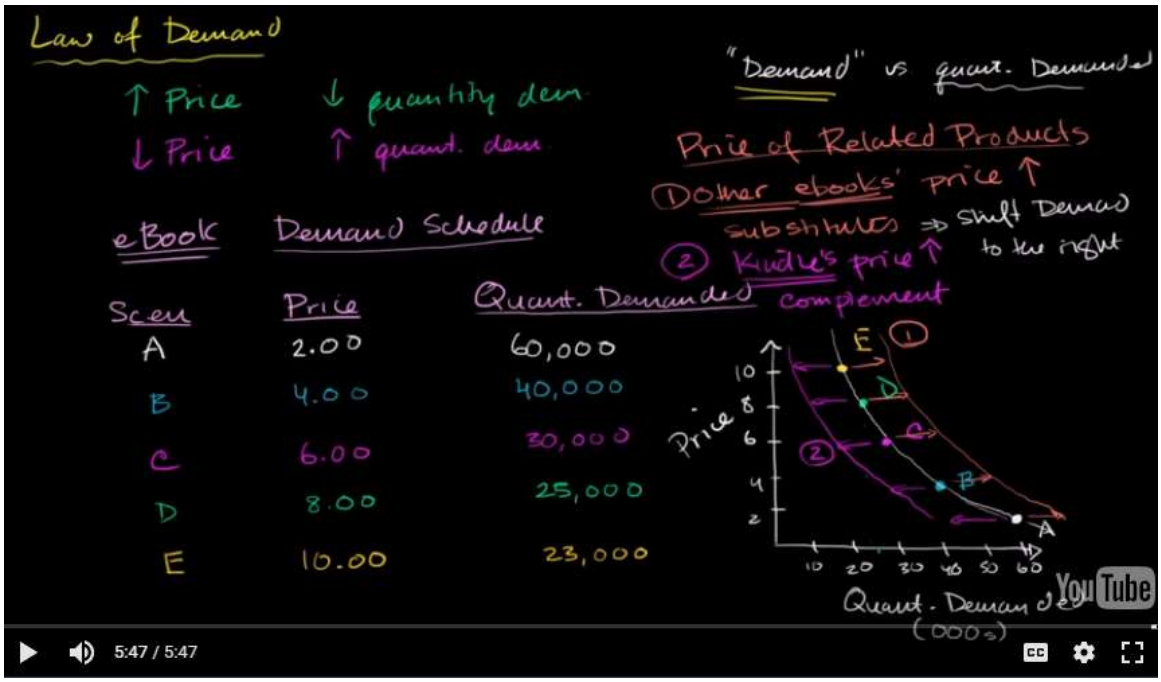
Demand Schedule and Demand Curve

- The law of demand
  - A **higher** price leads to a **lower** quantity demaned
  - A **lower** price leads to a **higher** quantity demanded
- Demand schedule vs. demand curve
  - A demand **schedule** is a **table** that shows the quantity demanded at each price.
  - A demand **curve** is a **graph** that shows the quantity demanded at each price
- Demand vs. quantity demanded
demand	the relationship between **a range of prices** and the **quantities demanded** at those prices, as illustrated by a demand curve or a demand schedule.
quantity demanded	only **a certain point** on the demand curve or **one quantity** on the demand schedule
  - **Demand** refers to the **curve**, and **quantity demanded** refers to a **specific point** on the curve.
  - If price increases, what happens?
    - No change in **demand**
    - Decrease in **quantity demanded**

- Graphical Comparison
  - Show the difference between a change in quantity demanded for DVDs and a change in demand for DVDs.



- Demand curve
  - **Horizontal** axis: **Quantity Demanded**
  - **Vertical** axis: **Price**

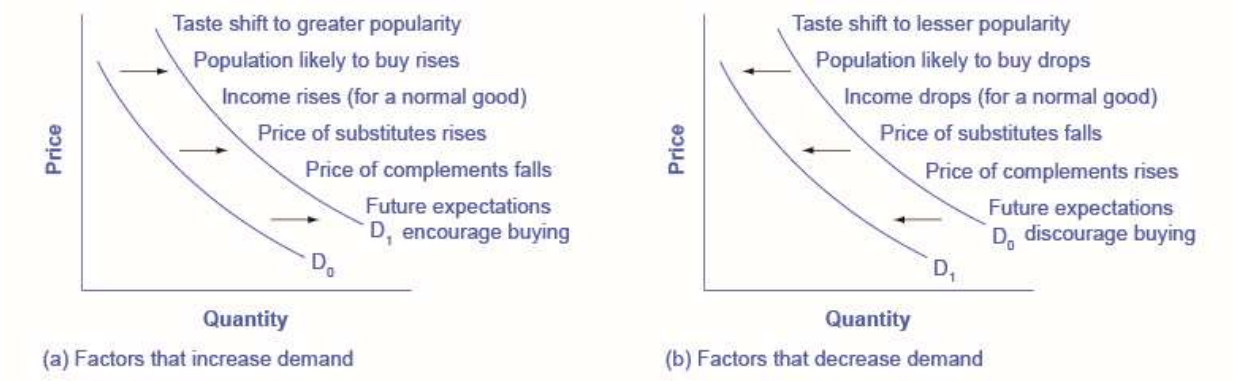


Shift of the Demand Curve

- Changes in the price of related goods
    - Substitutes (**positive** correlation)
        - **fall in the price** of one goods makes consumers **less willing** to buy the other good
    - Complements (**negative** correlation)
        - **fall in the price** of one of the goods makes consumers **more willing** to buy the other good
    - How to remember
        - Kids are **positive** when having a **substitute** teacher
        - We lived in a cynical world. If someone gives you a **complement**, the true intention might be **negative**.
- Changes in income
    - **Normal** goods
        - rise in income **increases** demand
        - ie. computers, Disneyland, steak
    - **Inferior** goods
        - rise in income **decreases** demand
        - ie. macaroni & cheese, top ramen
    - Normal goods vs. inferior goods

      Why do we say "most goods," not "all goods"? Most goods are **normal goods**—the demand for them increases when consumer income rises. However, the demand for some products falls when income rises. Goods for which demand decreases when income rises are known as **inferior goods.** Usually an inferior good is one that is considered less desirable than more expensive alternatives—such as a bus ride versus a taxi ride. When they can afford to, people stop buying an inferior good and switch their consumption to the preferred, more expensive alternative. So when a good is inferior, a rise in income shifts the demand curve to the left. And, not surprisingly, a fall in income shifts the demand curve to the right.
- Changes in tastes
    - Why do people want what they want?
    - Changes due to fad, beliefs, cultural shifts are all clumped together under **preferences.**

- Changes in expectations
    - If you expect **more income** in the future, demand for certain goods (ie. car or refrigerator) might **increase**
    - If expectation of a future **price drop** of items exist, then the demand for these items **drop** today, almost like a self-fulfilling prophecy.
- Graph



- Summary

TABLE 3-1

Factors That Shift Demand

Changes in the prices of related goods or services		
If *A* and *B* are **substitutes** . . .	. . . and the price of *B* rises, . . .	. . . demand for *A* increases.
	. . . and the price of *B* falls, . . .	. . . demand for *A* decreases.
If *A* and *B* are **complements** . . .	. . . and the price of *B* rises, . . .	. . . demand for *A* decreases.
	. . . and the price of *B* falls, . . .	. . . demand for *A* increases.
Changes in income		
If *A* is a **normal good** . . .	. . . and income rises, . . .	. . . demand for *A* increases.
	. . . and income falls, . . .	. . . demand for *A* decreases.
If *A* is an **inferior good** . . .	. . . and income rises, . . .	. . . demand for *A* decreases.
	. . . and income falls, . . .	. . . demand for *A* increases.
Changes in tastes		
	If tastes change in favor of *A*, . . .	. . . demand for *A* increases.
	If tastes change against *A*, . . .	. . . demand for *A* decreases.
Changes in expectations		
	If the price of *A* is expected to rise in the future, . . .	. . . demand for *A* increases today.
	If the price of *A* is expected to fall in the future, . . .	. . . demand for *A* decreases today.
If *A* is a **normal good** . . .	. . . and income is expected to rise in the future, . . .	. . . demand for *A* may increase today.
	. . . and income is expected to fall in the future, . . .	. . . demand for *A* may decrease today.
If *A* is an **inferior good** . . .	. . . and income is expected to rise in the future, . . .	. . . demand for *A* may decrease today.
	. . . and income is expected to fall in the future, . . .	. . . demand for *A* may increase today.
Changes in the number of consumers		
	If the number of consumers of *A* rises, . . .	. . . market demand for *A* increases.
	If the number of consumers of *A* falls, . . .	. . . market demand for *A* decreases.

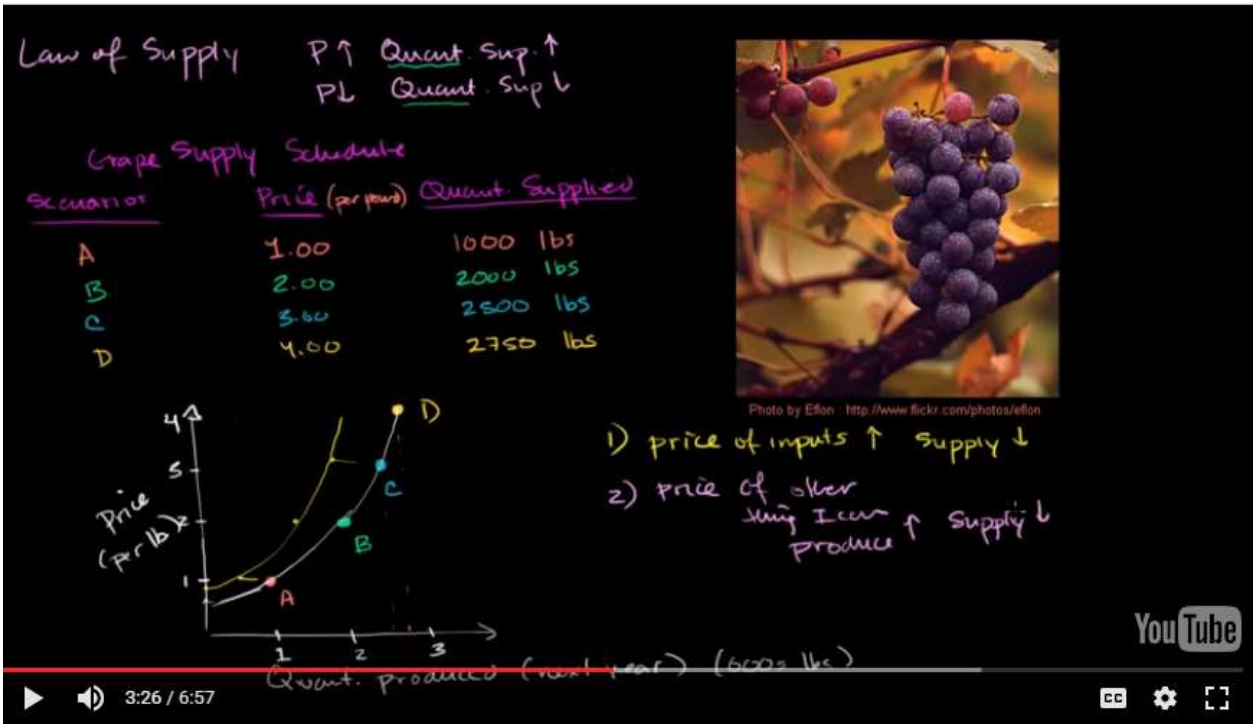
Supply Schedule and Supply Curve

- The law of supply
  - A **higher** price leads to a **higher** quantity supplied.
  - A **lower** price leads to a **lower** quantity supplied.
- Supply schedule vs. supply curve
  - A supply **schedule** is a **table** that shows the quantity supplied at each price.
  - A supply **curve** is a **graph** that shows the quantity supplied at each price.
- Supply vs. quantity supplied
supply	the relationship between **a range of prices** and the **quantities supplied** at those prices, as illustrated by a supply curve or a supply schedule.
quantity supplied	only **a certain point** on the supply curve or **one quantity** on the supply schedule
  - **Supply** refers to the **curve**, and **quantity supplied** refers to a **specific point** on the curve.
  - If price increase, what happens to supply?
    - **Nothing**
    - This is a change in quantity supplied not supply

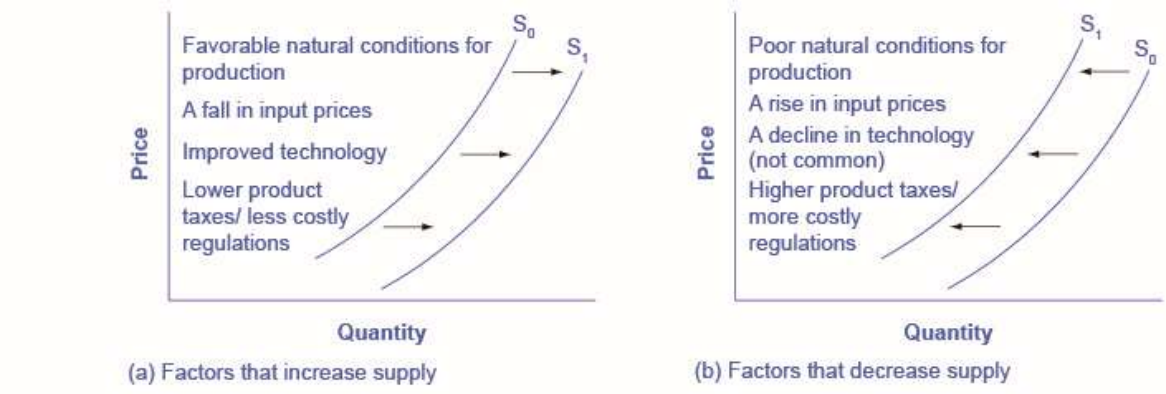
Shifts of the Supply Curve

- Changes in input prices
  - Input is a good used to **produce another** good
  - ie. cheese in a cheese pizza
- Change in technology
  - All the ways in which people can **turn more inputs into useful goods**
  - For example, an improved strain of corn resistant to disease increase supply of corn.
- Change in expectations
  - If **expectations** of a future price **increase** of items exist, then supplier will tend to **hoard** the item in order to make **more profit** in the future.
- Related goods

- If the price of other things I can produce goes up, then my supply of grapes, once again, would go down.



- Graph



- Summary

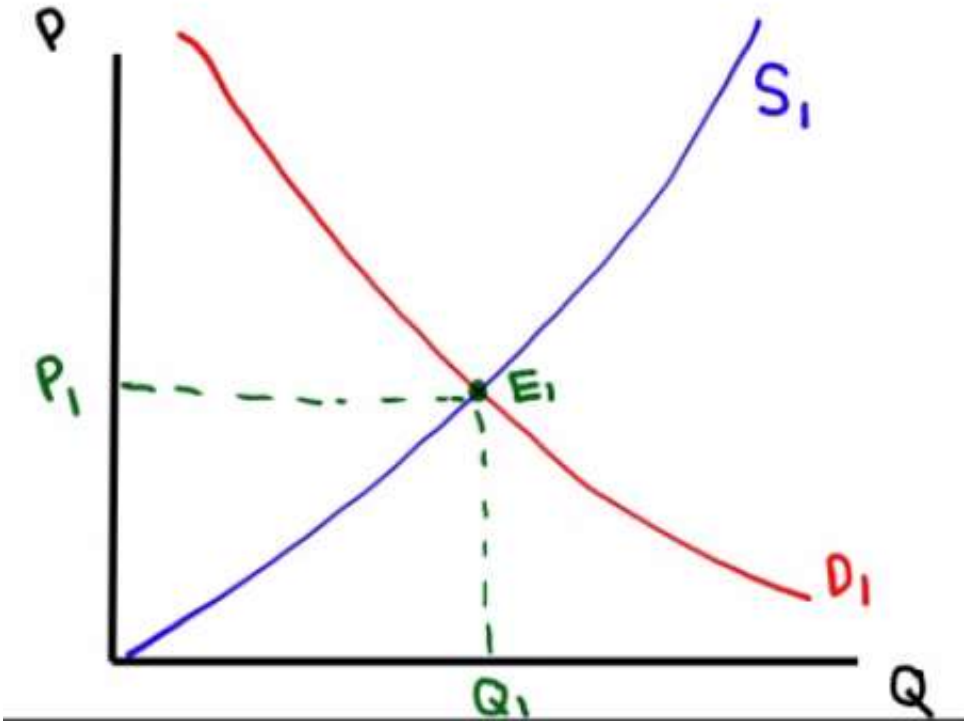
TABLE 3-2

Factors That Shift Supply

Changes in input prices		
	If the price of an input used to produce *A* rises, . . .	. . . supply of *A* decreases.
	If the price of an input used to produce *A* falls, . . .	. . . supply of *A* increases.
Changes in the prices of related goods or services		
If *A* and *B* are **substitutes in production** . . .	. . . and the price of *B* rises, . . .	. . . supply of *A* decreases.
	. . . and the price of *B* falls, . . .	. . . supply of *A* increases.
If *A* and *B* are **complements in production** . . .	. . . and the price of *B* rises, . . .	. . . supply of *A* increases.
	. . . and the price of *B* falls, . . .	. . . supply of *A* decreases.
Changes in technology		
	If the technology used to produce *A* improves, . . .	. . . supply of *A* increases.
Changes in expectations		
	If the price of *A* is expected to rise in the future, . . .	. . . supply of *A* decreases today.
	If the price of *A* is expected to fall in the future, . . .	. . . supply of *A* increases today.
Changes in the number of producers		
	If the number of producers of *A* rises, . . .	. . . market supply of *A* increases.
	If the number of producers of *A* falls, . . .	. . . market supply of *A* decreases.

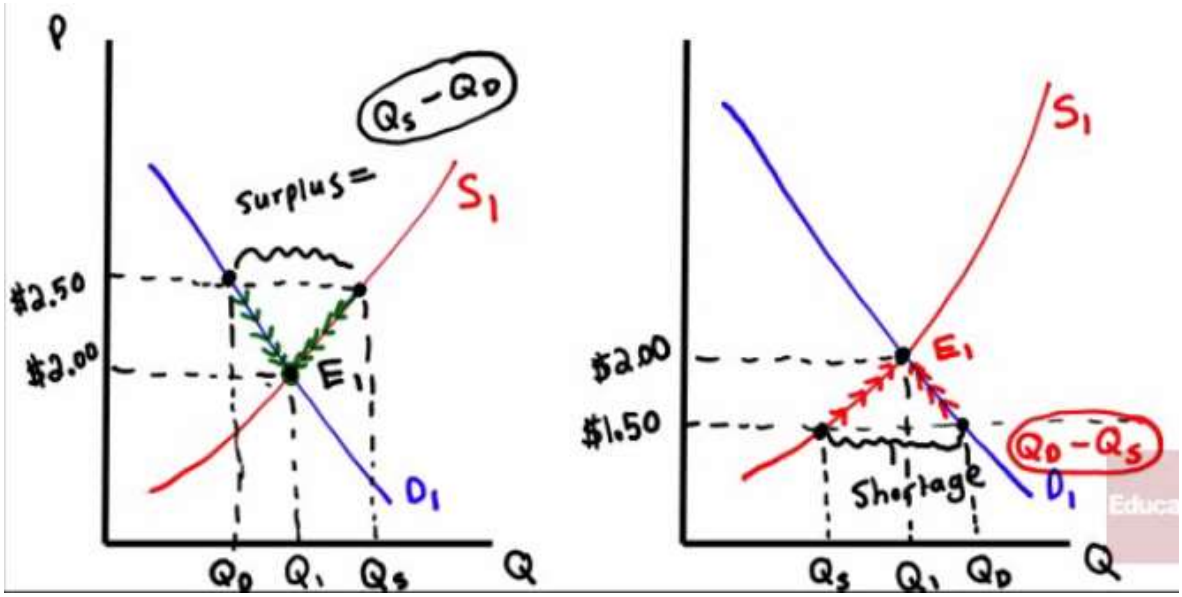
Supply, Demand, and Equilibrium

- Equilibrium price
  - price that **clears the market**
- Equilibrium quantity
  - quantity of good bought and sold at **market-clearing price**
- Equilibrium
  - where the supply and demand curves **intersect**
- Graph



Surplus & Shortage

- Surplus
  - when quantity **supplied exceeds** quantity **demanded**
  - $Q_s > Q_D$
  - $Surplus = Q_S - Q_D$
- Shortage
  - when quantity **demanded exceeds** quantity **supplied**
  - $Q_D > Q_s$
  - $Shortage = Q_D - Q_S$
- Graph


P
$Q_S - Q_D$
surplus =
S_1
$2.50
$2.00
E_1
D_1
Q_D Q_1 Q_S
Q
S_1
$2.00
$1.50
E_1
$Q_D - Q_S$
Shortage
D_1
Q_S Q_1 Q_D
Q

2.2 - Supply & Demand

Tuesday, January 10, 2017 7:55 PM

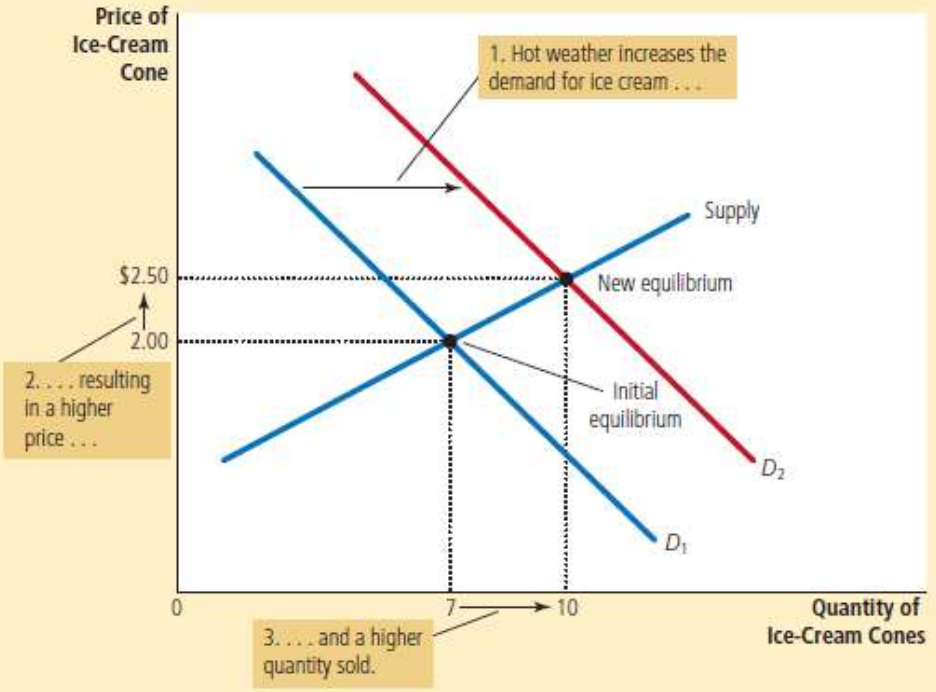
Shifts of the Demand or Supply Curve

- **Demand** shift to the **right**
  - **Increase** in equilibrium price
  - **Increase** in equilibrium quantity
- **Demand** shift to the **left**
  - **Decrease** in equilibrium price
  - **Decrease** in equilibrium quantity
- **Supply** shift to the **right**
  - **Decrease** in equilibrium **price**
  - **Increase** in equilibrium **quantity**
- **Supply** shift to the **left**
  - **Increase** in equilibrium **price**
  - **Decrease** in equilibrium **quantity**
- Graph

FIGURE 10

How an Increase in Demand Affects the Equilibrium

An event that raises quantity demanded at any given price shifts the demand curve to the right. The equilibrium price and the equilibrium quantity both rise. Here an abnormally hot summer causes buyers to demand more ice cream. The demand curve shifts from D_1 to D_2, which causes the equilibrium price to rise from $2.00 to $2.50 and the equilibrium quantity to rise from 7 to 10 cones.



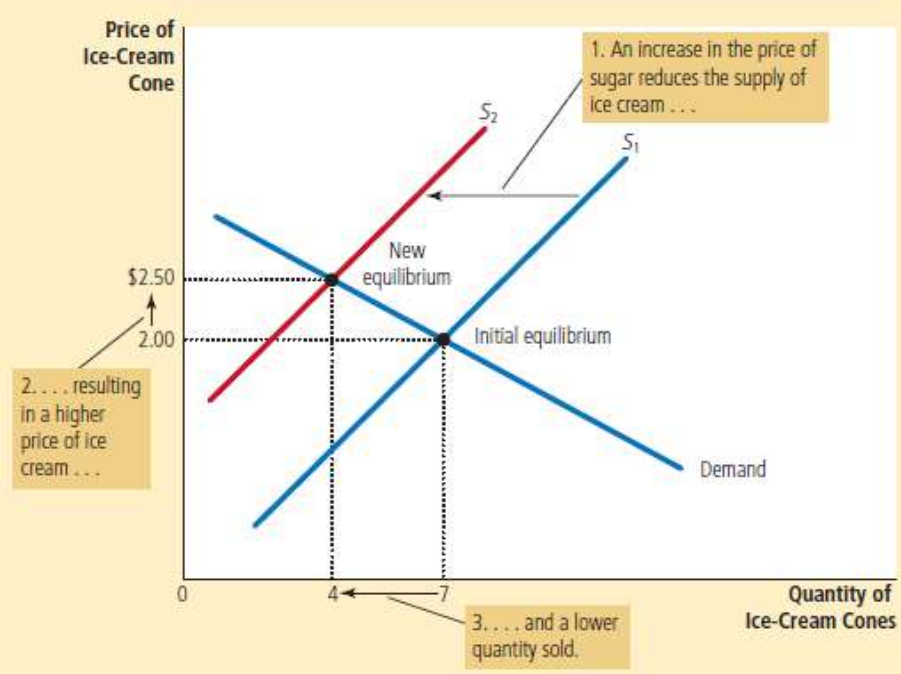


FIGURE 11

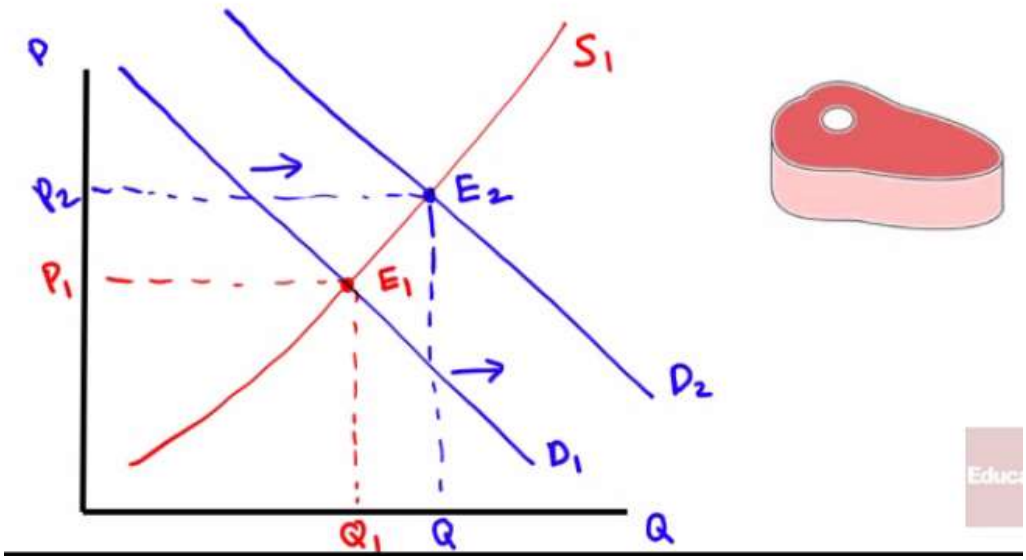
How a Decrease in Supply Affects the Equilibrium

An event that reduces quantity supplied at any given price shifts the supply curve to the left. The equilibrium price rises, and the equilibrium quantity falls. Here an increase in the price of sugar (an input) causes sellers to supply less ice cream. The supply curve shifts from *S*1 to *S*2, which causes the equilibrium price of ice cream to rise from $2.00 to $2.50 and the equilibrium quantity to fall from 7 to 4 cones.

- Examples

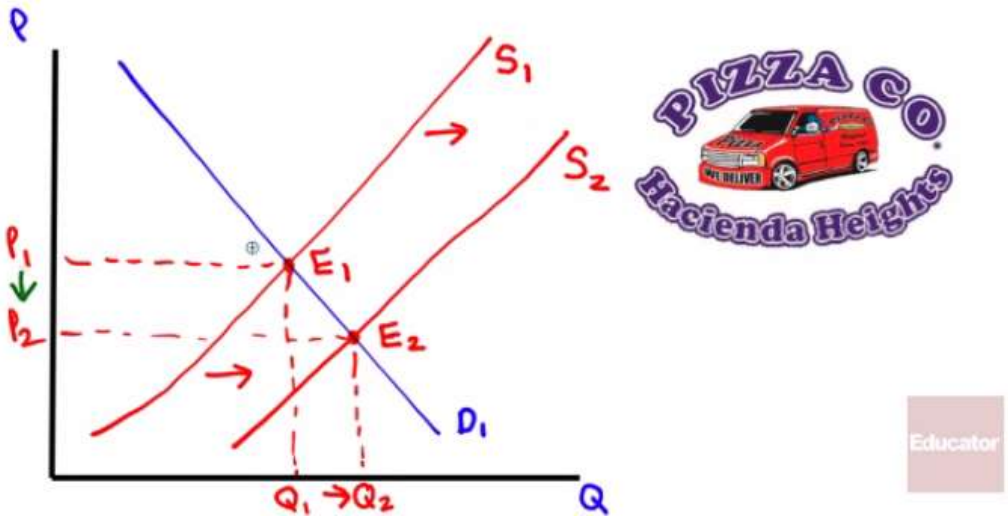
Example I

- Demand for steak (increase in income) D+
- Steaks are normal goods
- Equilibrium Price ↑ & Equilibrium Quantity ↑



Example III

- Supply of Pizza (decrease in cost of cheese, which is an input) ↓
- Equilibrium Price _↓_ & Equilibrium Quantity _↑_



Shifts of Both the Demand and Supply Curves

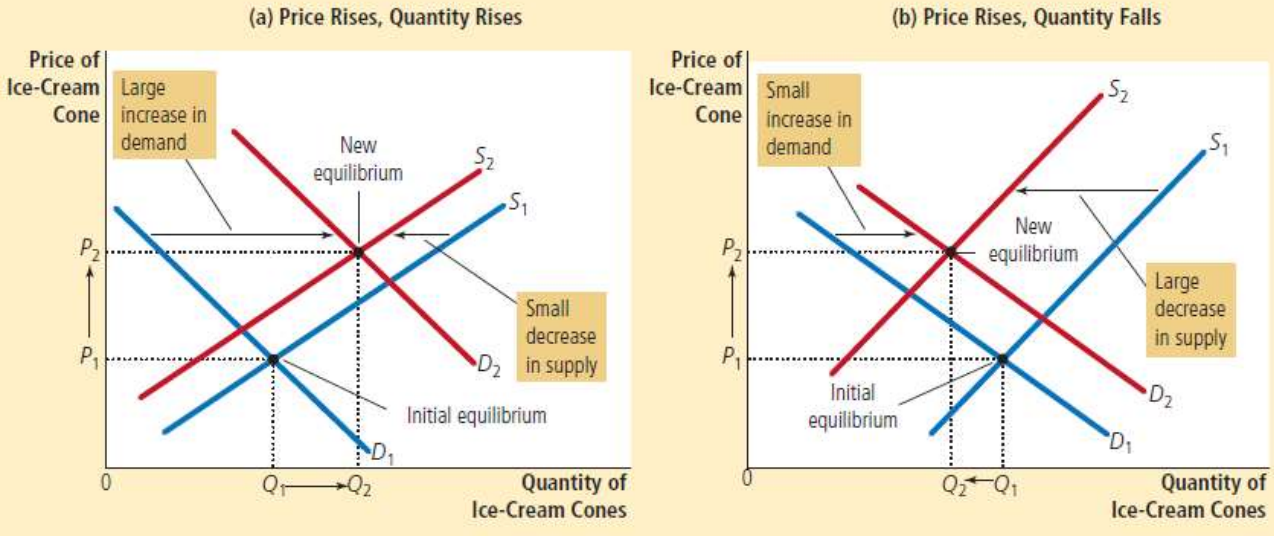
- Demand & supply shift to the **right**
  - **Increase** in equilibrium **quantity**
  - Equilibrium **price unsure**
- Demand & supply shift to the **left**
  - Decrease in equilibrium **quantity**
  - Equilibrium **price unsure**
- **Supply** shift to the **left** and **demand** shift to the **right**
  - **Increase** in equilibrium **price**
  - Equilibrium **quantity unsure**
- **Supply** shift to the **right** and **demand** shift to the **left**
  - **Decrease** in equilibrium **price**
  - Equilibrium **quantity unsure**

- Graph

FIGURE 12

A Shift in Both Supply and Demand

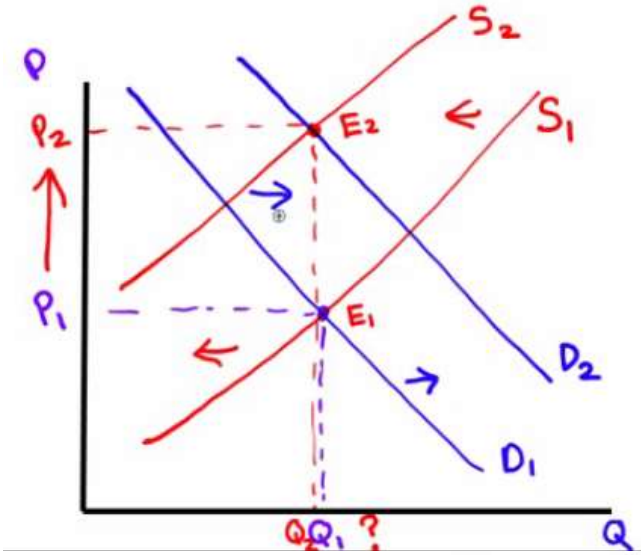
Here we observe a simultaneous increase in demand and decrease in supply. Two outcomes are possible. In panel (a), the equilibrium price rises from P_1 to P_2 and the equilibrium quantity rises from Q_1 to Q_2. In panel (b), the equilibrium price again rises from P_1 to P_2 but the equilibrium quantity falls from Q_1 to Q_2.



- Summary
  - Change in **same** direction: equilibrium **quantity** for sure
  - Change in **opposite** direction: equilibrium **price** for sure
- Examples

Example V

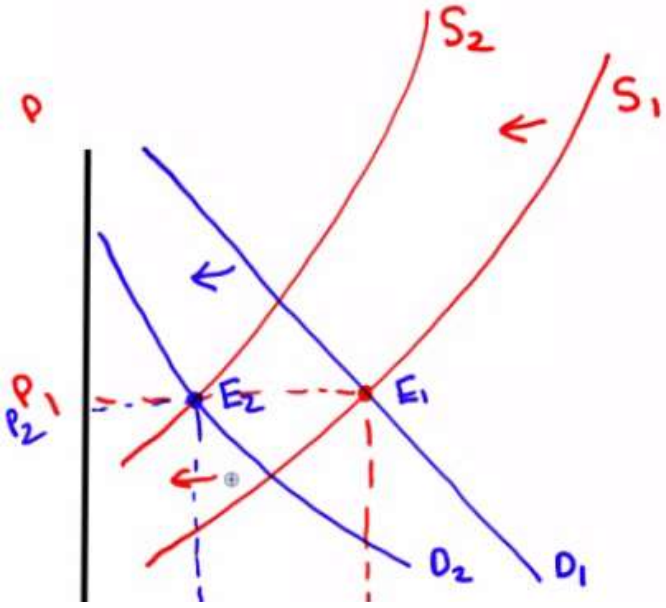
- Demand and Supply of Gas Guzzling SUVs (Price of gasoline falls and wages of auto workers increases)
- Equilibrium Price _↑_ & Equilibrium Quantity _?☹

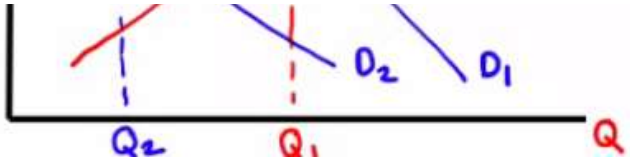


SUV
Sports Utility Vehicle

Example VI

- Demand and Supply of Coca-cola (Price of Pepsi Cola falls and cost of aluminum increases)
- Equilibrium Price _?_ & Equilibrium Quantity _↓_





Changes in equilibrium

	No Change in Supply	An Increase in Supply	A Decrease in Supply
No Change in Demand	*P* same *Q* same	*P* down *Q* up	*P* up *Q* down
An Increase in Demand	*P* up *Q* up	*P* ambiguous *Q* up	*P* up *Q* ambiguous
A Decrease in Demand	*P* down *Q* down	*P* down *Q* ambiguous	*P* ambiguous *Q* down

2.3 - Price Controls

Tuesday, January 10, 2017 8:30 PM

Why Price Controls are Inefficient

- Price controls
  - **legal restrictions** on how high or low a **market price** may go
- Price ceiling
  - a **maximum** price **sellers** are allowed to **charge** for a good or service
- Price floor
  - a **minimum** price **buyers** are required to **pay** for a good or service
- Whether the government tries to legislate price (up or down), there are predictable and unpleasant **side effects**.

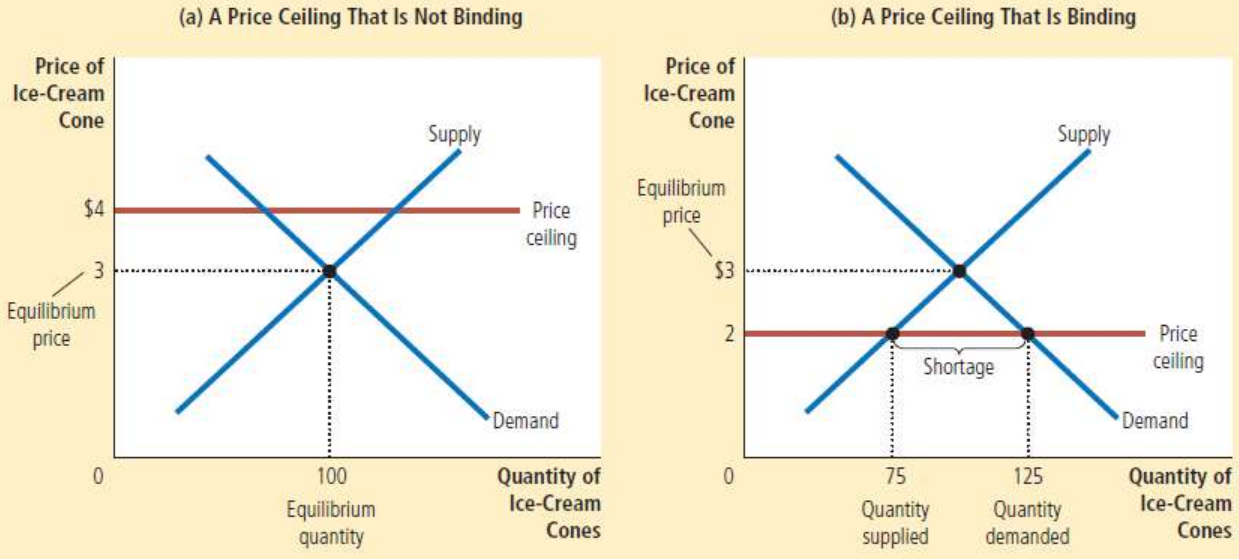
Effective Price Ceiling

- Effective price **ceilings** must be **below** equilibrium price
- Rent control
  - government attempt in regulating price on apartments
  - Predictable outcome of housing shortage and emergence of black markets
- Graph

In panel (a), the government imposes a price ceiling of $4. Because the price ceiling is above the equilibrium price of $3, the price ceiling has no effect, and the market can reach the equilibrium of supply and demand. In this equilibrium, quantity supplied and quantity demanded both equal 100 cones. In panel (b), the government imposes a price ceiling of $2. Because the price ceiling is below the equilibrium price of $3, the market price equals $2. At this price, 125 cones are demanded and only 75 are supplied, so there is a shortage of 50 cones.

FIGURE 1

A Market with a Price Ceiling



How a Price Ceiling Causes Inefficiency

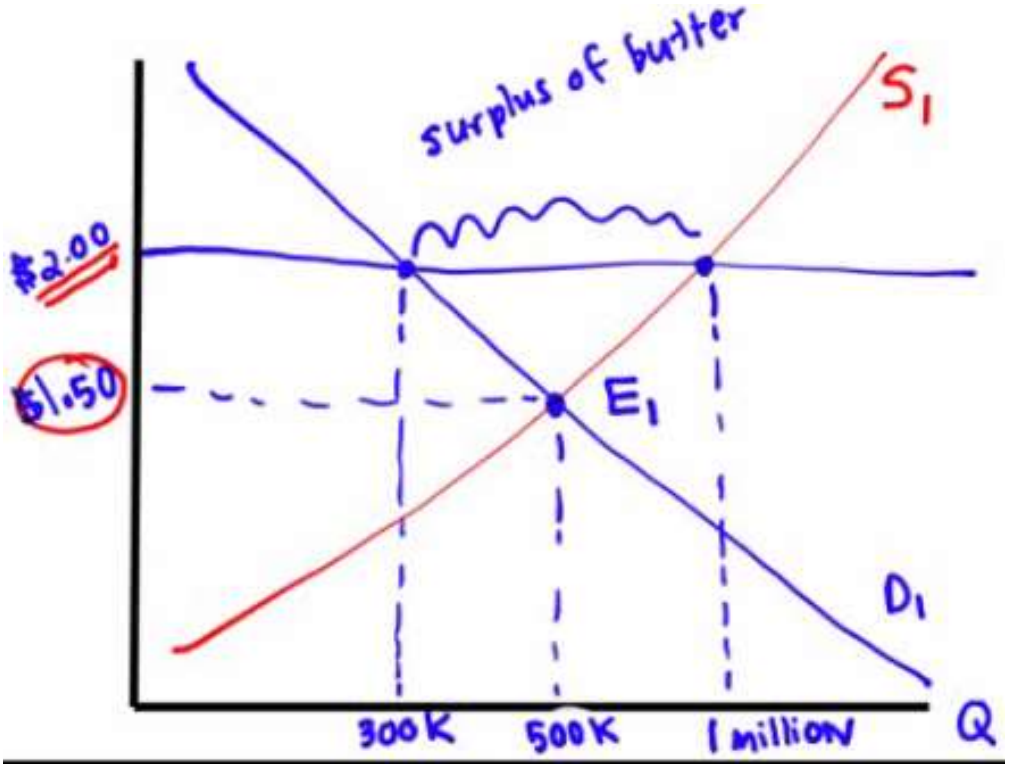
- Inefficiently allocation to consumers
  - Those who want an apartment the most **do not necessarily get it**.
  - At $1000, someone who was willing to pay $2000 may not get the apartment when the price is low.
- Wasted resources
  - Price ceilings on gas led to shortages and forced millions of American to spend hours **waiting** in lines at gas stations. **OPPORTUNITY COST!**
- Inefficiently low quality
  - Sellers have little incentive to improve the quality of their product.
  - Landlords have a perverse incentive to only meet the bare, minimum requirements

Effective Price Floor

- Effective price **floors** must be **above** the equilibrium price.
- Minimum wage

- government attempt in regulating the labor market in order to give workers a "**fair**" **wage**
- Predictable outcome of having surplus of labor (or unemployment)

- What happens when a price floor on butter is **set at $2.00** a pound when the **equilibrium is $1.50**
  - Predictable, there is a **surplus** of butter
  - Governments will stash away surplus, give away to schools, export at a loss, simply destroy the excess or pay farmers NOT to product at all.

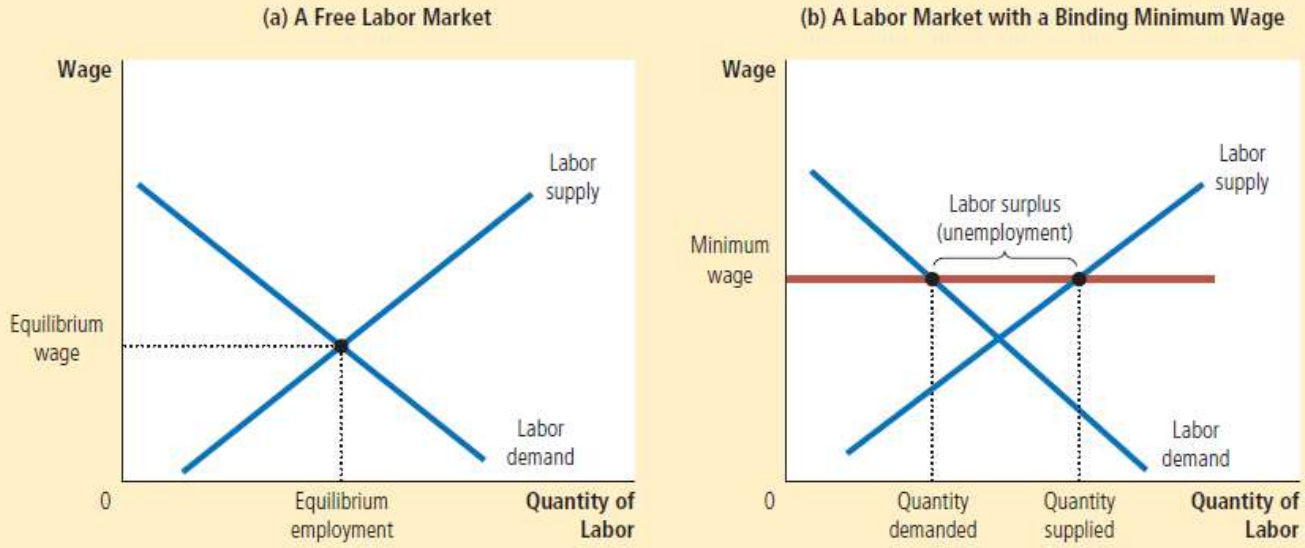


- Graph

FIGURE 5

How the Minimum Wage Affects the Labor Market

Panel (a) shows a labor market in which the wage adjusts to balance labor supply and labor demand. Panel (b) shows the impact of a binding minimum wage. Because the minimum wage is a price floor, it causes a surplus: The quantity of labor supplied exceeds the quantity demanded. The result is unemployment.

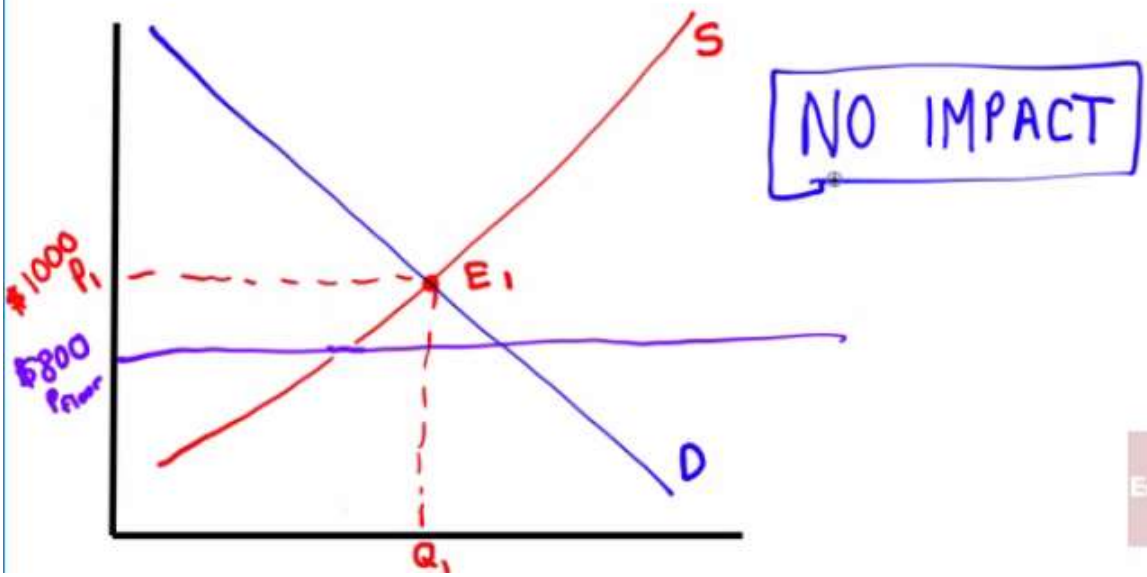


How a Price Floor Causes Inefficiency

- Inefficiently Low Quantity
  - Same impact as a price ceiling in having **less quantity** of goods bought and sold
- Wasted Resources
  - Just like families unsuccessfully looking for apartments under a price ceiling, workers **won't find jobs** in a price floor.
- Inefficiently high quality
  - Unable to compete for customers for lower prices, airlines provided lavish excesses consumers **didn't want**

Ineffective price controls

- If the equilibrium price of an airline flight from LAX to Heathrow airport is $1,000, what is the impact of a price floor of $800 for a flight?

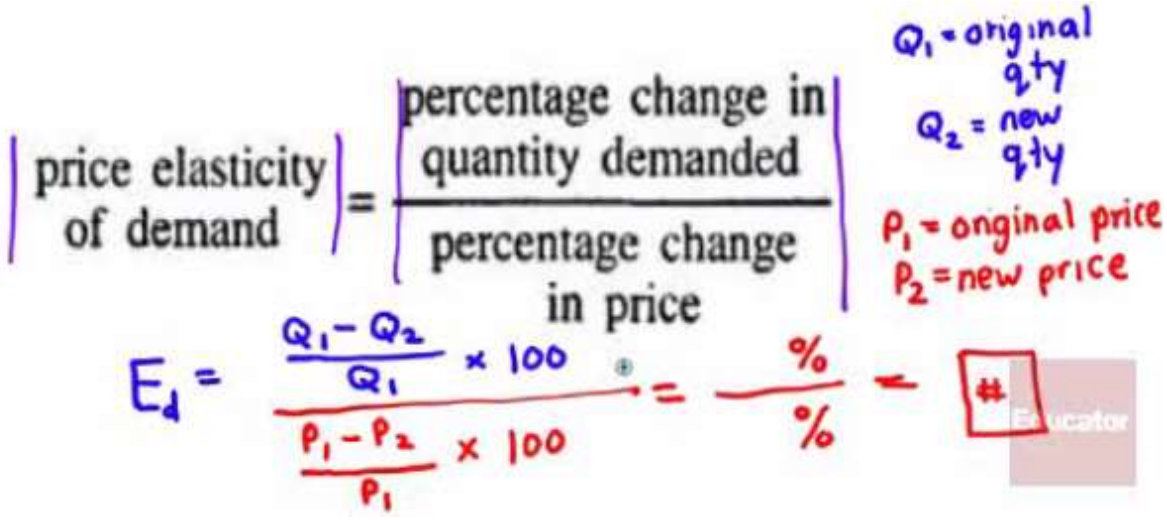


2.4 - Price Elasticity of Demand

Tuesday, January 10, 2017 10:01 PM

What is Elasticity of Demand

- Price elasticity of demand (PED or E_d)
  - Measure used to show the **responsiveness**, or **elasticity**, of the quantity demanded of a good or service to a change in price.
  - Devised by Alfred Marshall, using the **ceteris paribus** (all other things being equal) assumption, price elasticity shows by **how much quantity changes** as a result of a **change in price**. (Disregard the negative)
  - Formula



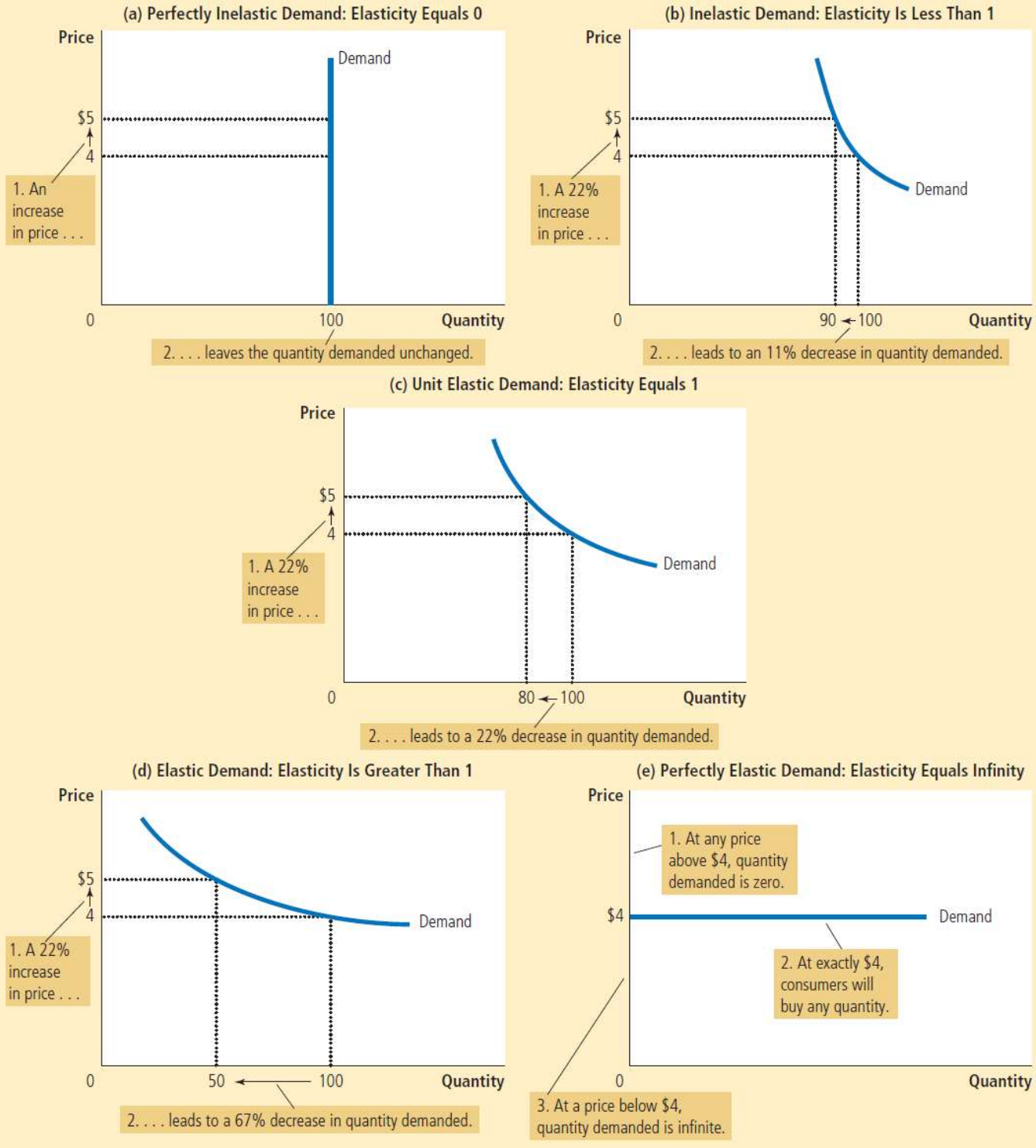
  - How to remember
    - **Queen** is greater than the **Princess**

The Variety of Demand Curves

The price elasticity of demand determines whether the demand curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

FIGURE 1

The Price Elasticity of Demand



Elastic Demand

- When **e > 1**, demand is elastic, or the **percent change in quantity** is **greater** than the

percent change in price.

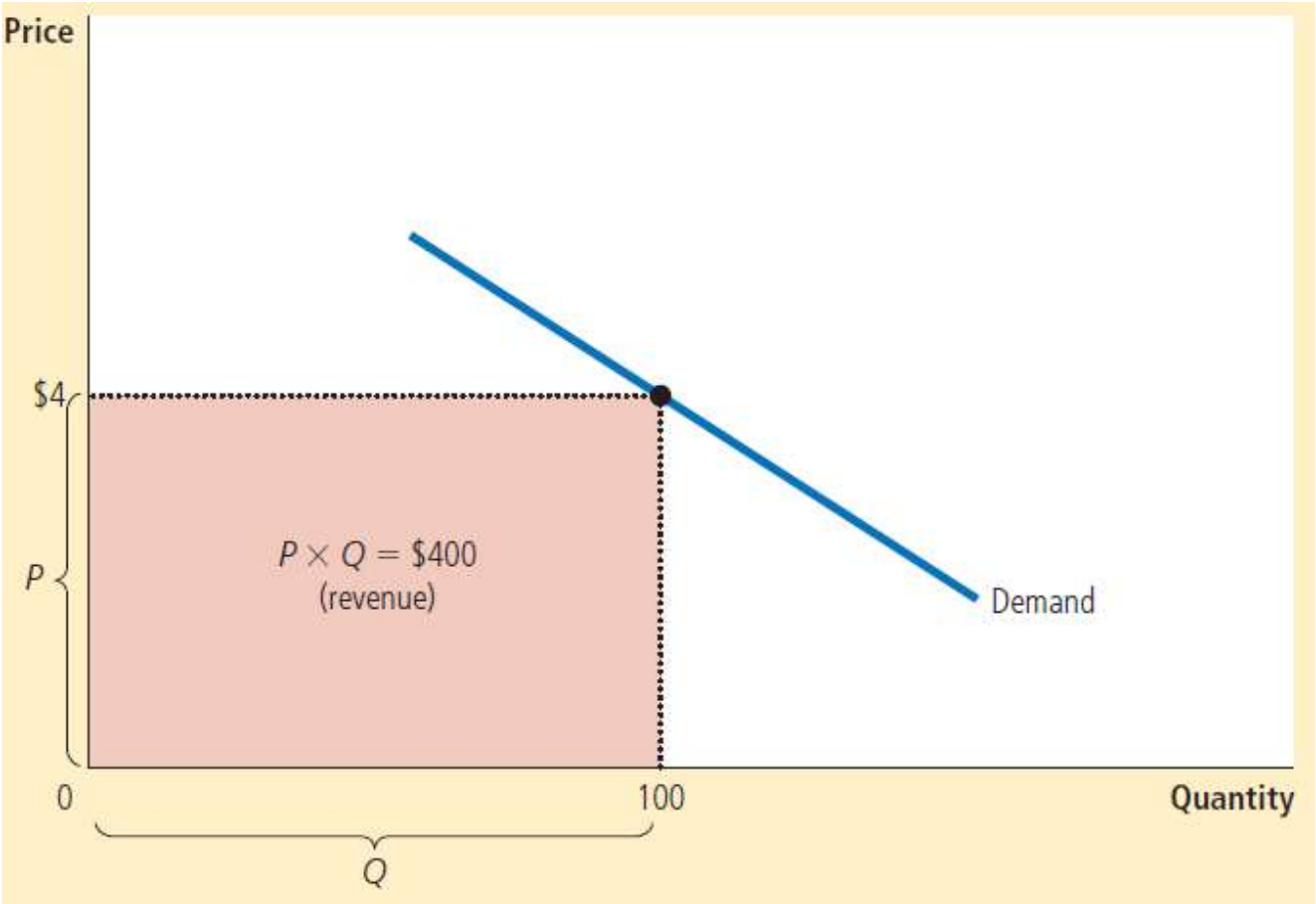
- It means that the product is relatively **price-sensitive**
- ie. fast-food restaurants, fruits, haircuts
- Demand curve is relatively **flat**.

Inelastic Demand

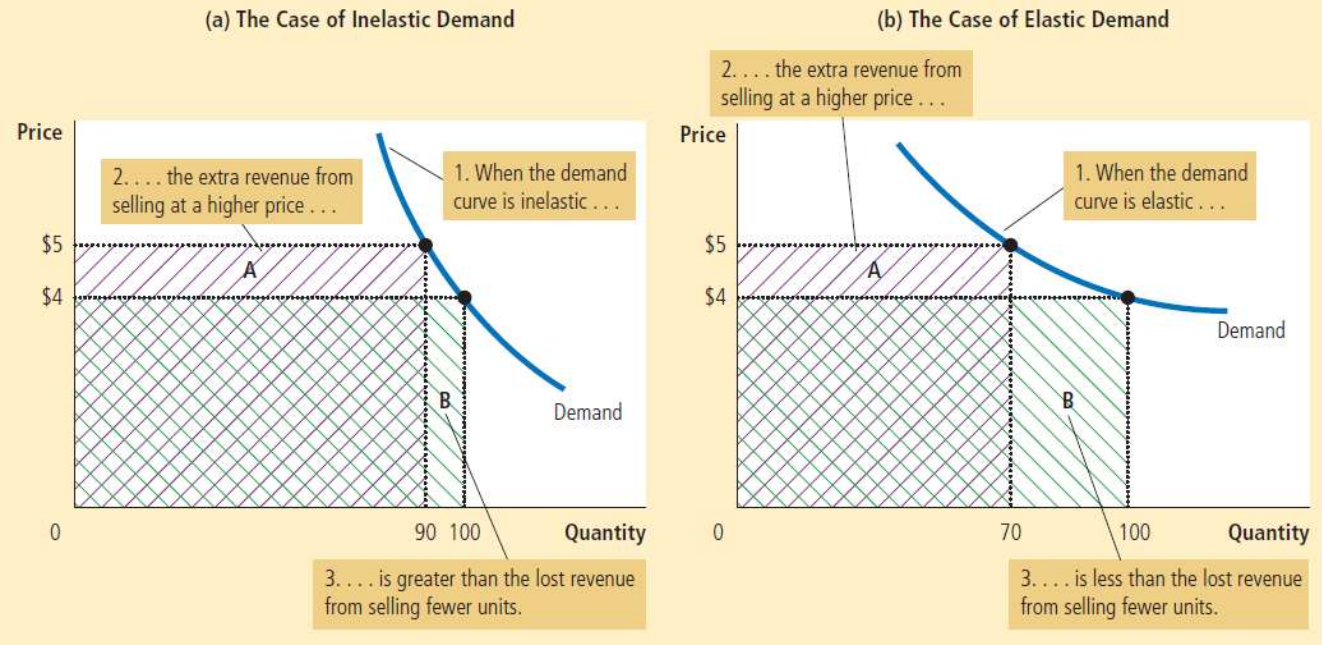
- When **e < 1**, demand is inelastic, or the **percent change in quantity** is **less** than the **percent change in price.**
- It means that the product is **not very sensitive** to a **change in price**
- ie. gasoline, insulin
- Demand curve is relatively **steep**.

Price Elasticity of Demand and Total Revenue

- The total amount paid by buyers, and received as revenue by sellers, equals the area of the box under the demand curve.



- When demand is **inelastic (e < 1)**, price and total revenue move in the **same direction**:
  - If the price increases, total revenue also increases.
- When demand is **elastic (e > 1**), price and total revenue move in **opposite directions**:
  - If the price increase, total revenue decreases.
- If demand is unit elastic (e = 1), total revenue remains constant when the price changes.



- Examples

Example I

If the price of an economics textbook is $100 ($P_1$) you sell 90 ($Q_1$) copies, but if you lower the price to $80 ($P_2$), you sell 100 ($Q_2$), find the elasticity of demand. Is it elastic or inelastic? Find the total revenue. Did it increase or decrease? By how much?

$$E_D = \left|\frac{\%\Delta Q_D}{\%\Delta P}\right| = \left|\frac{\frac{90-100}{90}}{\frac{100-80}{100}}\right| = \left|\frac{\frac{10}{90} = -\frac{1}{9}}{\frac{20}{100} = \frac{1}{5}}\right|$$

$$= \frac{1}{9} \times \frac{5}{1} = \boxed{\frac{5}{9}}$$

$TR_1 = p * q = \$100 \times 90 = \boxed{\$9000}$

$TR_2 = p * q = \$90 \times 100 = \boxed{\$9000}$

If item is inelastic, when you lower the price, the revenue decreases.

If item is inelastic, when you raise the price, the revenue increase.

Example II

If the price of an Academic Decathlon t-shirt is $10, you sell 200 shirts but if you raise the price to $15, you sell 100. find the elasticity of demand. Is it elastic or inelastic? Find the total revenue. Did it increase or decrease? By how much?

$$E_D = \frac{\frac{Q_1 - Q_2}{Q_1}}{\frac{P_1 - P_2}{P_1}} = \left| \frac{\frac{200-100}{100}}{\frac{10-15}{10}} \right| = \frac{\frac{100}{100} = 1}{\frac{5}{10} = \frac{1}{2}} = 1 \times 2 = 2$$

Elastic

If elastic, when you raise the price, TR ↓.
If elastic, when you lower the price, TR ↑.

$TR_1 = P_1 \times q_1 = \$10 \times 200 = \$200$
$TR_2 = P_2 \times q_2 = \$15 \times 100 = \$150$

$50 decrease

Midpioint Method to Find Elasticity

- Definition

One way to avoid this problem is to use the *midpoint method* for calculating elasticities. The standard procedure for computing a percentage change is to divide the change by the initial level. By contrast, the midpoint method computes a percentage change by dividing the change by the midpoint (or average) of the initial and final levels. For instance, \$5 is the midpoint between \$4 and \$6. Therefore, according to the midpoint method, a change from \$4 to \$6 is considered a 40 percent rise because $(6 - 4) / 5 \times 100 = 40$. Similarly, a change from \$6 to \$4 is considered a 40 percent fall.

Because the midpoint method gives the same answer regardless of the direction of change, it is often used when calculating the price elasticity of demand between two points. In our example, the midpoint between point A and point B is:

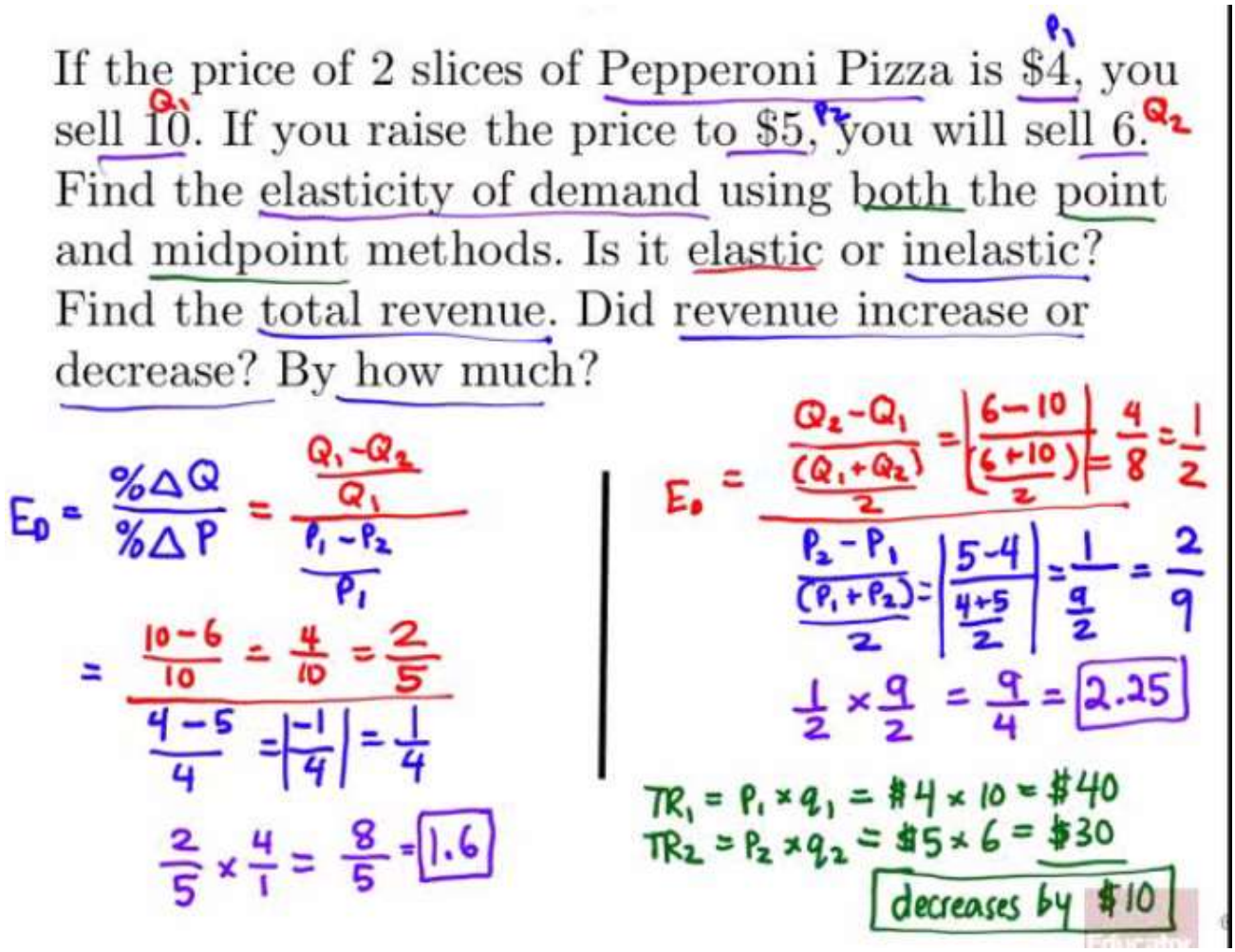
Midpoint: Price = \$5 Quantity = 100

According to the midpoint method, when going from point A to point B, the price rises by 40 percent and the quantity falls by 40 percent. Similarly, when going from point B to point A, the price falls by 40 percent and the quantity rises by 40 percent. In both directions, the price elasticity of demand equals 1.

The following formula expresses the midpoint method for calculating the price elasticity of demand between two points, denoted (Q_1, P_1) and (Q_2, P_2):

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1)/[(Q_2 + Q_1)/2]}{(P_2 - P_1)/[(P_2 + P_1)/2]}.$$

- Comparison



Factors That Determine Price Elasticity

- Whether close substitutes are available
  - Tends to be **high** if consumers are willing to **replace** with substitutes.
  - Tends to be **low** if there are **no close substitutes**
- Whether the good is **necessity** or a **luxury**
  - Life-saving **medication** will be **inelastic** but things you can **live without** tend to be **elastic**
- Time
  - PED tends to **increase over time**
  - ie. demand for gas is more elastic as behavior changes
- Share of income spend on the good
  - Elasticity of demand tends to be **low** when **prices are lower**
  - Conversely, PED is **higher** when **prices are higher**

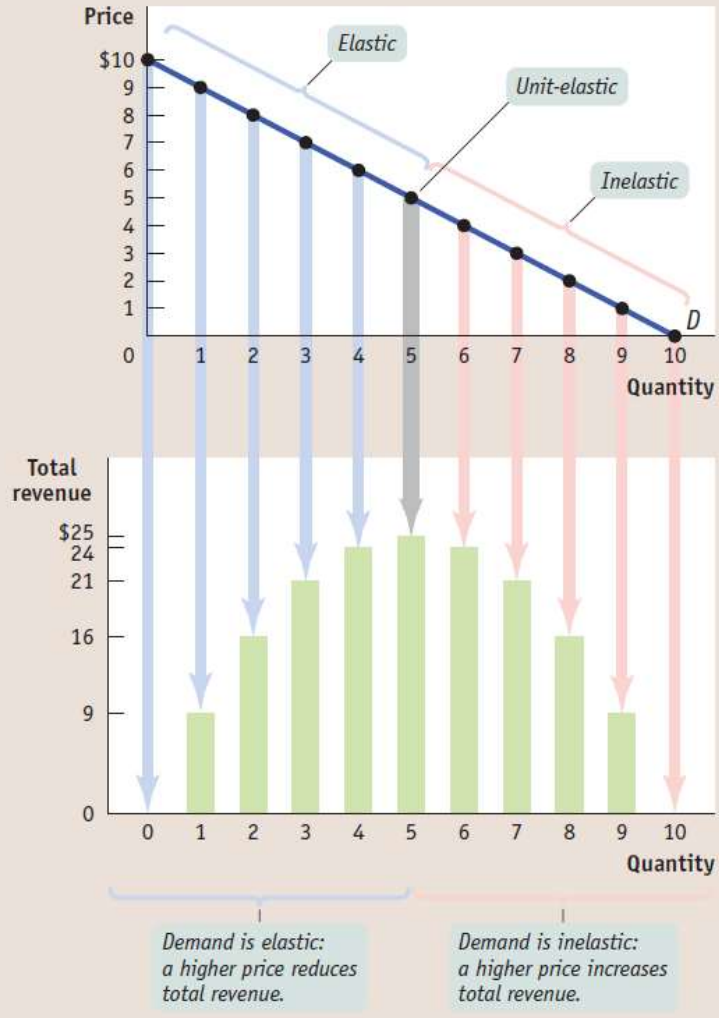
Price Elasticity Along the Demand Curve

- Price and total revenue

Inelastic	Price↑	Total Revenue↑
Inelastic	Price↓	Total Revenue↓
elastic	Price↑	Total Revenue↓
elastic	Price↓	Total Revenue↑

- Graph

FIGURE 6-5 The Price Elasticity of Demand Changes Along the Demand Curve



Demand Schedule and Total Revenue for a Linear Demand Curve

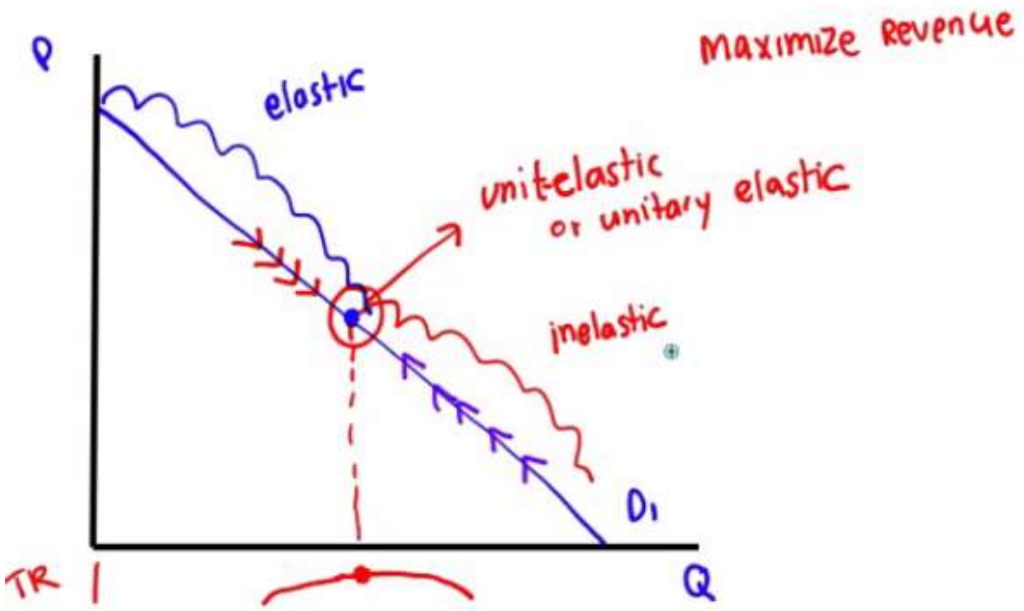
Price	Quantity demanded	Total revenue
$0	10	$0
1	9	9
2	8	16
3	7	21
4	6	24
5	5	25
6	4	24
7	3	21
8	2	16
9	1	9
10	0	0

The upper panel shows a demand curve corresponding to the demand schedule in the table. The lower panel shows how total revenue changes along that demand curve: at each price and quantity combination, the height of the bar represents the total revenue generated. You can see that at a low price, raising the price increases total revenue. So demand is inelastic at low prices. At a high price, however, a rise in price reduces total revenue. So demand is elastic at high prices.

- Example

Example V

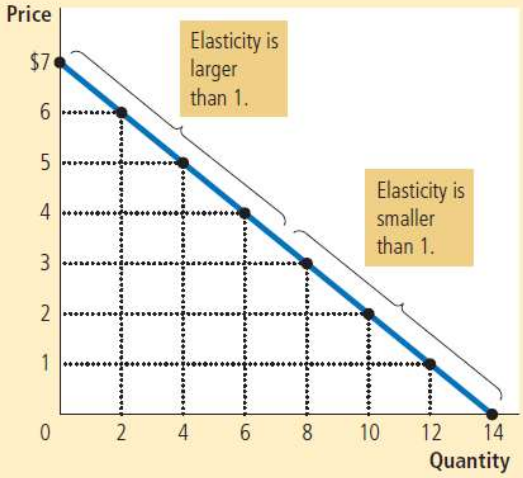
- Assuming that your goal is to maximize revenue, what portion of the demand curve will you be operating on: elastic, unit-elastic, or inelastic? Explain.



The slope of a linear demand curve is constant, but its elasticity is not. The demand schedule in the table was used to calculate the price elasticity of demand by the midpoint method. At points with a low price and high quantity, the demand curve is inelastic. At points with a high price and low quantity, the demand curve is elastic.

FIGURE 4

Elasticity of a Linear Demand Curve



Price	Quantity	Total Revenue (Price × Quantity)	Percentage Change in Price	Percentage Change in Quantity	Elasticity	Description
$7	0	$0				
			15	200	13.0	Elastic
6	2	12				
			18	67	3.7	Elastic
5	4	20				
			22	40	1.8	Elastic
4	6	24				
			29	29	1.0	Unit elastic
3	8	24				
			40	22	0.6	Inelastic
2	10	20				
			67	18	0.3	Inelastic
1	12	12				
			200	15	0.1	Inelastic
0	14	0				

2.5 - Income, Cross-Price & Supply Elasticities

Wednesday, January 11, 2017 1:40 PM

Cross-price elasticity of demand ($E_{A,B}$)

- Meaning
  - Measure used to show the change in the **price** of **one good** affecs the **demand** for **another good**.
- Formula
  - Percentage change in **Quantity Demanded** of **Good A** divided by **Percentage change** in **Price** of **Good B**
  - $E_{A,B} = \frac{\%\Delta Q_A}{\%\Delta P_B}$

The Cross-Price Elasticity of Demand The cross-price elasticity of demand measures how the quantity demanded of one good responds to a change in the price of another good. It is calculated as the percentage change in quantity demanded of good 1 divided by the percentage change in the price of good 2. That is,

$$\text{Cross-price elasticity of demand} = \frac{\text{Percentage change in quantity demanded of good 1}}{\text{Percentage change in the price of good 2}}.$$

Substitutes

- Definition
  - If the coefficient is **positive**, then the two items are **substitutes.**
  - *Do **NOT** find the absolute value for cross-price elasticity!
- $E_{A,B}$ and substitutes
  - The **higher** the number, the **more perfect** the two items are as **substitutes.**
  - The **lower** the number, the **less perfect** the two items are as **substitutes.**
- Price change and quantity demanded
  - If the **price** of Good A **increases** , then the **quantity demanded** of Good B will **increase**.
  - If the **price** of Good A **decreases**, then the **quantity demanded** of Good B will **decrease**.

- Example

If the price of Coca-cola increases by 20%, and the quantity demanded of Pepsi increases by 30%. Calculate the cross-price elasticity of Coke.

$$E_{A,B} = \frac{+30\%}{+20\%} = 1.5$$

Since positive,
Coke and Pepsi are SUBSTITUTES

Complements

- Definition
  - If the coefficient is **negative**, then the two items are **complements.**
  - *Do **NOT** find the absolute value for cross-price elasticity!
- $E_{A,B}$ and substitutes
  - The **more negative** the number, the **more perfect** the two items are as **complements.**
  - The **less negative** the number, the **less perfect** the two items are as **complements.**
- Price change and quantity demanded
  - If the **price** of Good A **increases** , then the **quantity demanded** of Good B will **decrease**.
  - If the **price** of Good A **decreases**, then the **quantity demanded** of Good B will **increase**.
- Example

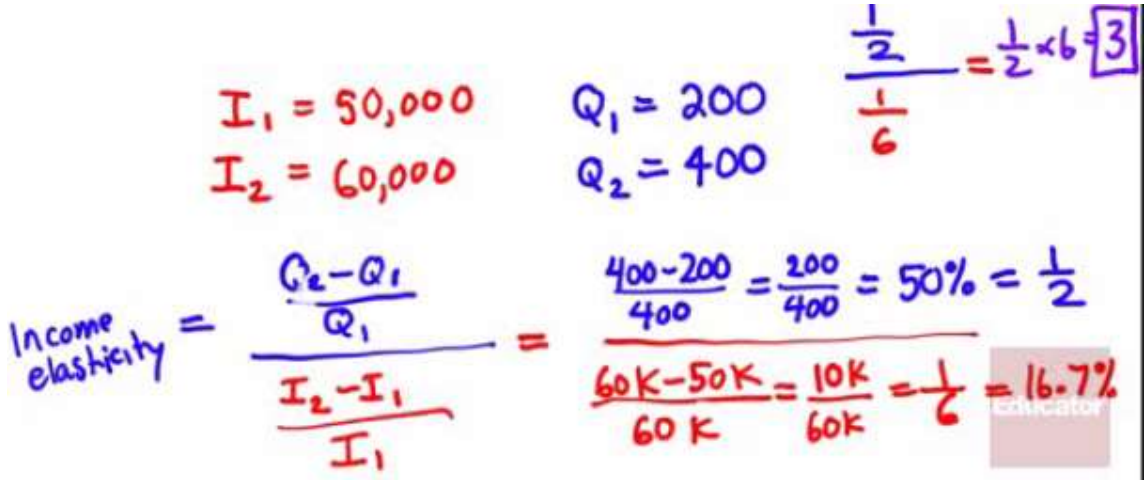
If the price of skis goes up by 20% and the quantity demanded of ski boots goes down by 25%. Calculate the cross-price elasticity of ski boots.

$$E_{A,B} = \frac{\%\Delta Q_B}{\%\Delta P_A} = \frac{+25\%}{-20\%} = \frac{5}{4} = 1.25$$

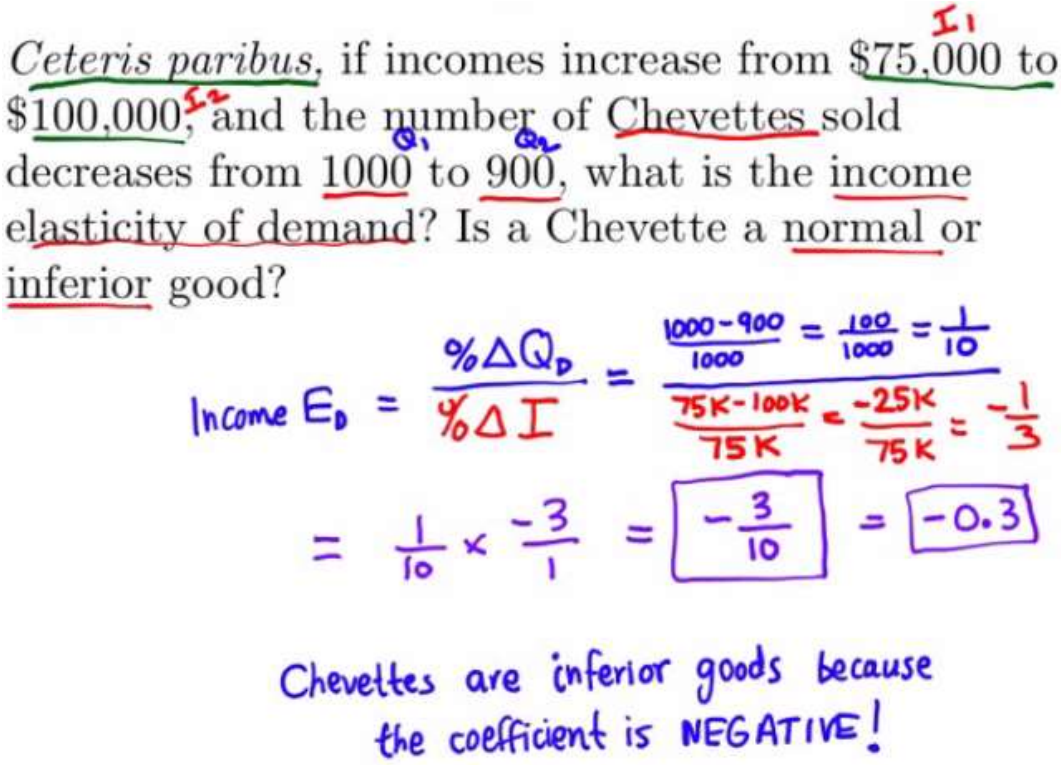
Because coefficient is NEGATIVE, the two items are COMPLEMENTS

Income Elasticity of Demand

- Meaning
  - Measures how changes in **income** affect the **demand** for a good
- Normal good vs. Inferior good
  - If the income elasticity of demand is **positive**, then it's a **normal** good.
  - If the income elasticity of demand is **negative**, then it's a **inferior** good.
- Income-elastic vs. income-inelastic
  - If the income elasticity of demand is **greater than 1**, then it is **income-elastic**
  - If the income elasticity of demand is **less than 1**, then it is **income-inelastic**
- Formula
  - Percentage change in **Quantity Demanded** Divided by Percentage change in **Income**
  - $Income\ Elasticity = \frac{\%\Delta Q}{\%\Delta I}$
- Example 1
  - Income elastic good:



- Example 2
  - ceteris paribus: all other things being equal



- Example 3

If incomes decrease from 20% and people buy 50% less ice cream, find the income elasticity of demand. Is ice cream a normal or inferior good? Is it income-elastic or income-inelastic? Why?

$$\text{Income } E_D = \frac{\%\Delta Q}{\%\Delta I} = \frac{-50\%}{-20\%} = \boxed{2.5}$$

Ice cream is a NORMAL GOOD because the coefficient is positive.

Income-elastic because coefficient is greater than 1.

Price Elasticity of Supply

- Meaning
  - Measure of responsiveness of the quantity of a good **supplied** to the **price** of that good
- Formula
  - **Percentage** change in **quantity supplied** divided by the **percentage** change in **price**
  - $Elasticity\ of\ Supply = \frac{\%\Delta Q_S}{\%\Delta P}$
- Availability of inputs affects elasticity
  - Supply of pizza tends to be very elastic

Panel (b) shows the supply curve for pizza. We suppose that it costs $12 to produce a pizza, including all opportunity costs. At any price below $12, it would be unprofitable to produce pizza and all the pizza parlors would go out of business. At a price of $12 or more, there are many producers who could operate pizza parlors. The ingredients—flour, tomatoes, cheese—are plentiful. And if necessary, more tomatoes could be grown, more milk could be produced to make mozzarella cheese, and so on. So by allowing profits, any price above $12 would elicit the supply of an extremely large quantity of pizzas. The implied supply curve is therefore a horizontal line at $12. Since even a tiny increase in the price would lead to an enormous increase in the quantity

  - Supply of cell phone frequencies is zero. The input (radio spectrum) cannot be changed

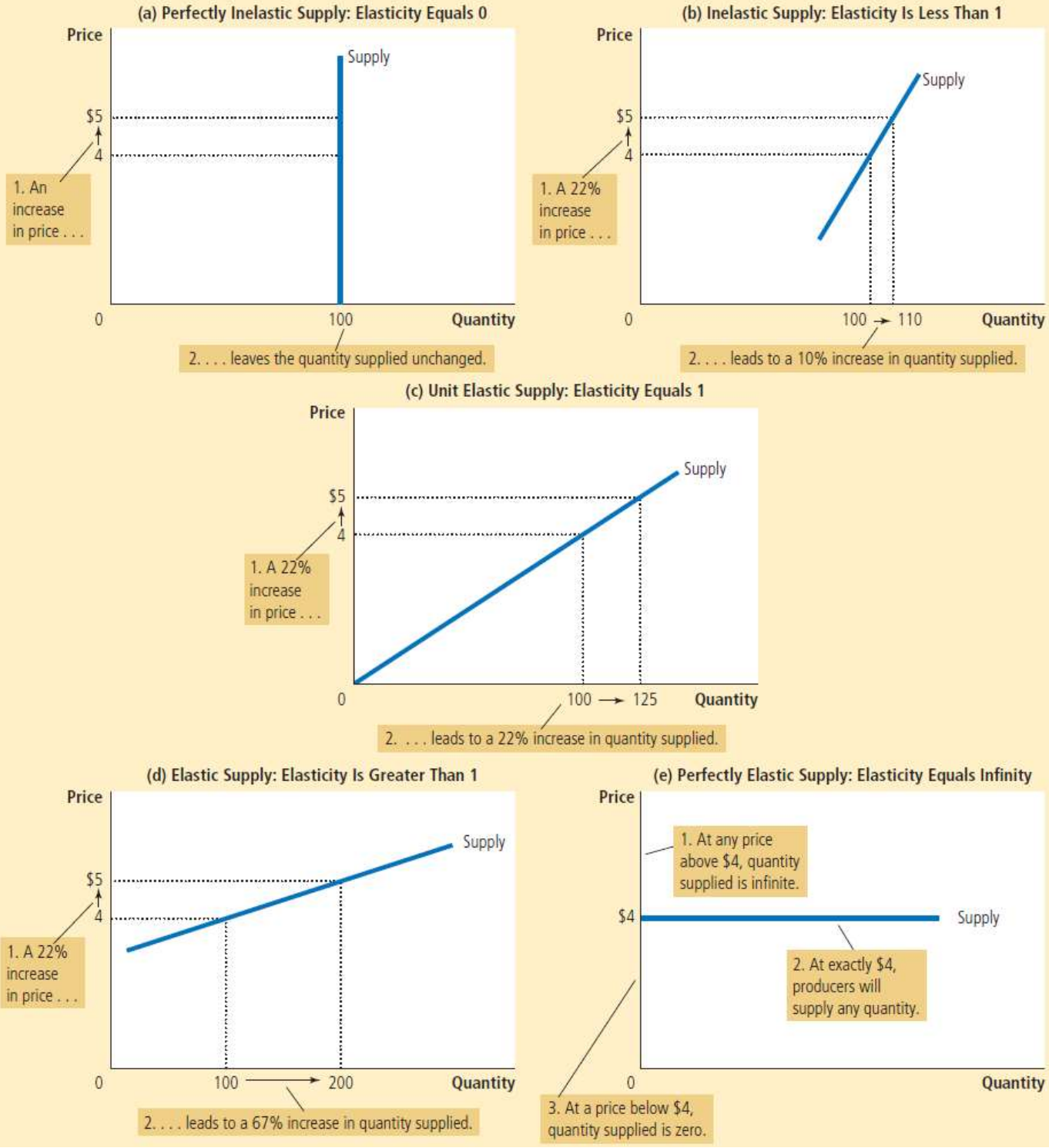
As in the case of demand, the extreme values of the price elasticity of supply have a simple graphical representation. Panel (a) of Figure 48.1 shows the supply of cell phone frequencies, the portion of the radio spectrum that is suitable for sending and receiving cell phone signals. Governments own the right to sell the use of this part of the radio spectrum to cell phone operators inside their borders. But governments can't increase or decrease the number of cell phone frequencies they have to offer—for technical reasons, the quantity of frequencies suitable for cell phone operation is fixed. So the supply curve for cell phone frequencies is a vertical line, which we have assumed is set at the quantity of 100 frequencies. As you move up and down that curve, the change in the quantity supplied by the government is zero, whatever the change in price. So panel (a) illustrates a case of **perfectly inelastic supply,** meaning that the price elasticity of supply is zero.

- Graph

FIGURE 5

The Price Elasticity of Supply

The price elasticity of supply determines whether the supply curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.



Summary for Elasticity

Name	Possible values	Significance
Price elasticity of demand = $\frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$ (dropping the minus sign)		
Perfectly inelastic demand	0	Price has no effect on quantity demanded (vertical demand curve).
Inelastic demand	Between 0 and 1	A rise in price increases total revenue.
Unit-elastic demand	Exactly 1	Changes in price have no effect on total revenue.
Elastic demand	Greater than 1, less than ∞	A rise in price reduces total revenue.
Perfectly elastic demand	∞	A rise in price causes quantity demanded to fall to 0. A fall in price leads to an infinite quantity demanded (horizontal demand curve).
Cross-price elasticity of demand = $\frac{\%\text{ change in quantity } \textit{of one good} \text{ demanded}}{\%\text{ change in price } \textit{of another good}}$		
Complements	Negative	Quantity demanded of one good falls when the price of another rises.
Substitutes	Positive	Quantity demanded of one good rises when the price of another rises.
Income elasticity of demand = $\frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$		
Inferior good	Negative	Quantity demanded falls when income rises.
Normal good, income-inelastic	Positive, less than 1	Quantity demanded rises when income rises, but not as rapidly as income.
Normal good, income-elastic	Greater than 1	Quantity demanded rises when income rises, and more rapidly than income.
Price elasticity of supply = $\frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$		
Perfectly inelastic supply	0	Price has no effect on quantity supplied (vertical supply curve).
	Greater than 0, less than ∞	Ordinary upward-sloping supply curve.
Perfectly elastic supply	∞	Any fall in price causes quantity supplied to fall to 0. Any rise in price elicits an infinite quantity supplied (horizontal supply curve).

2.6 - Total Surplus, Deadweight Loss & World Trade

Wednesday, January 11, 2017 1:40 PM

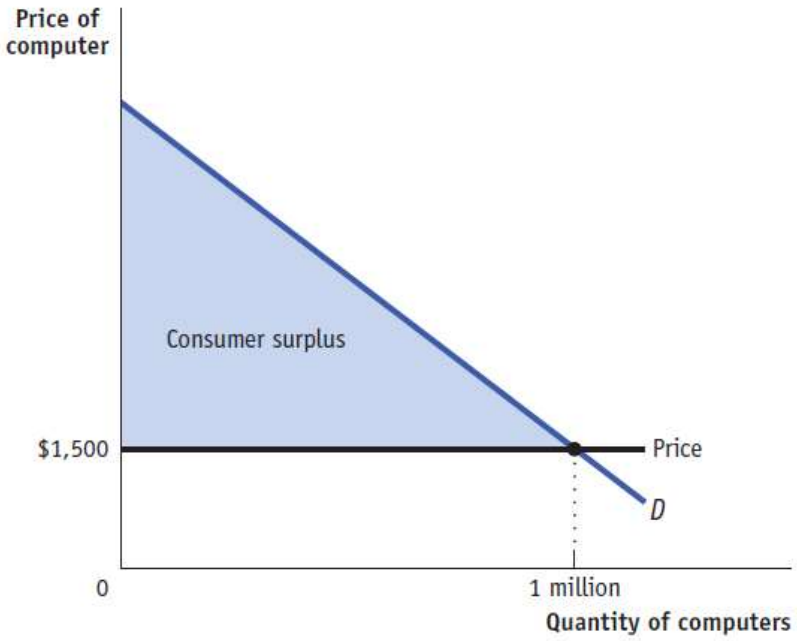
Consumer Surplus

- Meaning
  - the difference between the buyer's **willingness to pay** versus what he **actually pays**
- Graph
  - On a supply and demand graph, the area of consumers surplus (CS) is **below** the **demand curve** but **above** the **equilibrium price**

figure 49.3

Consumer Surplus

The demand curve for computers is smooth because there are many potential buyers. At a price of $1,500, 1 million computers are demanded. The consumer surplus at this price is equal to the shaded area: the area below the demand curve but above the price. This is the total net gain to consumers generated from buying and consuming computers when the price is $1,500.

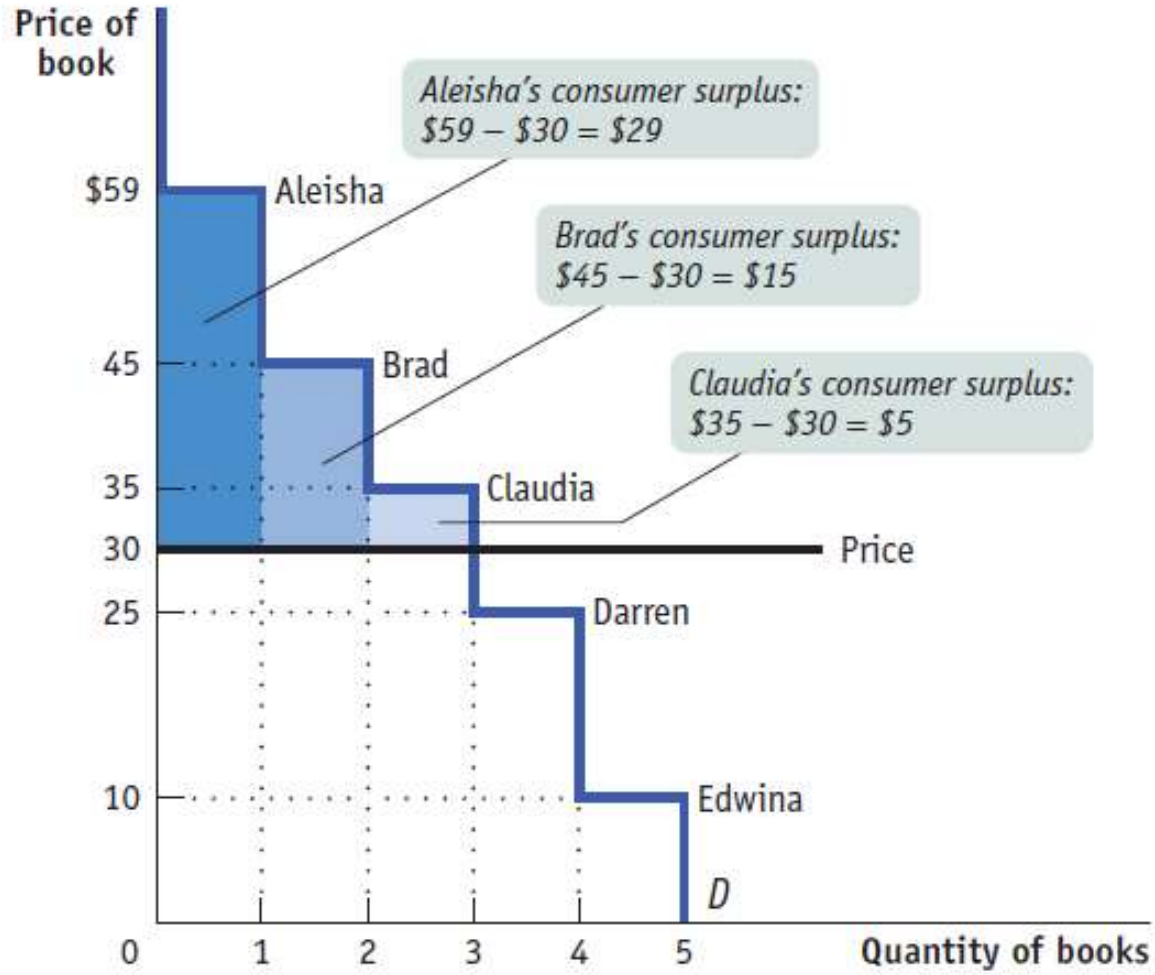


- Example 1

table **49.1**

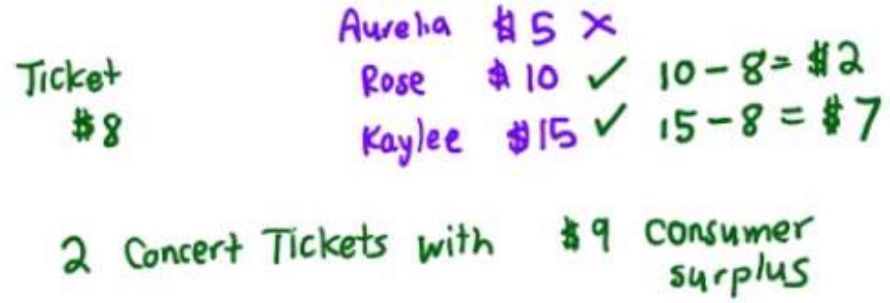
Consumer Surplus When the Price of a Used Textbook Is $30

Potential buyer	Willingness to pay	Price paid	Individual consumer surplus = Willingness to pay – Price paid
Aleisha	$59	$30	$29
Brad	45	30	15
Claudia	35	30	5
Darren	25	—	—
Edwina	10	—	—
All buyers			Total consumer surplus = $49



- Example 2

If Aurelia is willing to pay $5 for a concert ticket and Rose is willing to pay $10 for a concert ticket and Kaylee is willing to pay $15 for a concert ticket but the market price of the ticket is $8, what is the total consumer surplus after all tickets are purchased?



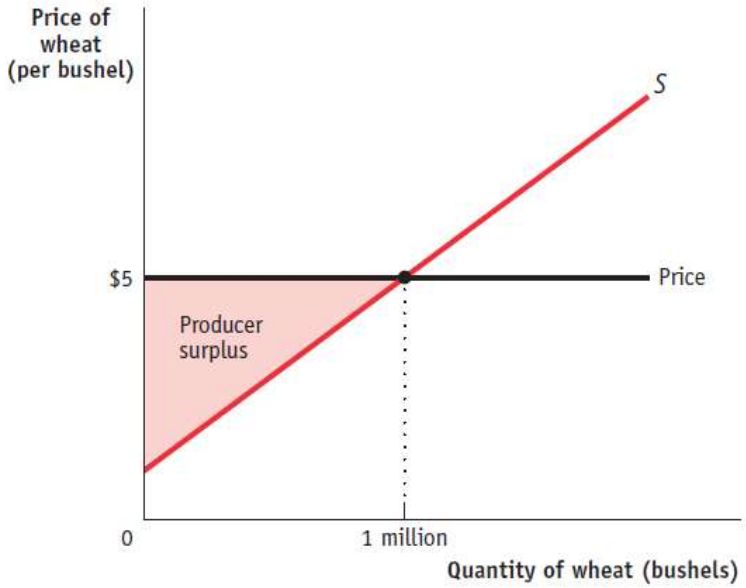
Producer Surplus

- Meaning
  - the difference between the price a sellers **pays** for and what he was actually **willing to sell for**
- Graph
  - On a supply and demand graph, the producer surplus is **above** the **supply curve** but **below** the **equilibrium price**.

figure 49.8

Producer Surplus

Here is the supply curve for wheat. At a price of $5 per bushel, farmers supply 1 million bushels. The producer surplus at this price is equal to the shaded area: the area above the supply curve but below the price. This is the total gain to producers—farmers in this case—from supplying their product when the price is $5.

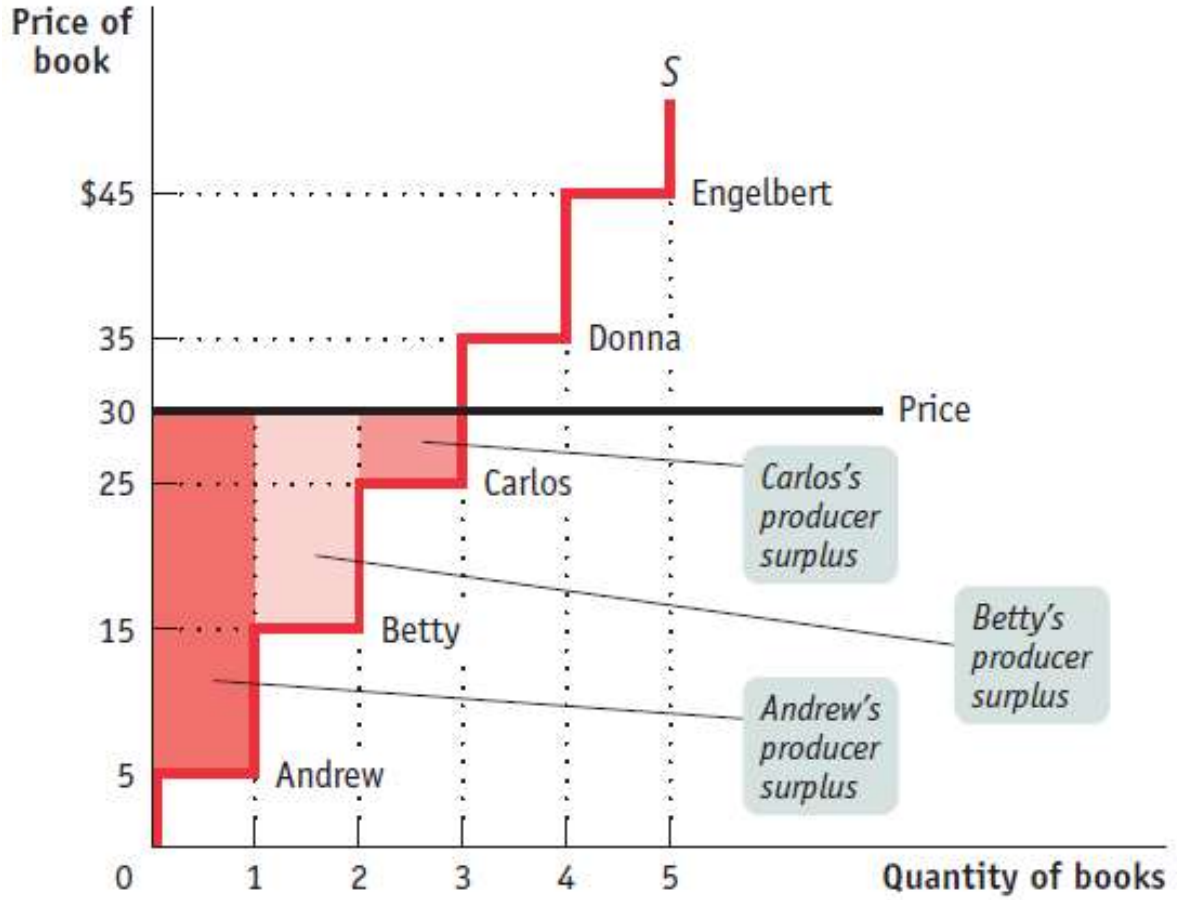


- Example 1

table 49.2

Producer Surplus When the Price of a Used Textbook Is $30

Potential seller	Cost	Price received	Individual producer surplus = Price received – Cost
Andrew	$5	$30	$25
Betty	15	30	15
Carlos	25	30	5
Donna	35	—	—
Engelbert	45	—	—
All sellers			Total producer surplus = $45



- Example 2

If Aram is willing to sell a candy bar for $1 and Nathan is willing to sell a candy bar for $1.50 and Gerardo is willing to sell a candy bar for $2.00, how many candy bars will be sold and what is the total producer surplus if the price of the candy bar is $2.00?

Market Price: $2.00

Aram → $1.00 ✓ 2-1 = $1
Nathan → $1.50 ✓ 2-1.50 = $0.5
Gerardo → $2.00 ✓ 2-2 = $0

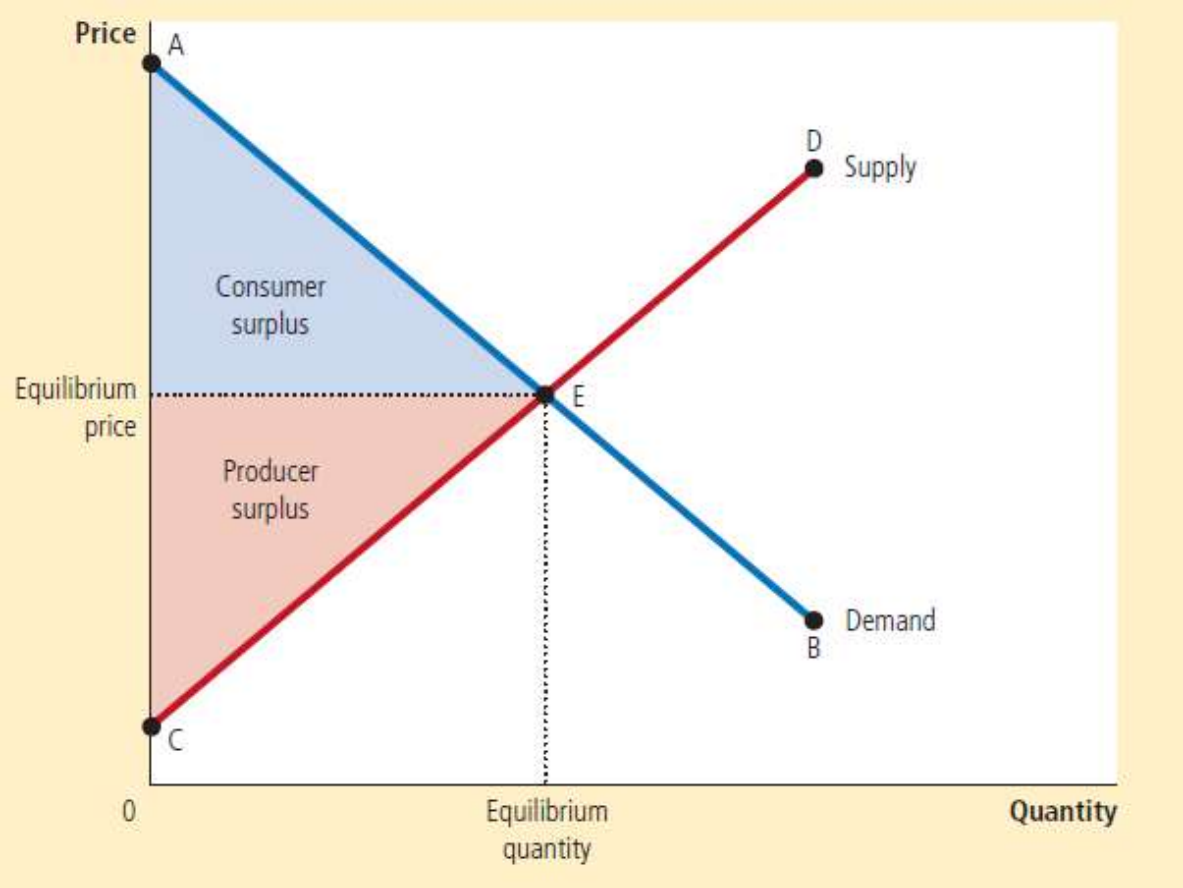
3 candy bars sold, PS = 1 + 0.50 = $1.50

Total Surplus

- Meaning

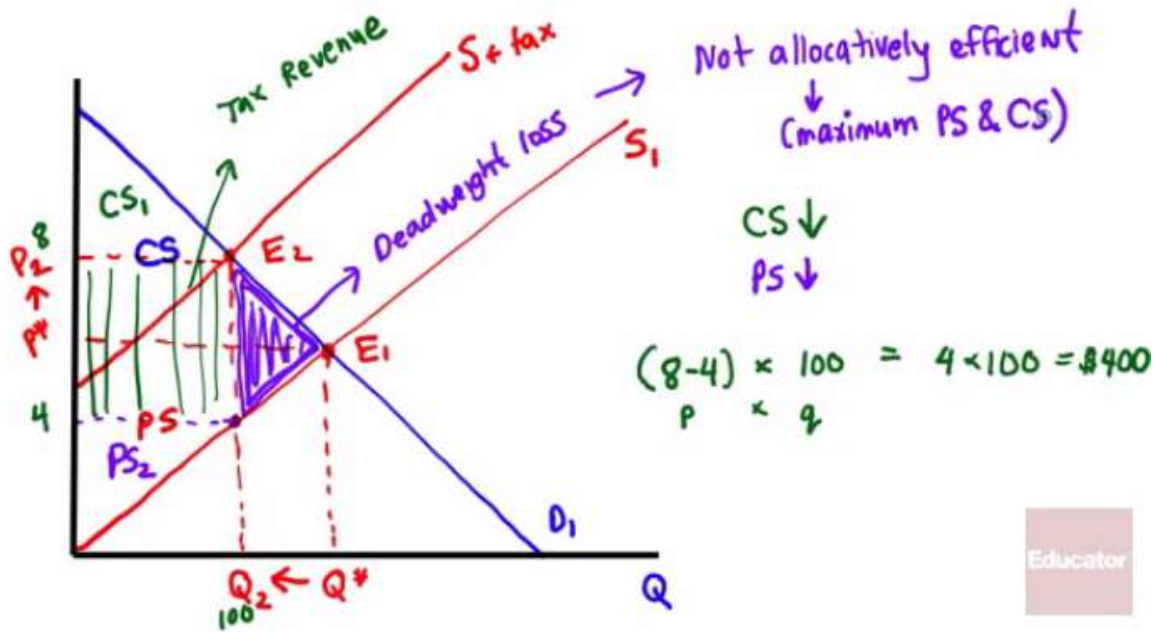
- the **sum** of consumer and producer **surplus**

- Graph
  - the area **between** the supply and demand **curves** up to the **equilibrium quantity**

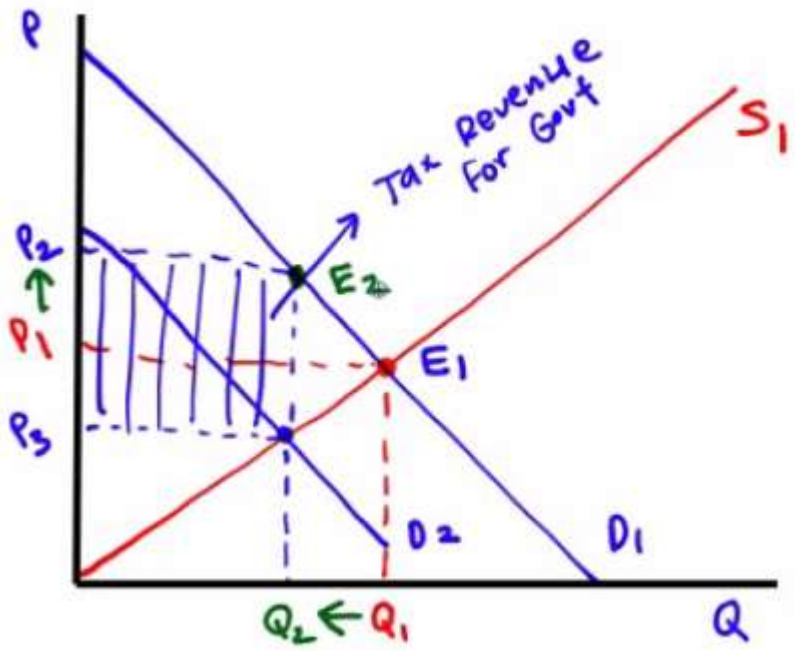


Effects of Taxes on Surplus

- How does a tax affect hotel owners?
  - An excise tax on hotel owners will shift the **supply** curve to the **left**
  - The equilibrium **price** will be **higher** and the equilibrium **quantity** will be **lower**



- How does a tax effect hotel guests
    - An excise tax on hotel guests will shift the **demand** curve to the **left**
    - The equilibrium **price** will be **higher** and the equilibrium **quantity** will be **lower**
    - The tax incidence in both cases are **identical**



- How the imposition of a tax will decrease consumer and producer surplus

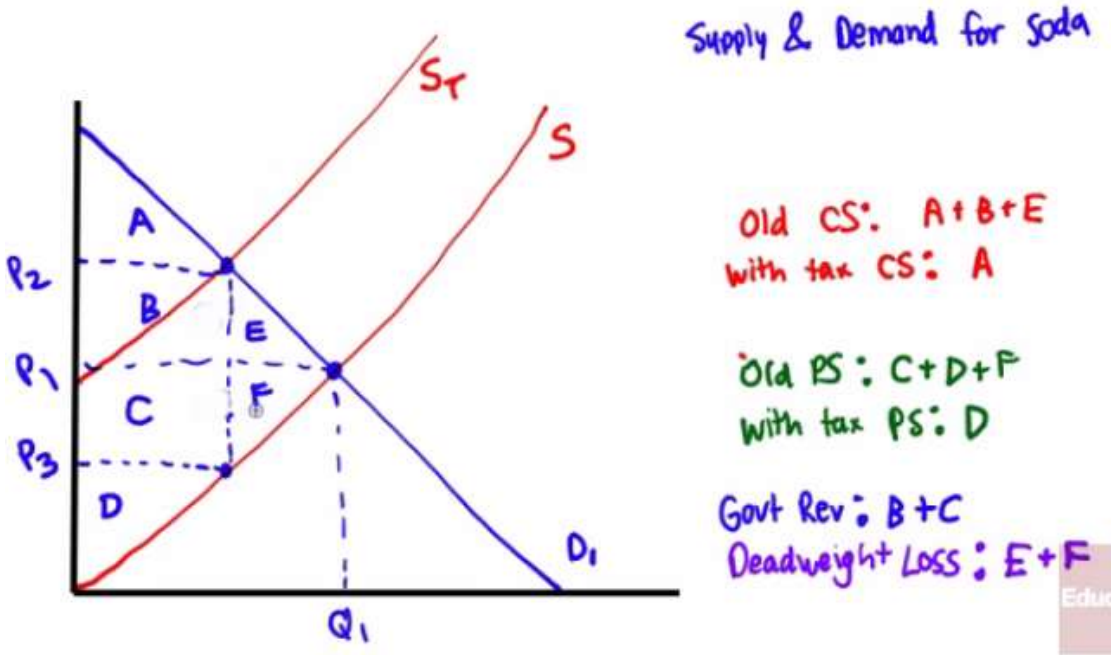
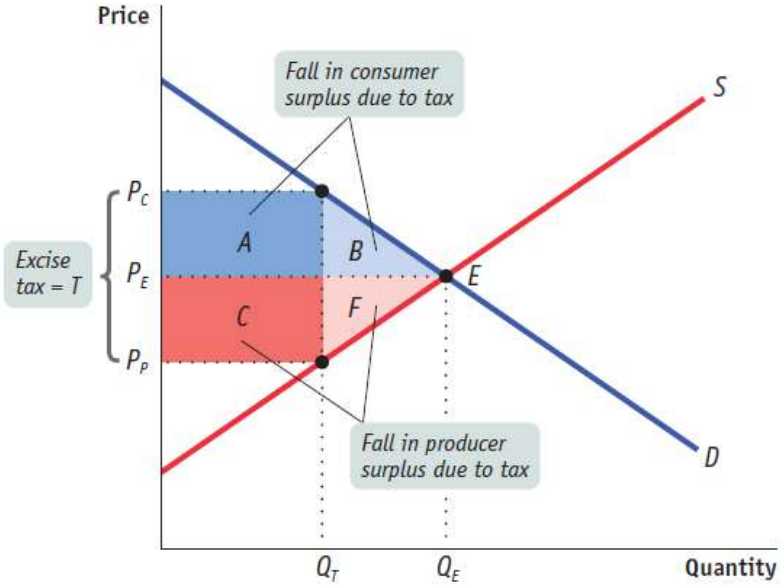


figure 50.11

A Tax Reduces Consumer and Producer Surplus

Before the tax, the equilibrium price and quantity are P_E and Q_E, respectively. After an excise tax of T per unit is imposed, the price to consumers rises to P_C and consumer surplus falls by the sum of the dark blue rectangle, labeled *A*, and the light blue triangle, labeled *B*. The tax also causes the price to producers to fall to P_P; producer surplus falls by the sum of the dark red rectangle, labeled *C*, and the light red triangle, labeled *F*. The government receives revenue from the tax, $Q_T \times T$, which is given by the sum of the areas *A* and *C*. Areas *B* and *F* represent the losses to consumer and producer surplus that are not collected by the government as revenue; they are the deadweight loss to society of the tax.

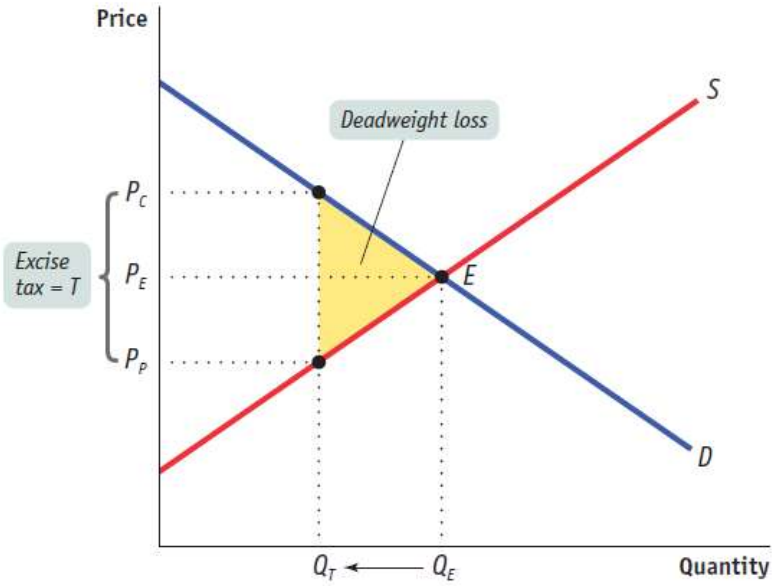


- Deadweight loss

figure 50.12

The Deadweight Loss of a Tax

A tax leads to a deadweight loss because it creates inefficiency: some mutually beneficial transactions never take place because of the tax, namely the transactions $Q_E - Q_T$. The yellow area here represents the value of the deadweight loss: it is the total surplus that would have been gained from the $Q_E - Q_T$ transactions. If the tax had not discouraged transactions—had the number of transactions remained at Q_E—no deadweight loss would have been incurred.



International Trade

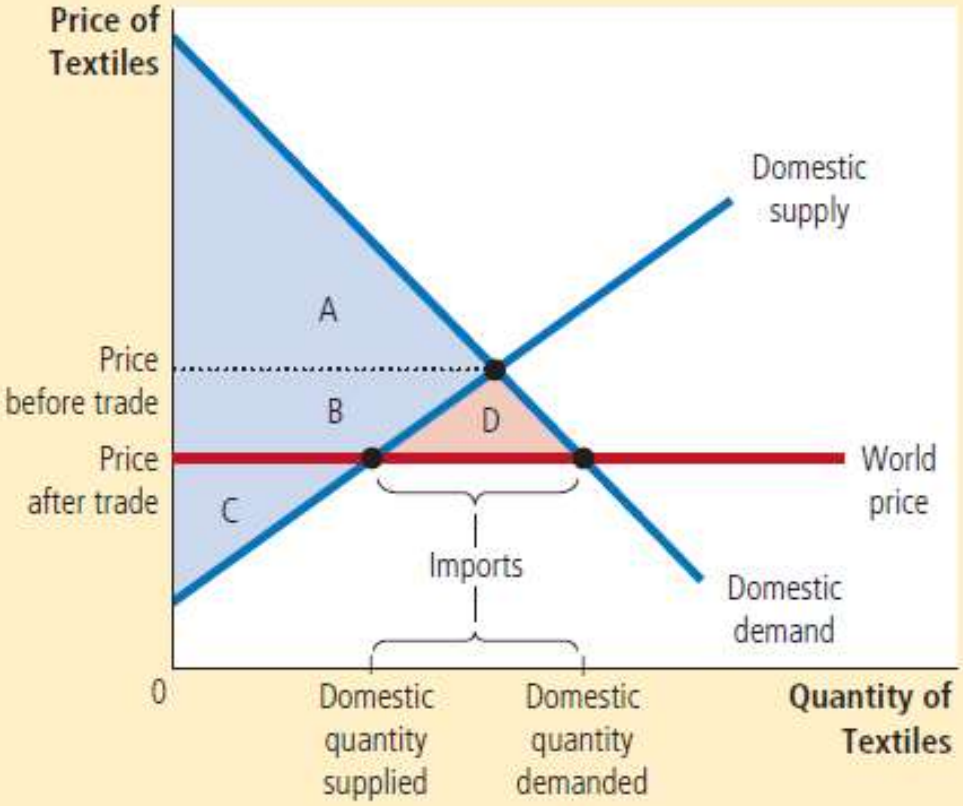
- Autarky
  - the quality of being **self-sufficient** with **no imports or exports**, a **closed** economy
- Free trade and Tariffs
  - Free trade **increases total surplus**
  - **Tariffs** serve to **reduce** allocative **efficiency**

Importing Countries

- The **World Price** (P_w) will be **below** the autarky price and **total surplus** will **increase**
- Domestic **consumers gain**, domestic **producers lose**, but the **net gain** is **positive**

	Before Trade	After Trade	Change
Consumer Surplus	A	A + B + D	+(B + D)
Producer Surplus	B + C	C	−B
Total Surplus	A + B + C	A + B + C + D	+D

The area D shows the increase in total surplus and represents the gains from trade.



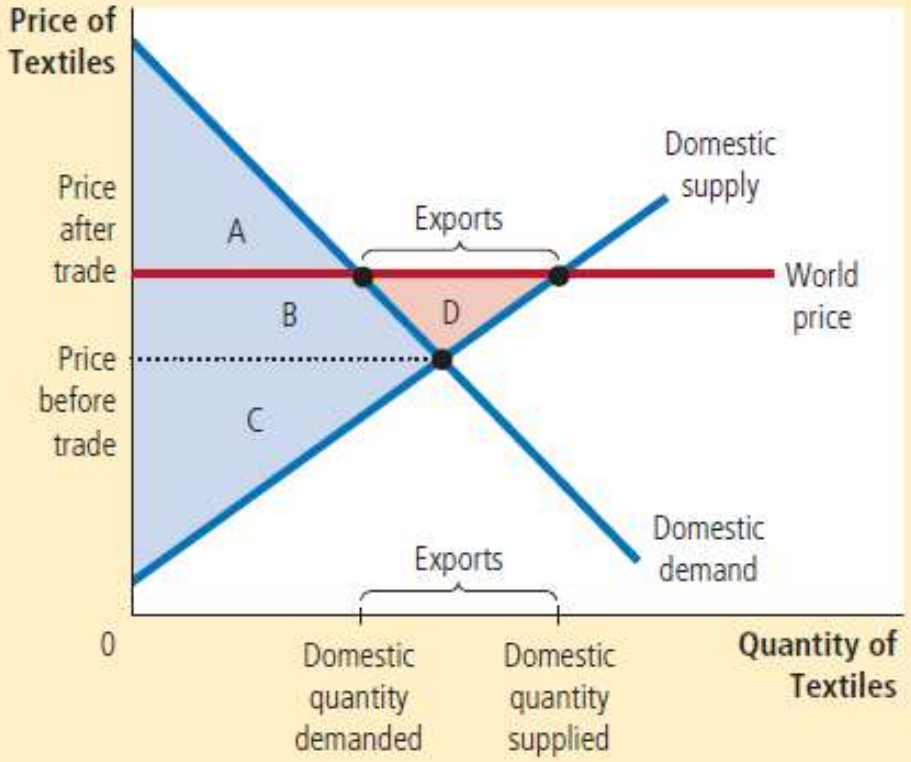
- **Buyers** are **better off** (consumer surplus rises from A to A + B + D)
- **Sellers** are **worse off** (producer surplus falls from B + C to C)
- **Total surplus rises** by an amount equal to area D
- Trade **raises the economic well-being** of the country as a whole.

Exporting Countries

- The **World Price** (P_w) will be **above** the autarky price and **total surplus** will **increase**
- Domestic **consumers lose**, domestic **producers gain**, but the **net gain** is **positive**

	Before Trade	After Trade	Change
Consumer Surplus	A + B	A	−B
Producer Surplus	C	B + C + D	+(B + D)
Total Surplus	A + B + C	A + B + C + D	+D

The area D shows the increase in total surplus and represents the gains from trade.

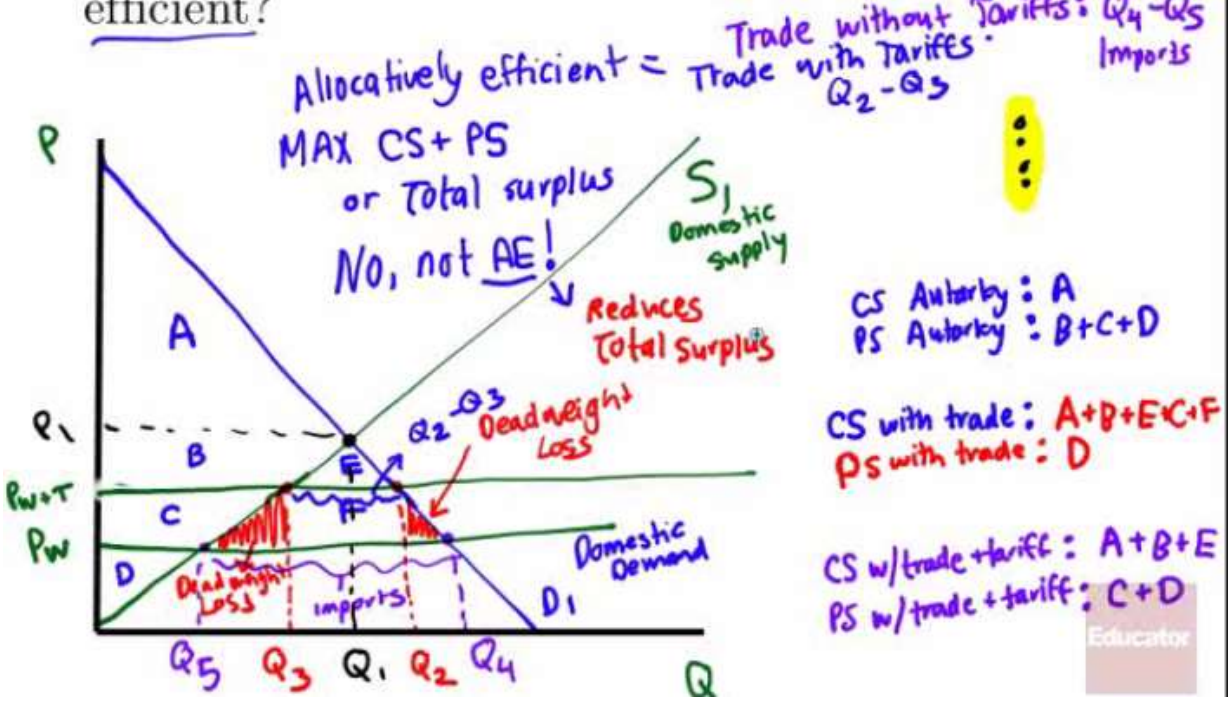


- **Sellers** are **better off** (producer surplus rises from C to B + C + D)
- **Buyers** are **worse off** (consumer surplus falls from A + B to A)
- **Total surplus rises** by an amount equal to area D
- Trade **raises the economic well-being** of the country as a whole.

The Effects of a Tariff

- Tariff
  - a government **tax** on **imports or exports**
- Example 1

- Graph what would happen if an importing country imposes a tariff in order to protect the corn industry from low world prices. Who gains? Who loses? What's the deadweight loss? Is this allocatively efficient?



- Example 2

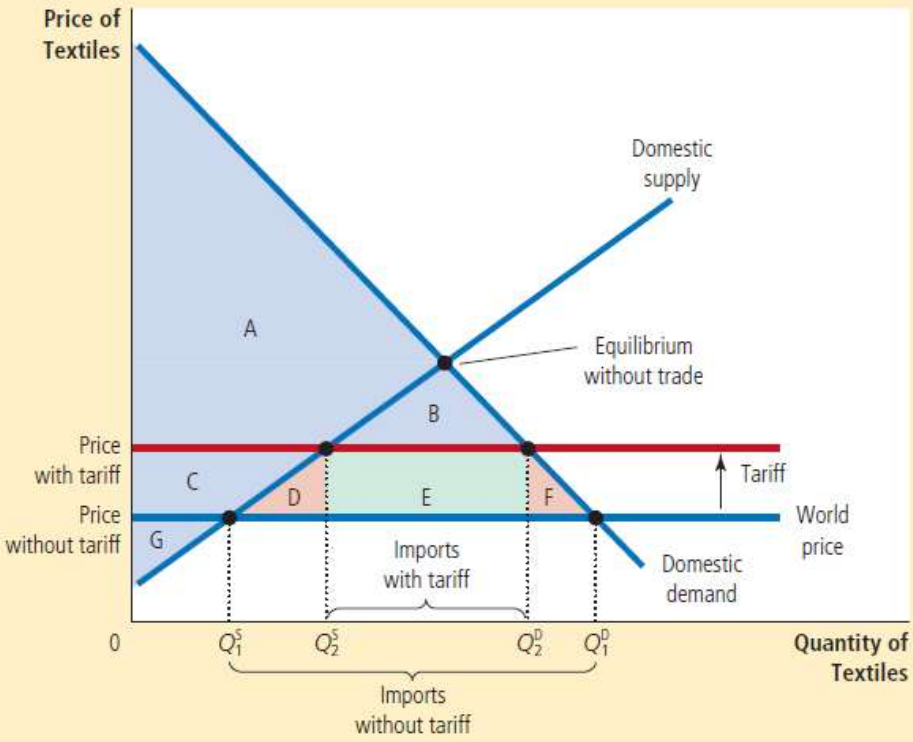
FIGURE 4

The Effects of a Tariff

A tariff reduces the quantity of imports and moves a market closer to the equilibrium that would exist without trade. Total surplus falls by an amount equal to area D + F. These two triangles represent the deadweight loss from the tariff.

	Before Tariff	After Tariff	Change
Consumer Surplus	A + B + C + D + E + F	A + B	−(C + D + E + F)
Producer Surplus	G	C + G	+C
Government Revenue	None	E	+E
Total Surplus	A + B + C + D + E + F + G	A + B + C + E + G	−(D + F)

The area D + F shows the fall in total surplus and represents the deadweight loss of the tariff.



2.7 - Production Function & Firm Costs

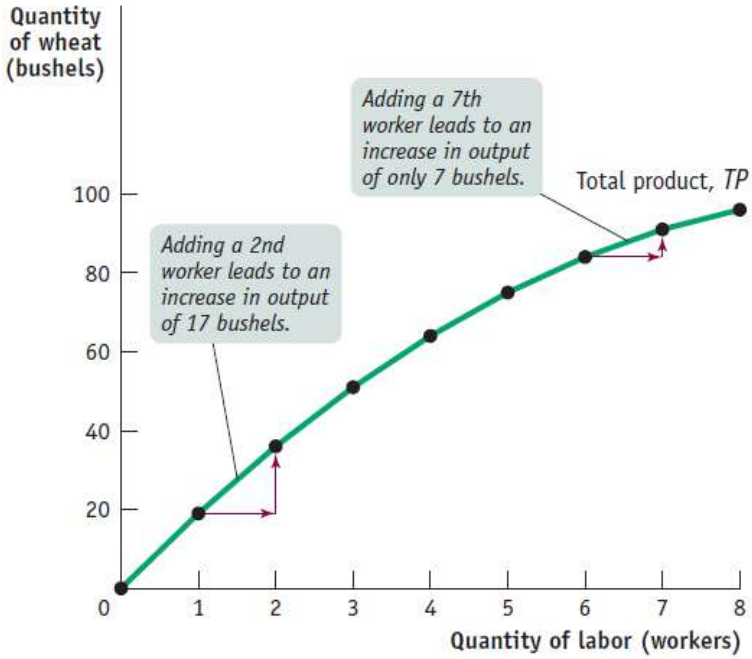
Wednesday, January 11, 2017 3:58 PM

Long Run vs. Short Run

- Production function
  - The **quantity** of **output** a firm produces depends on the **quantity** of **inputs**
  - This relationship is known as the firm's **production function**
- Inputs and outputs
  - **Fixed input** is an input whose quantity is **fixed for a period of time** and **cannot be varied** (ie. Land)
  - **Variable** input is an input whose quantity **can vary over a short period** of time (ie. Labor)
- Long run vs. short run
  - In the **long run**, there are **no fixed inputs**. All costs are **variable**
  - In the **short run**, **at least one** input will be **fixed**

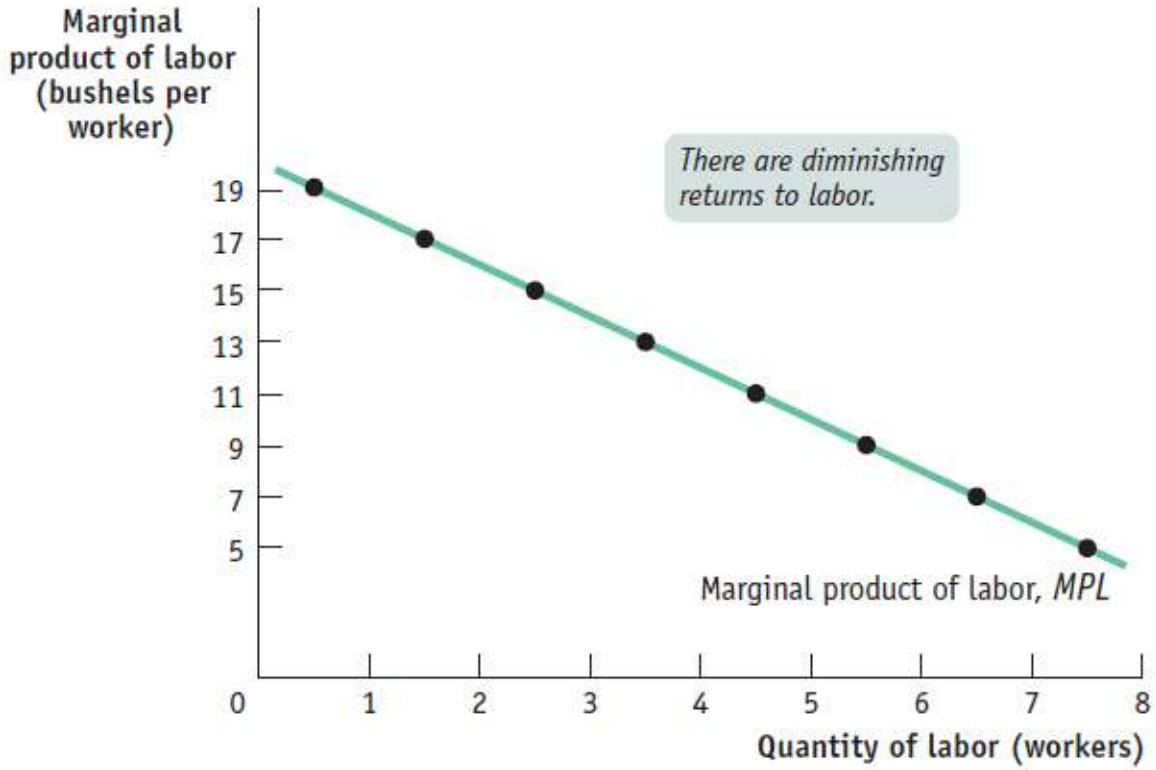
Marginal Product of Labor (MPL)

- Definition
  - change in **quantity** of output produced by one **additional** unit of **labor**
- Formula
  - $MPL = \frac{\Delta Q}{\Delta L}$
- Graph
  - Downward sloping
  - Quantity of Labor on the x-axis
  - MPL of labor on the y-axis
- Example 1



Quantity of labor L (workers)	Quantity of wheat Q (bushels)	Marginal product of labor $MPL = \Delta Q/\Delta L$ (bushels per worker)
0	0	
		19
1	19	
		17
2	36	
		15
3	51	
		13
4	64	
		11
5	75	
		9
6	84	
		7
7	91	
		5
8	96	

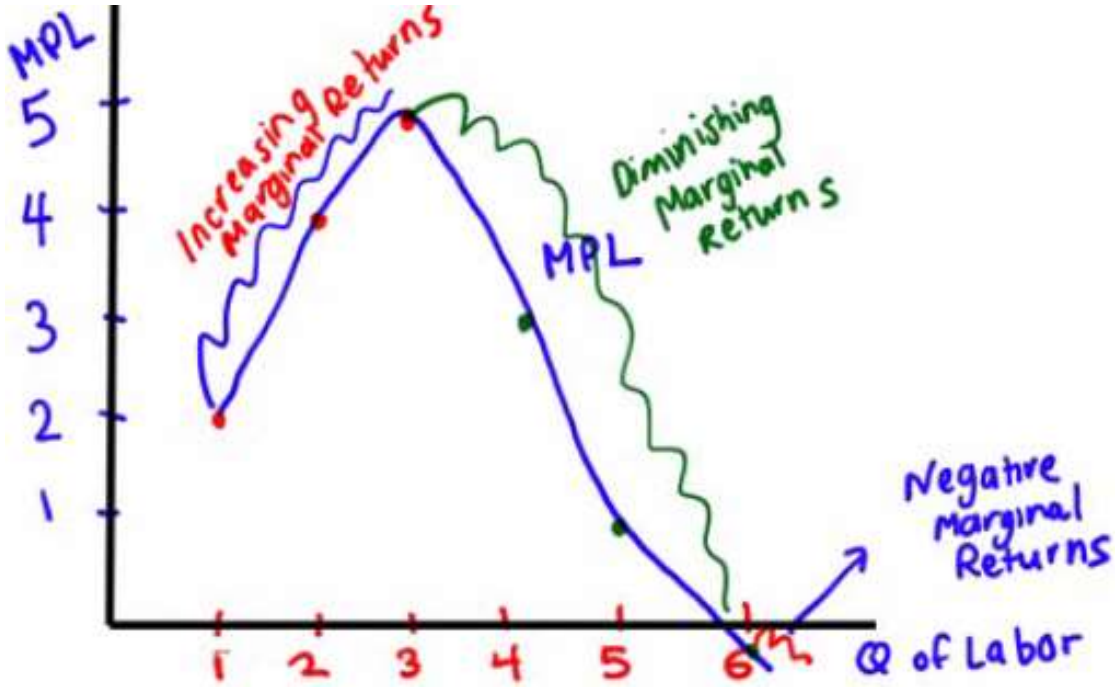
- The table shows the **production function**, the relationship between the quantity of the **variable input** (labor, measured in number of workers) and the quantity of **output** (wheat, measured in bushels) for a given quantity of the fixed input.
- It also shows the **marginal product of labor** on George and Martha's farm.
- The total product curve shows the production function graphically.
- It **slopes** upward because **more wheat is produced** as **more workers are employed**.
- It also becomes **flatter** because the **marginal product of labor declines** as more and more workers are employed.



- The marginal product of labor curve plots each worker's **marginal product**, the **increase** in the **quantity** of output generated by each **additional worker**.
- The **change in the quantity of output** is measured on the **vertical** axis and the **number of workers employed** on the **horizontal** axis.
- The first worker employed generates an increase in output of 19 bushels, the second worker generates an increase of 17 bushels, and so on.
- The curve **slopes downward** due to the **diminishing** returns to labor

Different Types of Marginal Returns

- **Increasing** marginal returns
  - The MPL **increases** as you hire more workers
- **Diminishing** marginal returns
  - The MPL **decreases** but the total **output increases**
- **Negative** marginal returns
  - The MPL **decreases as well as** the total **output**
- Graph



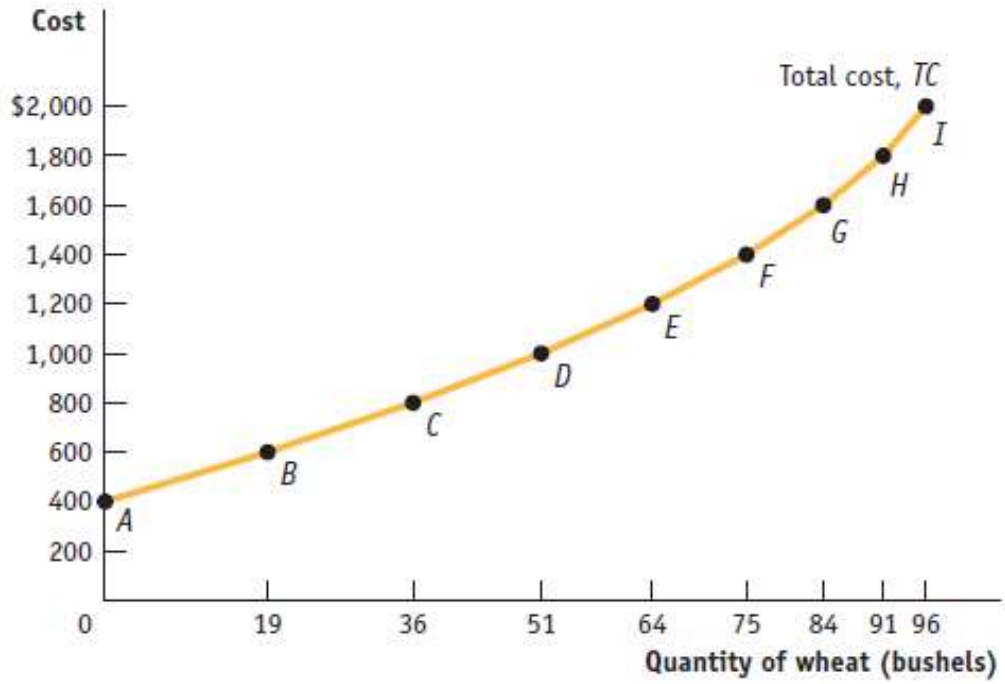
Was Thomas Malthus Correct?

- In his book, *An Essay On the Principle of Population*, Thomas Malthus predicted that, based on the **principle of diminishing marginal returns**, we would have to brace ourselves for a **widespread starvation** of the masses.
- Thomas Carlyle coined the phrase "dismal science" - the term has caught on to describe **economics** as a **gloomy subject**
- Was Malthus right?
- No, he did not account for the increase in **TECHNOLOGY**!

Fixed, Variable and Total Cost

- Fixed cost
  - cost that does **not depend** on the **quantity of output produced** (ie. franchising fee)
- Variable cost
  - cost that **depends** on the **quantity of output produced** (ie. bread, cheese, part-time workers)
- Total cost
  - **Sum** of fixed and variable cost
  - $TC = FC + VC$

- Graph



Point on graph	Quantity of labor *L* (workers)	Quantity of wheat *Q* (bushels)	Variable cost *VC*	Fixed cost *FC*	Total cost *TC = FC + VC*
A	0	0	$0	$400	$400
B	1	19	200	400	600
C	2	36	400	400	800
D	3	51	600	400	1,000
E	4	64	800	400	1,200
F	5	75	1,000	400	1,400
G	6	84	1,200	400	1,600
H	7	91	1,400	400	1,800
I	8	96	1,600	400	2,000

  - The total cost curve **slopes upward** because the **number of workers employed**, and hence total cost, increases as the quantity of output increases.
  - The curve gets **steeper** as output increases due to **diminishing** returns to **labor**.

Average Cost

- Average total cost
  - total cost **per unit of output**
  - $ATC = \frac{TC}{Q}$

- Average fixed cost
  - fixed cost **per unit of output**
  - $AFC = \frac{FC}{Q}$
- Average variable cost
  - variable cost **per unit of output**
  - $AVC = \frac{VC}{Q}$

table **55.2**

Average Costs for Selena's Gourmet Salsas

Quantity of salsa *Q* (cases)	Total cost *TC*	Average total cost of case *ATC = TC/Q*	Average fixed cost of case *AFC = FC/Q*	Average variable cost of case *AVC = VC/Q*
1	$120	$120.00	$108.00	$12.00
2	156	78.00	54.00	24.00
3	216	72.00	36.00	36.00
4	300	75.00	27.00	48.00
5	408	81.60	21.60	60.00
6	540	90.00	18.00	72.00
7	696	99.43	15.43	84.00
8	876	109.50	13.50	96.00
9	1,080	120.00	12.00	108.00
10	1,308	130.80	10.80	120.00

Marginal Cost

- Meaning
  - **change** in **total cost** generated by one **additional** unit of **output**
  - **change** in **total cost** divided by **change** in quantity of **output**
- Formula
  - $MC = \frac{\Delta TC}{\Delta Q}$

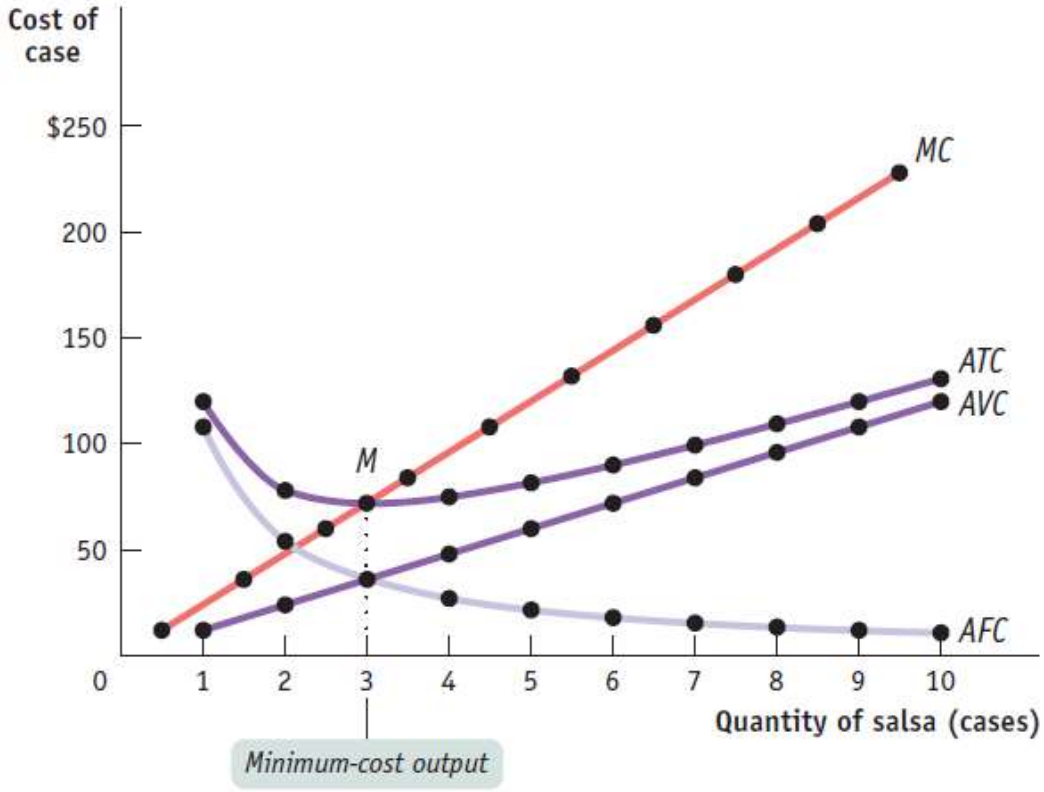
table **55.1**

Costs at Selena's Gourmet Salsas

Quantity of salsa *Q* (cases)	Fixed cost *FC*	Variable cost *VC*	Total cost *TC = FC + VC*	Marginal cost of case *MC = ΔTC/ΔQ*
0	$108	$0	$108	
				$12
1	108	12	120	
				36
2	108	48	156	
				60
3	108	108	216	
				84
4	108	192	300	
				108
5	108	300	408	
				132
6	108	432	540	
				156
7	108	588	696	
				180
8	108	768	876	
				204
9	108	972	1,080	
				228
10	108	1,200	1,308	

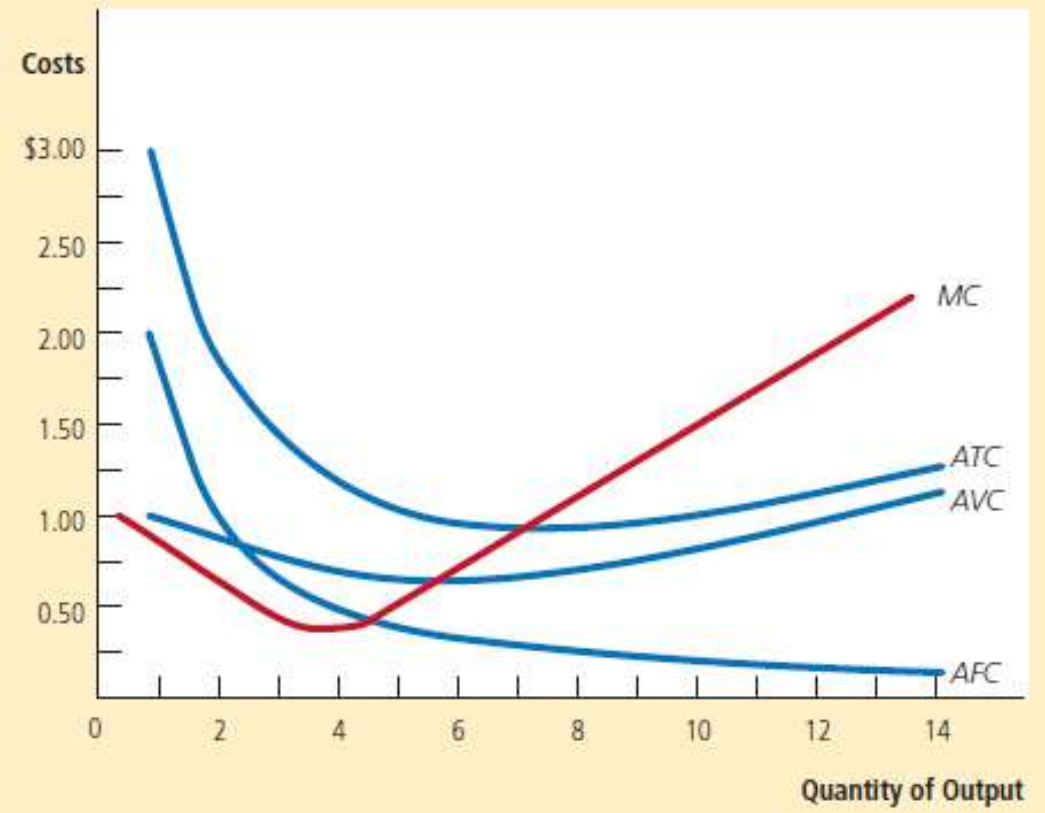
Relationship Between ATC and MC Curves

- At the **minimum-cost output**, **average total cost** is equal to **marginal cost** - ALWAYS!
- At **output less** than the **minimum**-cost output, **MC** is **less** than **ATC** and the ATC is **rising**
- At **output greater** than the **minimum**-cost output, **MC** is **greater** than **ATC** and ATC is **rising**
- Ideal Graph



- MC: marginal cost
- ATC: average total cost
- AVC: average variable cost
- AFC: average fixed cost

- Typical Graph



- Many firms experience **increasing** marginal product **before diminishing** marginal product.
- As a result, they have cost curves shaped like those in this figure.

True or False Questions

- ATC is always greater than AVC by a constant amount
  - Answer: False
  - Reason: The distance between ATC and AVC is AFC
- If a firm shuts down in the short run, its profits will equal zero
  - Answer: False
  - Reason: Fixed cost is a cost that you will incur even if you shut down
  - Equations:
    - Total cost = Fixed cost + Variable cost
    - Profit = Total revenue - Total cost
  - Price vs. average variable cost
    - If P > AVC, stay in business

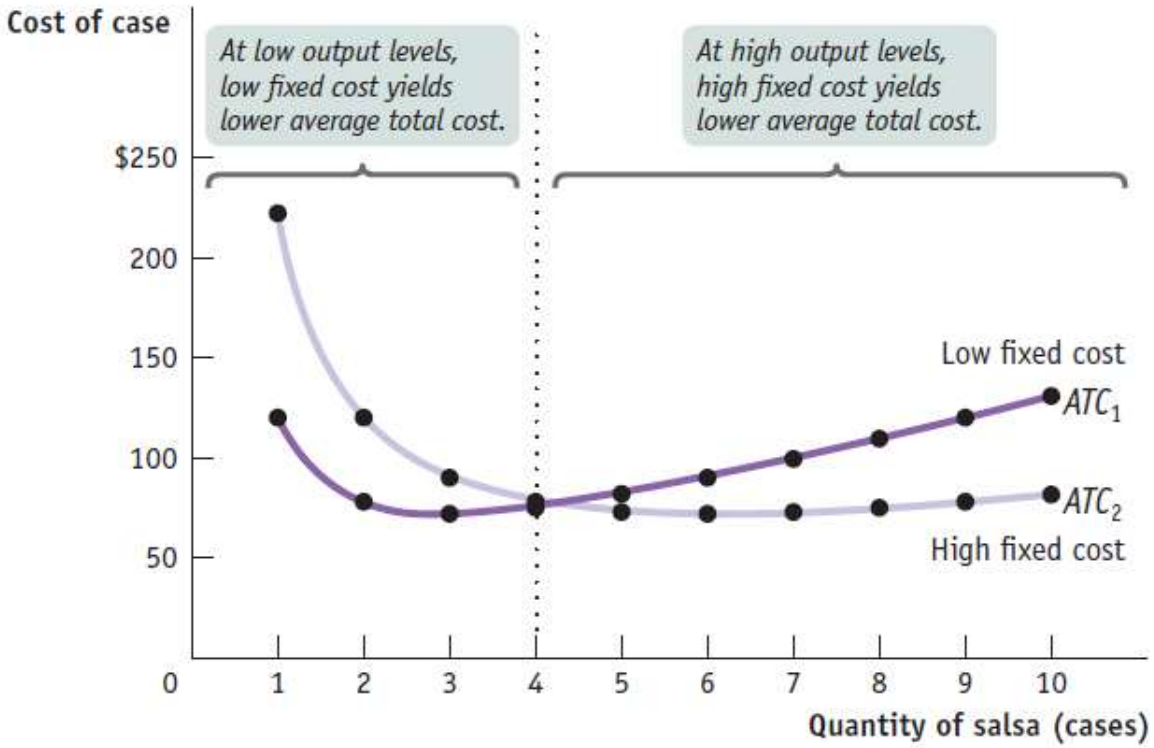
- If P < AVC, then shutdown

2.8 - Long-Run Costs & Economies of Scale

Wednesday, January 11, 2017 5:35 PM

Short-Run vs. Long-Run Costs

- Business must make decisions on whether to spend money **now** (**fixed**) or spend money **later** (**variable**)
- If a firm plans on producing a **high** amount of output, it might make sense to have a **high fixed cost**
- Conversely, if a firm plans on producing a **small** amount of output, it might make sense to have a **low fixed cost**
- Choosing the optimal level of fixed cost requires a lot of planning

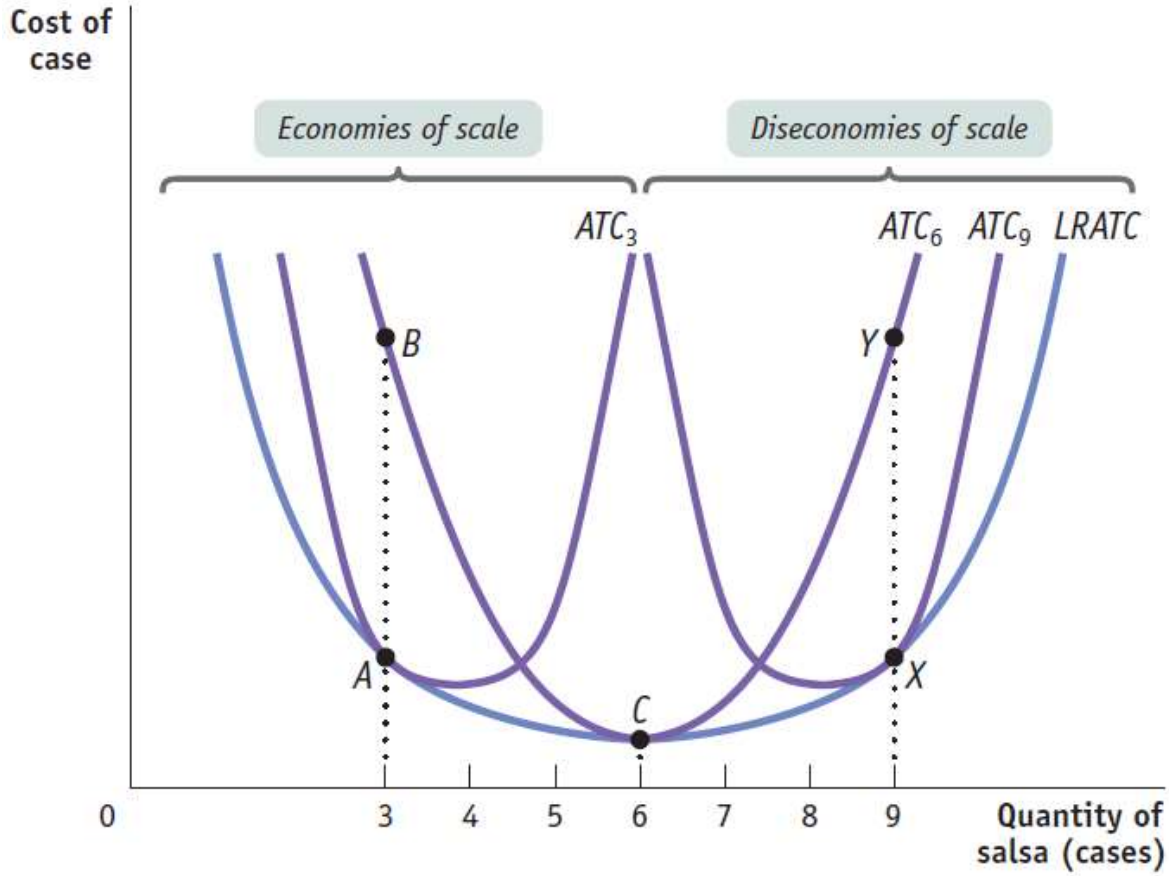


	Low fixed cost (FC = $108)			High fixed cost (FC = $216)		
Quantity of salsa (cases)	High variable cost	Total cost	Average total cost of case ATC_1	Low variable cost	Total cost	Average total cost of case ATC_2
1	$12	$120	$120.00	$6	$222	$222.00
2	48	156	78.00	24	240	120.00
3	108	216	72.00	54	270	90.00
4	192	300	75.00	96	312	78.00
5	300	408	81.60	150	366	73.20
6	432	540	90.00	216	432	72.00
7	588	696	99.43	294	510	72.86
8	768	876	109.50	384	600	75.00
9	972	1,080	120.00	486	702	78.00
10	1,200	1,308	130.80	600	816	81.60

Long-Run Average Total Cost (LRATC)

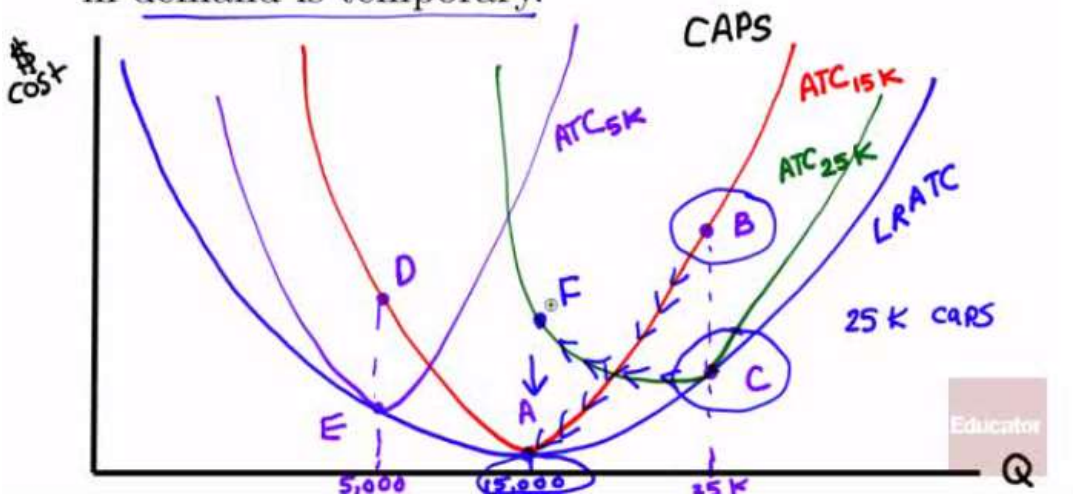
- Meaning
  - the relationship between **output** and **average total cost** when fixed cost has been chosen to **minimize** average total cost for **each level of output**
  - If there are **many possible choices** of fixed cost, the long-run average total cost curve will have the familiar, **smooth** U shape.

- Graph



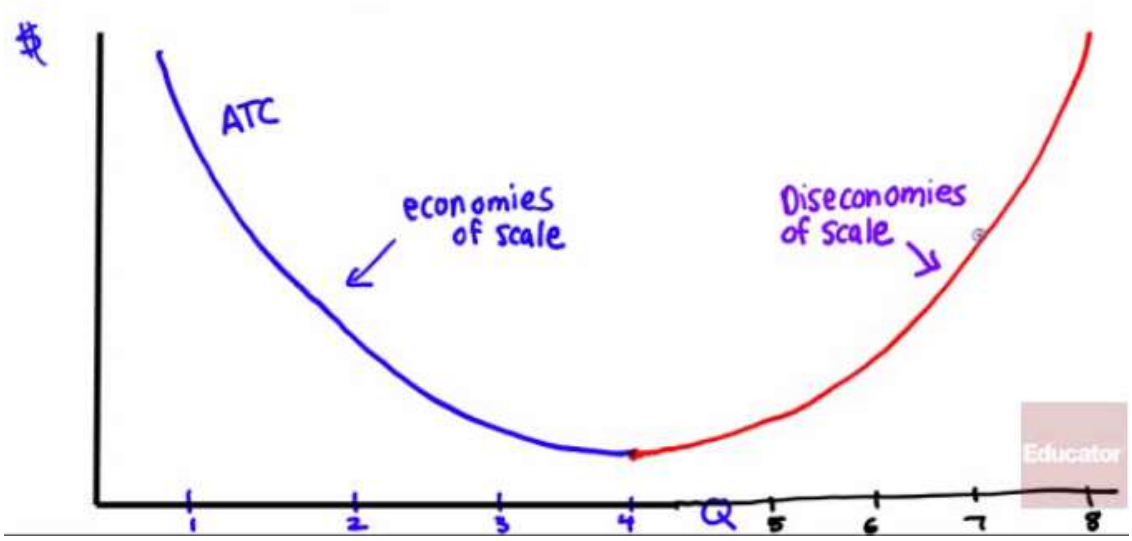
  - **Short-run** and **long-run** average total cost curves **differ** because a firm can **choose** its fixed cost in the **long run**.
  - If Selena has chosen the level of fixed cost that minimizes short-run average total cost at an output of **6** cases, and actually produces 6 cases, then she will be at point **C** on LRATC and ATC6.
  - But if she produces only **3** cases, then she will move to point **B**.
  - If she expects to produce only 3 cases for **a long time**, in the long run she will reduce her fixed cost and move to point **A** on ATC3.
  - Likewise, if she produces **9** cases (putting her at point Y) and expects to continue this **for a long time**, she will increase her fixed cost in the long run and move to point **X**
- Example

- Suppose that a firm that has historically produced 15,000 caps, experiences a sharp, permanent increase in demand that leads it to produce 25,000 units. Explain how its average total cost will change in the short run and in the long-run. Explain what the firm should do instead if it believes the change in demand is temporary.



Returns to Scale

- **Economies** of scale
  - when long-run average total cost **declines** as input **increases**
  - **ATC decreases** as **Q increases**
- **Diseconomies** of scale
  - when long-run average total cost **increases** as output **increases**
  - **ATC increases** as **Q increases**
- Graph



Sources of Economies of Scale

- Increased specialization that larger output levels allow
  - a **larger scale** of operation means that workers are very **specialized** individuals
- Large initial set-up cost
  - in auto manufacturing, electricity generating or petroleum refining, there exist **high fixed costs** to enter the industry
- Network externalities
  - the effect that **one user** of a good or service has on the **value** of that product to **other people**
  - When network effect it present, the value of a product or service if dependent on **the number of others using it** (ie. Telephone, Facebook, Twitter, eBay)

Sunk Cost

- Definition
  - cost that should be **ignored** when making a decision
  - A cost that has **already happened** that **cannot be recovered**
- As the old saying goes, "There's no use crying over spilled milk"
- Example
  - You go to an All You Can Eat Brazilian BBQ Restaurant, pay $40 after eating a salad and you are full.

- What's the rational thing to do in order to get your money's worth?
- **WALK OUT! SUNK COST!**
- Marginal Benefit > Marginal Cost: Keep doing
- Marginal Cost > Marginal Benefit: Leave!

Summary of Costs

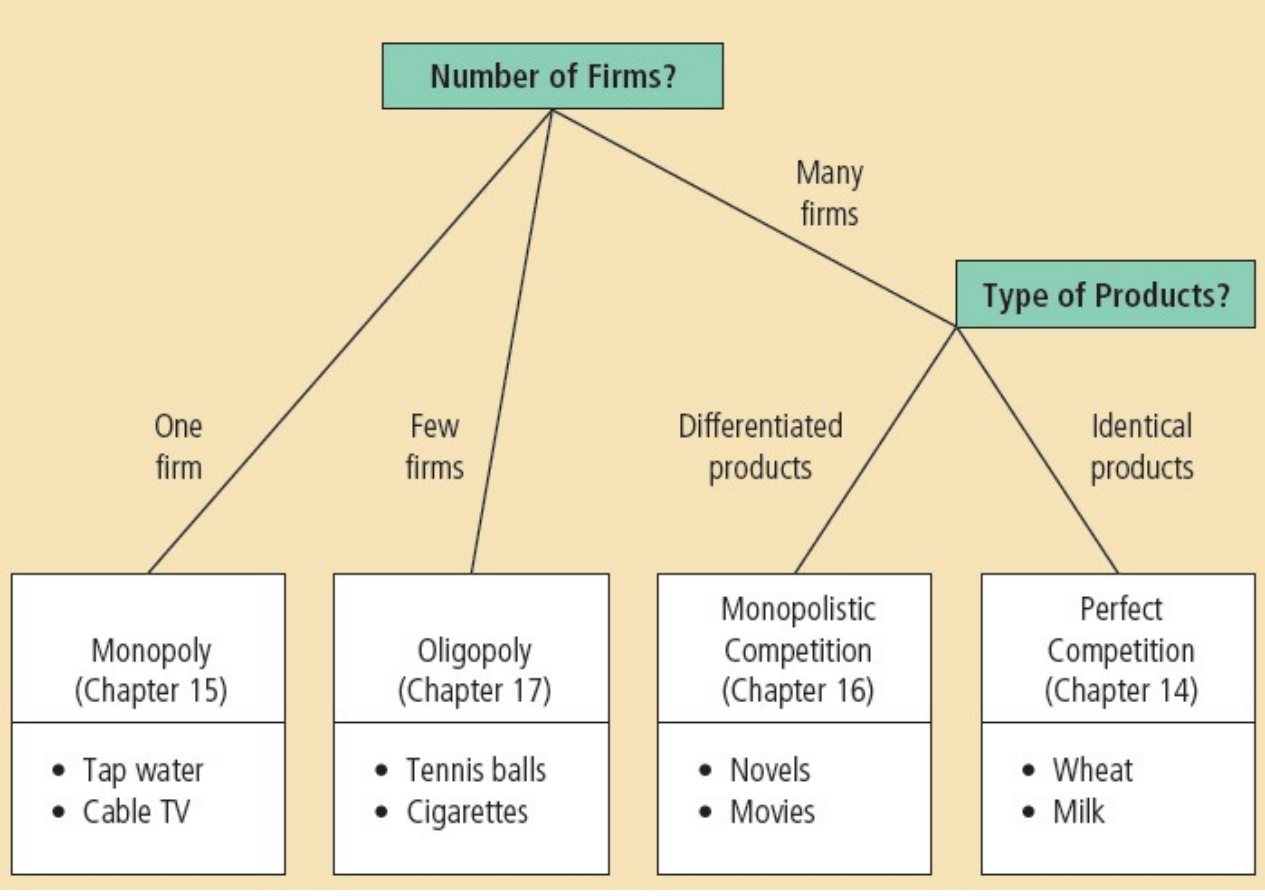
	Measurement	Definition	Mathematical term
Short run	Fixed cost	Cost that does not depend on the quantity of output produced	FC
	Average fixed cost	Fixed cost per unit of output	$AFC = FC/Q$
Short run and long run	Variable cost	Cost that depends on the quantity of output produced	VC
	Average variable cost	Variable cost per unit of output	$AVC = VC/Q$
	Total cost	The sum of fixed cost (short run) and variable cost	$TC = FC$ (short run) $+ VC$
	Average total cost (average cost)	Total cost per unit of output	$ATC = TC/Q$
	Marginal cost	The change in total cost generated by producing one more unit of output	$MC = \Delta TC/\Delta Q$
Long run	Long-run average total cost	Average total cost when fixed cost has been chosen to minimize average total cost for each level of output	$LRATC$

3.1 - Perfect Competition

Thursday, January 12, 2017 9:23 AM

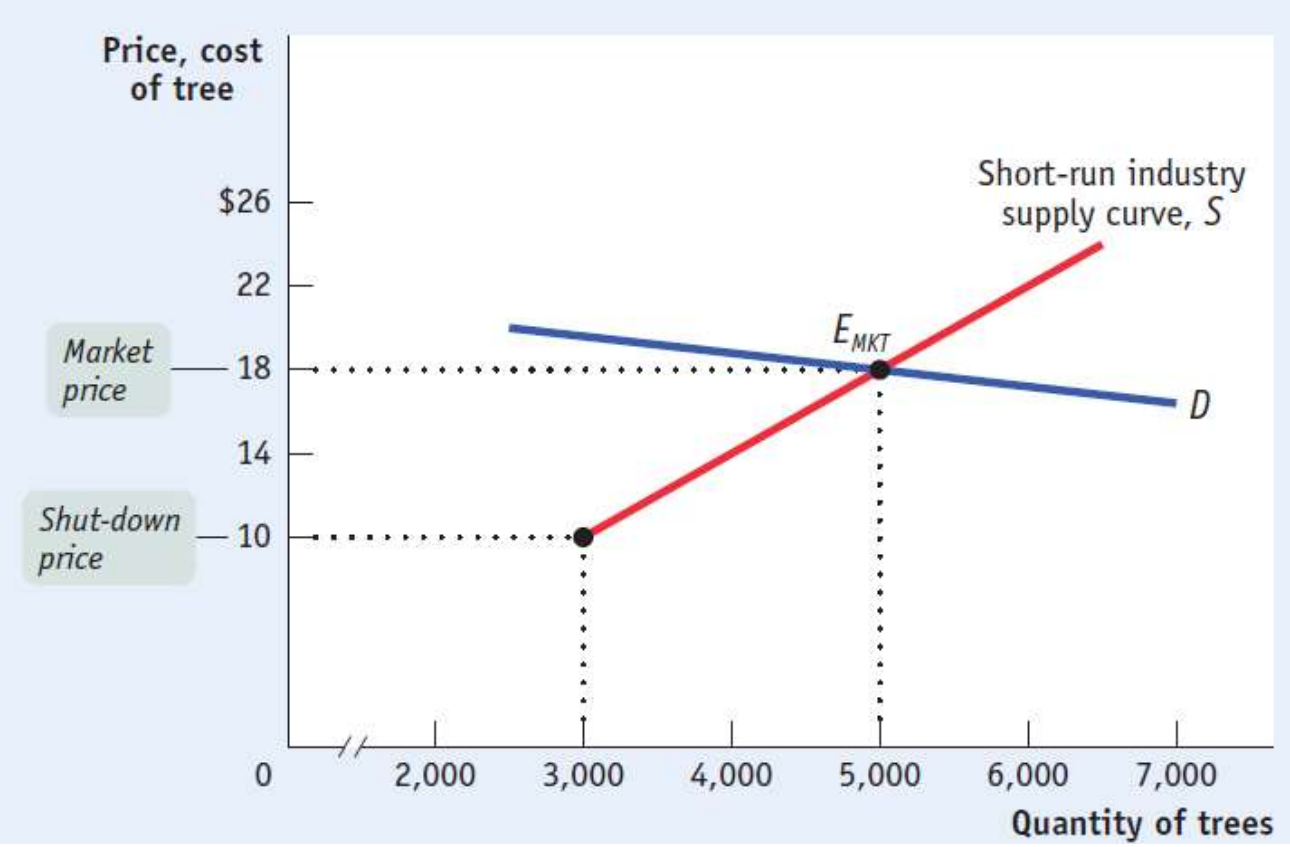
Types of Market Structure

- Perfect Competition
  - **many firms** each sell an **identical** product
- Monopoly
  - a **single** firm sells a **single**, **undifferentiated** product
- Oligopoly
  - a **few** firms (usually 2-4) selling either **identical** or an **undifferentiated** product (ie. steel or cigarettes)
- Monopolistic Competition
  - **many** firms each sell **differentiated** products

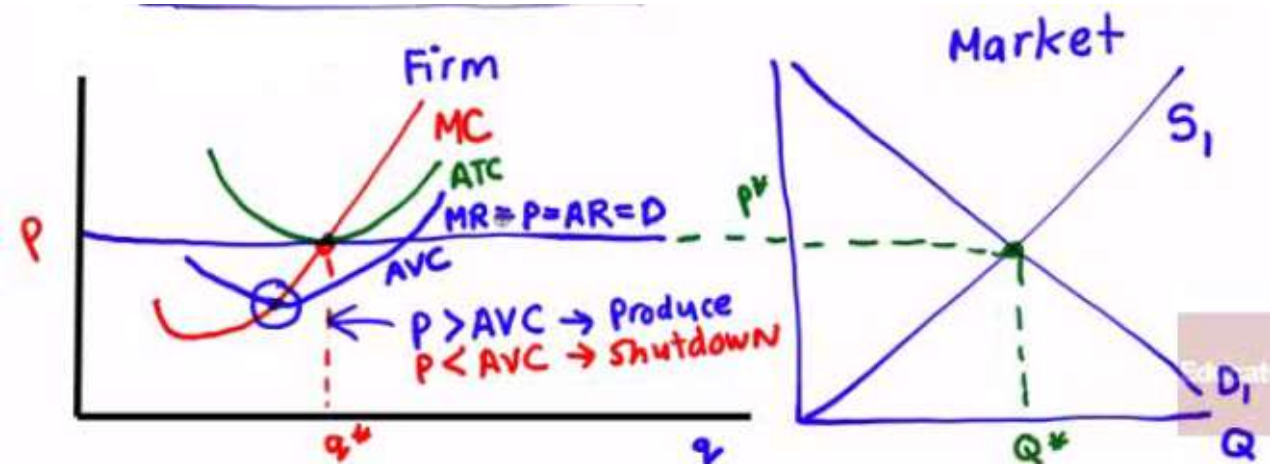


Short-run industry supply curve

- Definition
    - relationship between the **price** of a good and the **total output of the industry** as a whole
- When the market price equals or exceed the **shut-down price**, firms will continue to **produce** at the point which the **price equals marginal cost**
- At any price above the **AVC**, the short-run individual supply curve is the firm's **marginal cost (MC)** curve



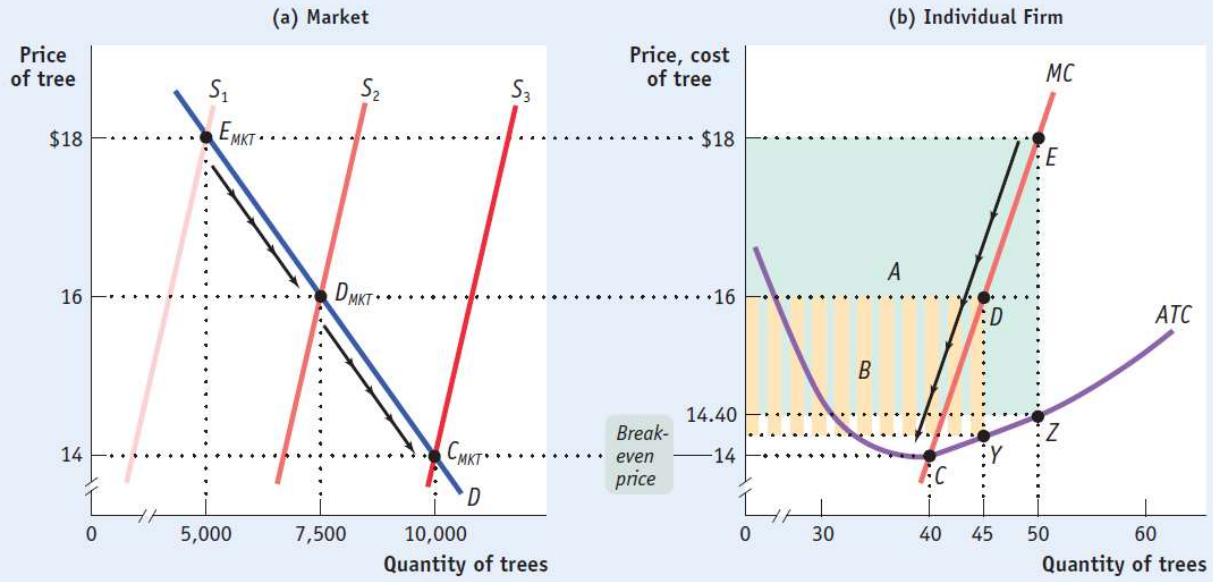
- The short-run industry supply curve, S, is the industry curve.
- **Below** the **shut-down price** of $10, **no** producer wants to **produce** in the short run.
- **Above** $10, the short-run industry supply curve **slopes upward**, as each producer **increases output** as **price increases**.
- It interescts the demand curve, D, at point $\mathbf{E_{MKT}}$, the point of short-run **market equilibrium**, correspongding to a market price of $18 and a quantity of 5000 trees.



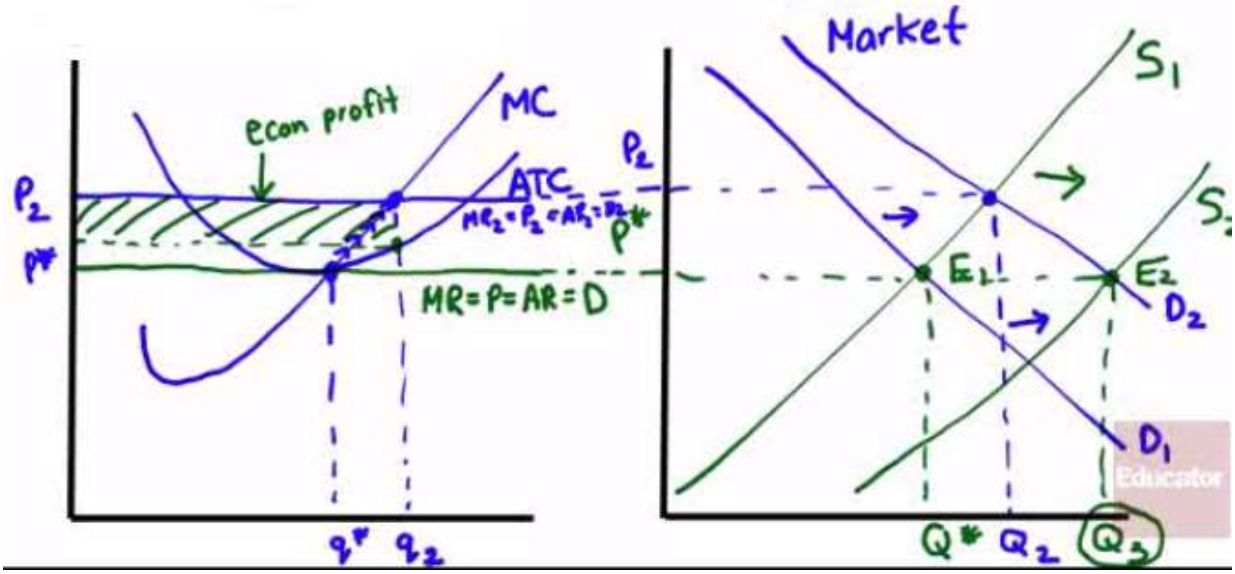
Long-run industry supply curve

- Meaning
  - shows how the **quantity supplied** responds to the **price** once producers **enter** or **exit** the industry
- **Profits** cause more firms to **enter**, which **shifts** the supply curve to the right, resulting in **lower prices** and **higher industry output**.
- However, **individual output** by firms **decreases** as does **profit until** there is **no economic profit**.

FIGURE 12-6 The Long-Run Market Equilibrium



Point E_{MKT} of panel (a) shows the initial short-run market equilibrium. Each of the 100 existing producers makes an economic profit, illustrated in panel (b) by the green rectangle labeled *A*, the profit of an existing firm. Profits induce entry by additional producers, shifting the short-run industry supply curve outward from S_1 to S_2 in panel (a), resulting in a new short-run equilibrium at point D_{MKT}, at a lower market price of $16 and higher industry output. Existing firms reduce output and profit falls to the area given by the striped rectangle labeled *B* in panel (b). Entry continues to shift out the short-run industry supply curve, as price falls and industry output increases yet again. Entry of new firms ceases at point C_{MKT} on supply curve S_3 in panel (a). Here market price is equal to the break-even price; existing producers make zero economic profits, and there is no incentive for entry or exit. So C_{MKT} is also a long-run market equilibrium.



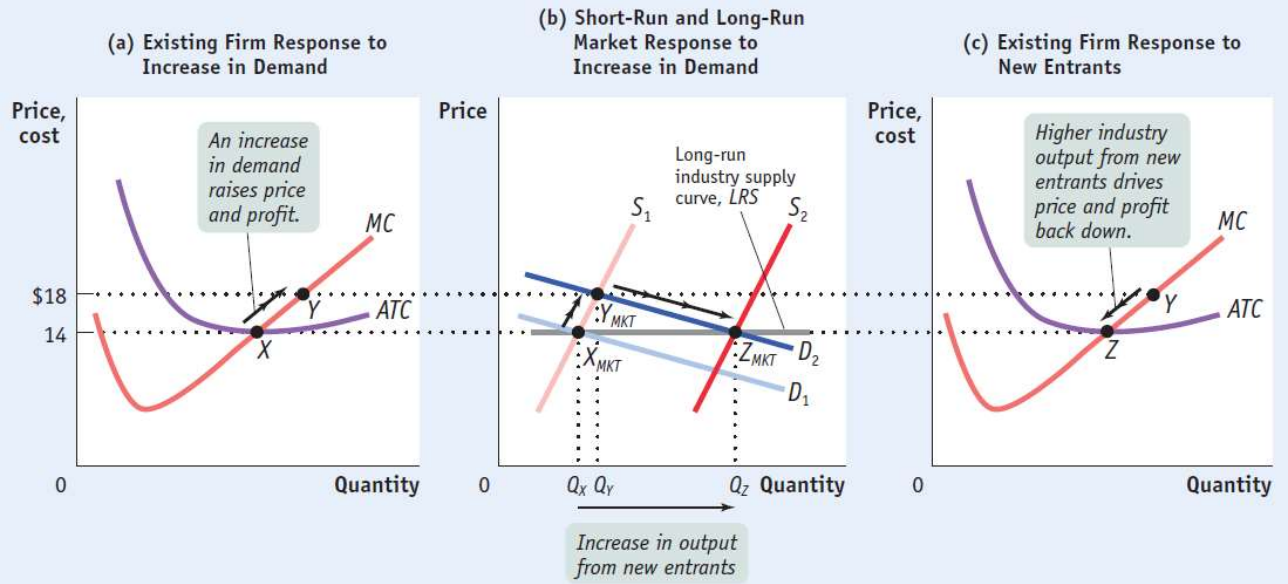
- Profit = Total Revenue - Total Cost = Price * Quantity - Average Total Cost * Quantity

The Effect of an Increase in Demand

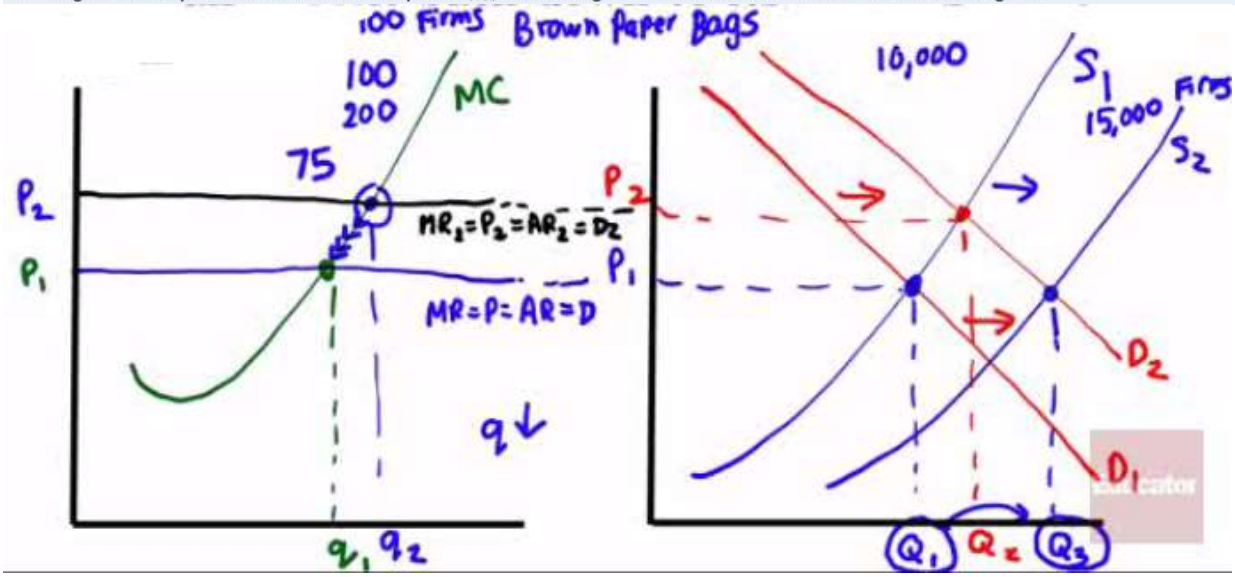
- An **increase** in the **demand** for a product causes the **equilibrium price** and **quantity** to **increase** in the market.
- An **increase** in **demand** raises **price** and **profit**, which causes **more suppliers** to enter

the market

- Higher industry output from new entrants drives **price** and **profit** back **down** to its **original** equilibrium

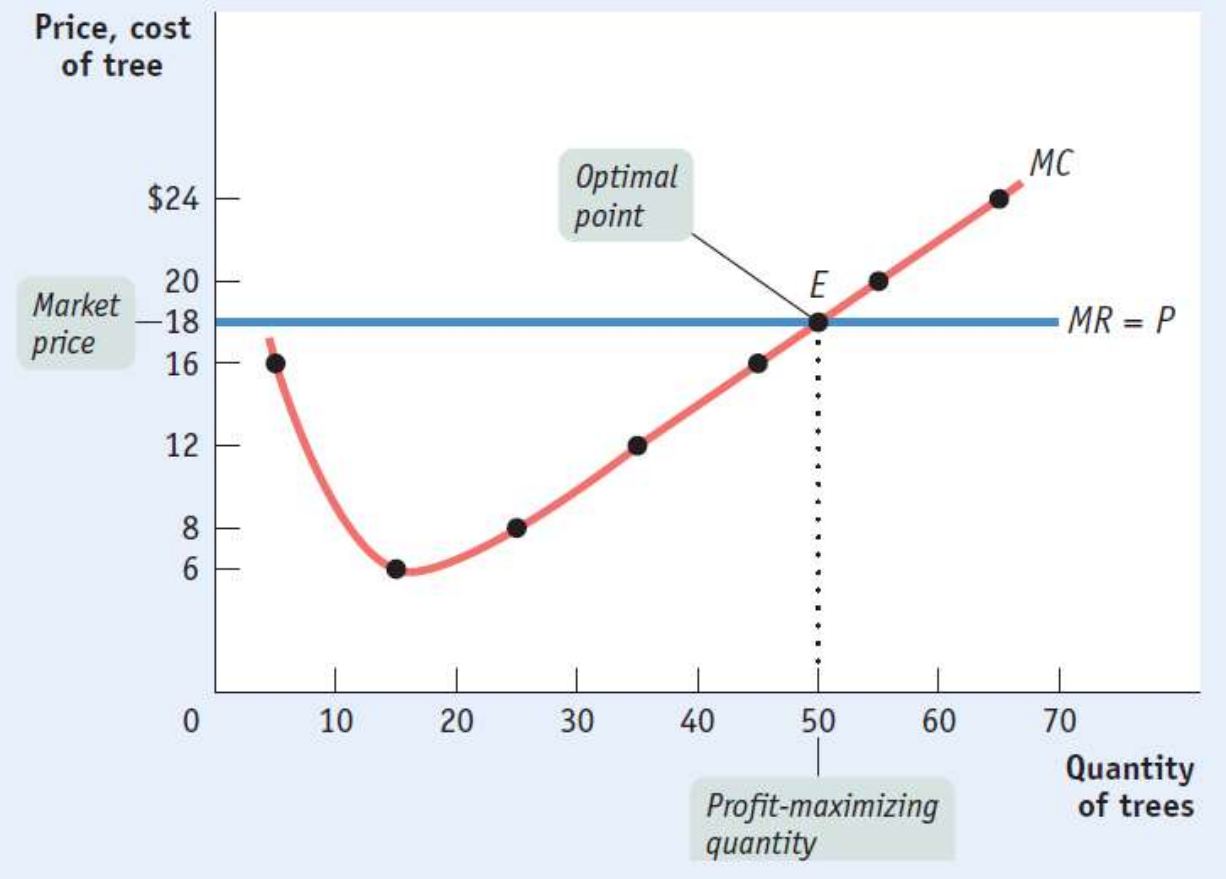


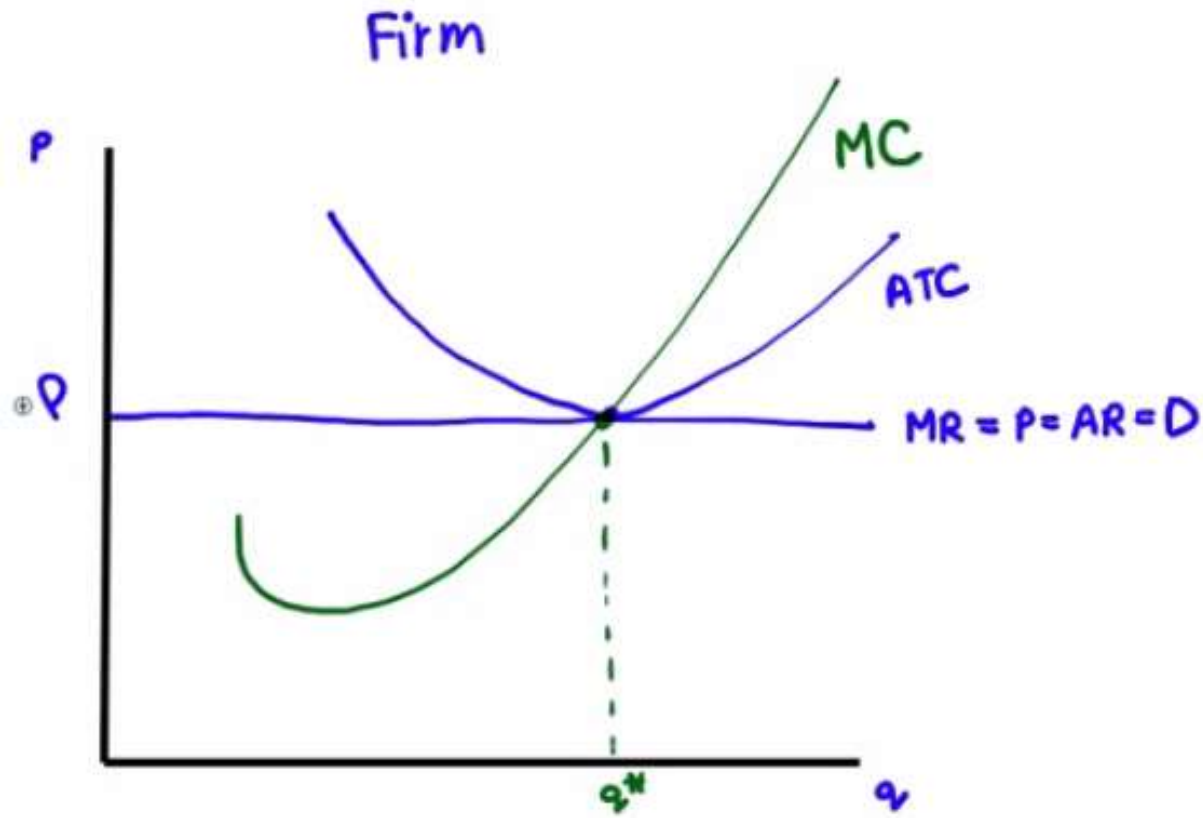
Panel (b) shows how an industry adjusts in the short and long run to an increase in demand; panels (a) and (c) show the corresponding adjustments by an existing firm. Initially the market is at point X_{MKT} in panel (b), a short-run and long-run equilibrium at a price of \$14 and industry output of Q_X. An existing firm makes zero economic profit, operating at point X in panel (a) at minimum average total cost. Demand increases as D_1 shifts rightward to D_2 in panel (b), raising the market price to \$18. Existing firms increase their output, and industry output moves along the short-run industry supply curve S_1 to a short-run equilibrium at Y_{MKT}. Correspondingly, the existing firm in panel (a) moves from point X to point Y. But at a price of \$18 existing firms are profitable. As shown in panel (b), in the long run new entrants arrive and the short-run industry supply curve shifts rightward, from S_1 to S_2. There is a new equilibrium at point Z_{MKT}, at a lower price of \$14 and higher industry output of Q_Z. An existing firm responds by moving from Y to Z in panel (c), returning to its initial output level and zero economic profit. Production by new entrants accounts for the total increase in industry output, $Q_Z - Q_X$. Like X_{MKT}, Z_{MKT} is also a short-run and long-run equilibrium: with existing firms earning zero economic profit, there is no incentive for any firms to enter or exit the industry. The horizontal line passing through X_{MKT} and Z_{MKT}, *LRS*, is the long-run industry supply curve: at the break-even price of \$14, producers will produce any amount that consumers demand in the long run.



Perfect Competition

- Price-taking firm
  - the actions of the **firm** has **no impact** on the **market price** of the product
- Price-taking consumer
  - what **consumers** do have **no bearing** on the **price** of the product that is purchased
- Perfectly competitive market
  - all participants are referred to as **price takers**, taking whatever the markets gives them
- Three characteristics of perfect competition
  - Many firms. **No** individual firm can have a disproportionately **large market share**
  - Item sold is a **commodity**, or a product that is the **same** no matter who sells or buys it
  - Free entry and exit. If there's **profit**, firms **enter**. If there's **loss**, firms **exit**.
- Optimal output rule
  - **producing** the quantity of output at which the **market price** is **equal** to the **marginal cost** of the last unit produced
- Equation
  - Marginal Cost = Marginal Revenue = Price = Average Revenue = Demand
  - How to remember: Mc= Mr. Pard

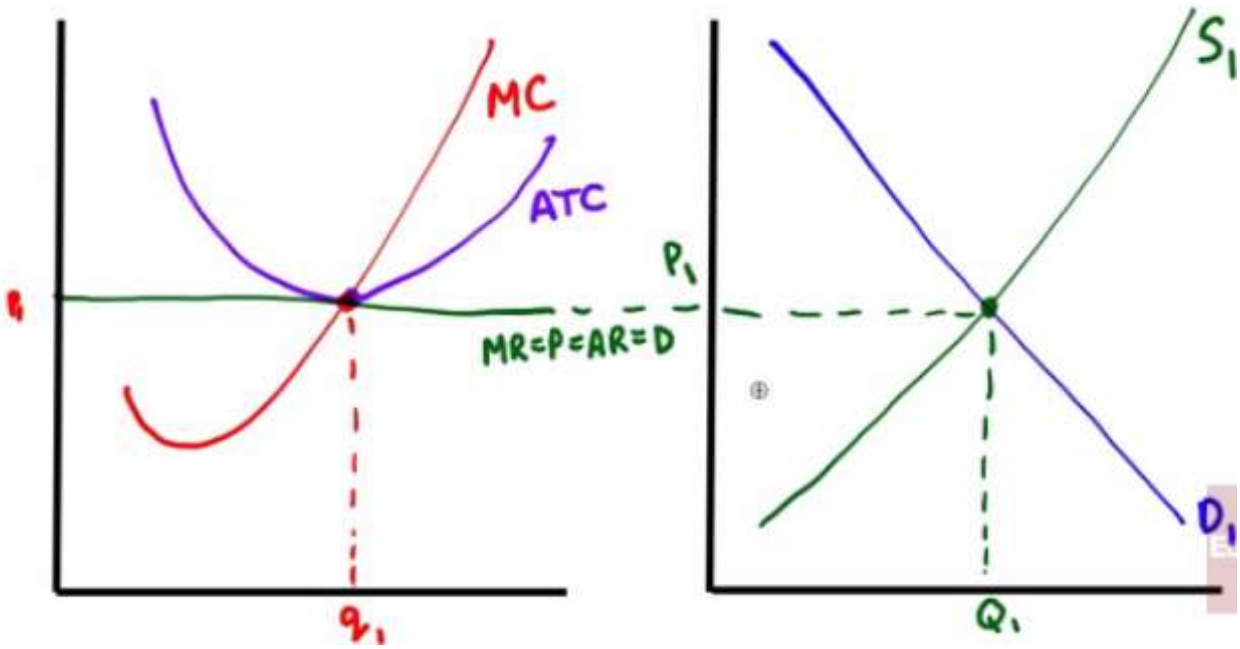




- small q for quantity of a firm

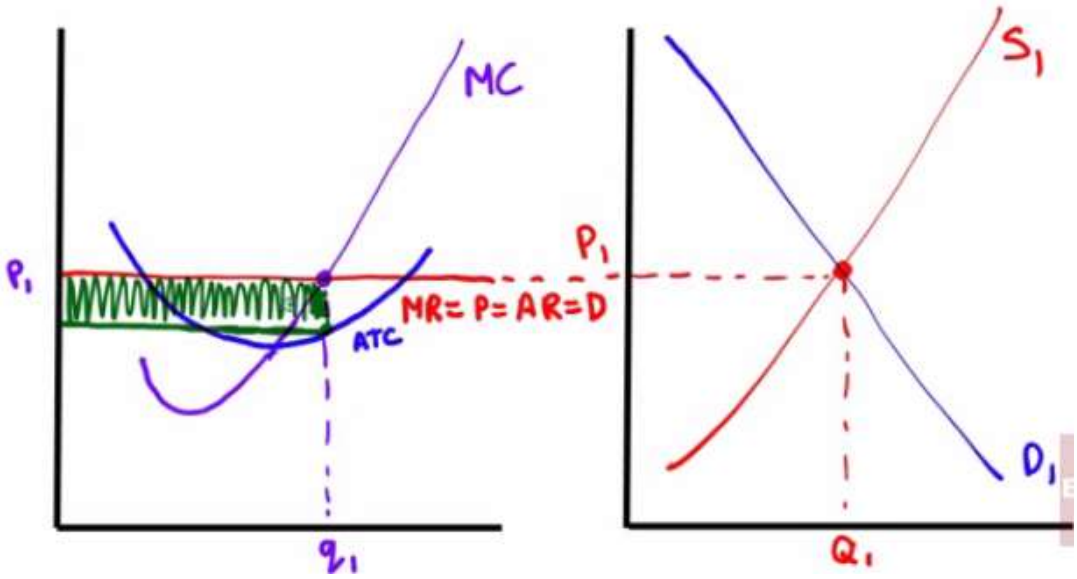
Perfect Competition in Long-Run Equilibrium

- Long-run competitive equilibrium
    - All firms in an industry are maximizing profit, no firm has an incentive to enter or exit, and price is such that quantity supplied equals quantity demanded
- Conditions
    - There is **no economic profit**
    - **No** firms **enter** or **leave**
- The **market** is always **right**
- **Label all points correctly!**

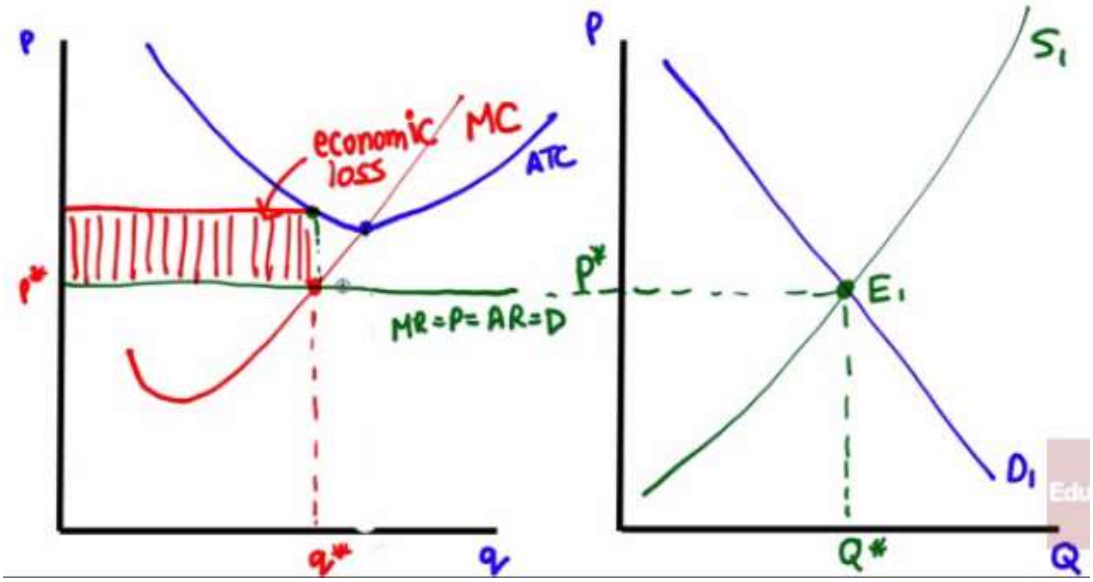


Perfect Competition and Short-Run Market Price

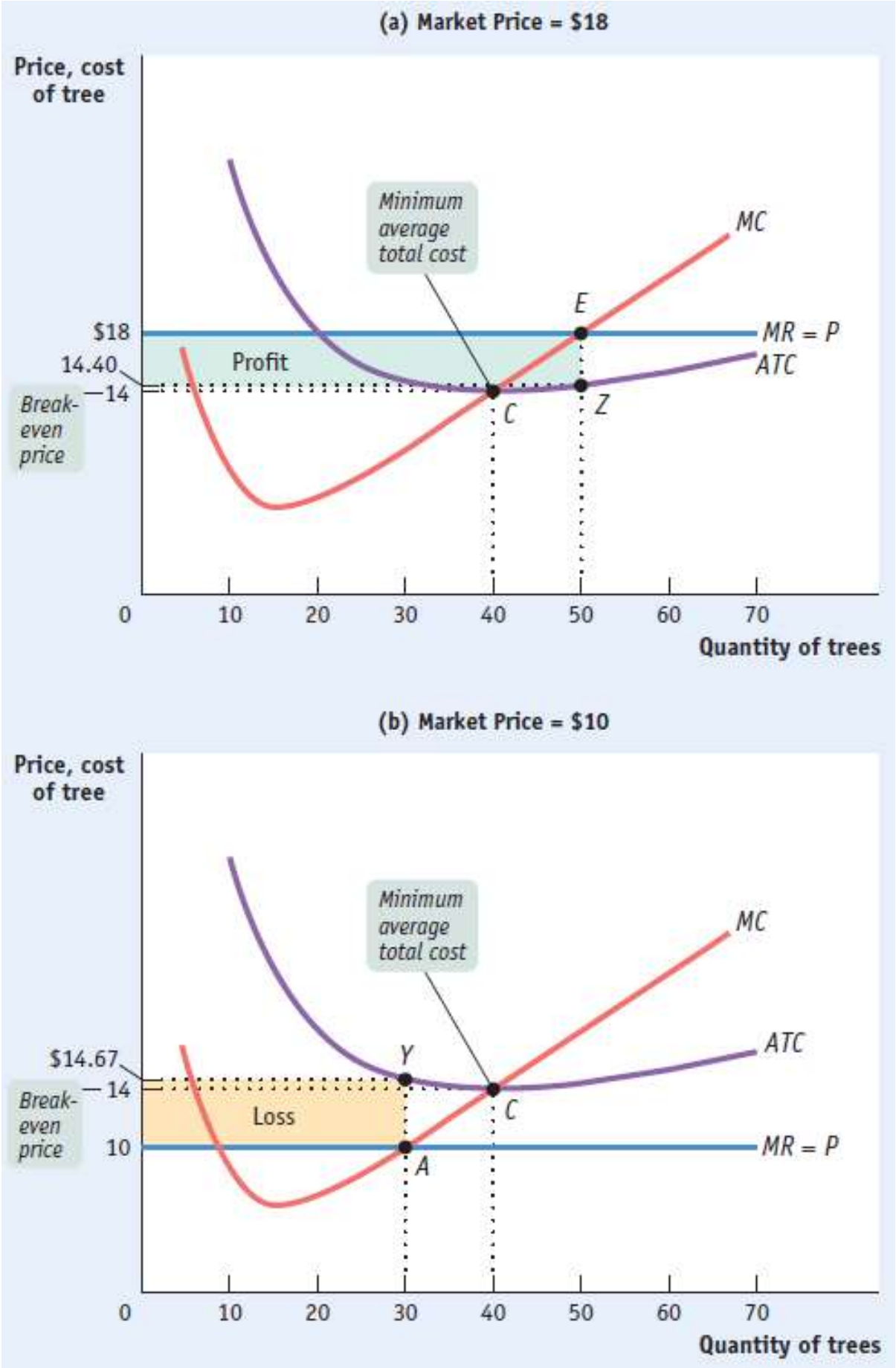
- Making Short-Run Profit
    - MR = P = AR = D is **above** the ATC curve
    - Make sure the **ATC** and **MC intersect** at the **minimum ATC**
    - The **market** is always **right**!
    - Economic Profit shaded in green



- Incurring Short-Run Loss
  - MR = P = AR = D is **below** the ATC curve
  - Make sure the **ATC** and **MC intersect** at the **minimum ATC**
  - The **market** is always **right!**
  - Economic Loss shaded in red



- Summary


(a) Market Price = $18
Price, cost of tree
Minimum average total cost
MC
E
$18
MR = P
14.40
Profit
ATC
14
Break-even price
C
Z
0
10
20
30
40
50
60
70
Quantity of trees
(b) Market Price = $10
Price, cost of tree
Minimum average total cost
MC
ATC
$14.67
Y
14
Break-even price
Loss
C
10
MR = P
A
0
10
20
30
40
50
60
70
Quantity of trees

Summary of Profitability and Production

- Long-run (Profitability)

Profitability condition (minimum *ATC* = break-even price)	Result
$P >$ minimum *ATC*	Firm profitable. Entry into industry in the long run.
$P =$ minimum *ATC*	Firm breaks even. No entry into or exit from industry in the long run.
$P <$ minimum *ATC*	Firm unprofitable. Exit from industry in the long run.

- Short-run (Production)

Production condition (minimum *AVC* = shut-down price)	Result
$P >$ minimum *AVC*	Firm produces in the short run. If $P <$ minimum *ATC*, firm covers variable cost and some but not all of fixed cost. If $P >$ minimum *ATC*, firm covers all variable cost and fixed cost.
$P =$ minimum *AVC*	Firm indifferent between producing in the short run or not. Just covers variable cost.
$P <$ minimum *AVC*	Firm shuts down in the short run. Does not cover variable cost.

3.2 - Monopoly

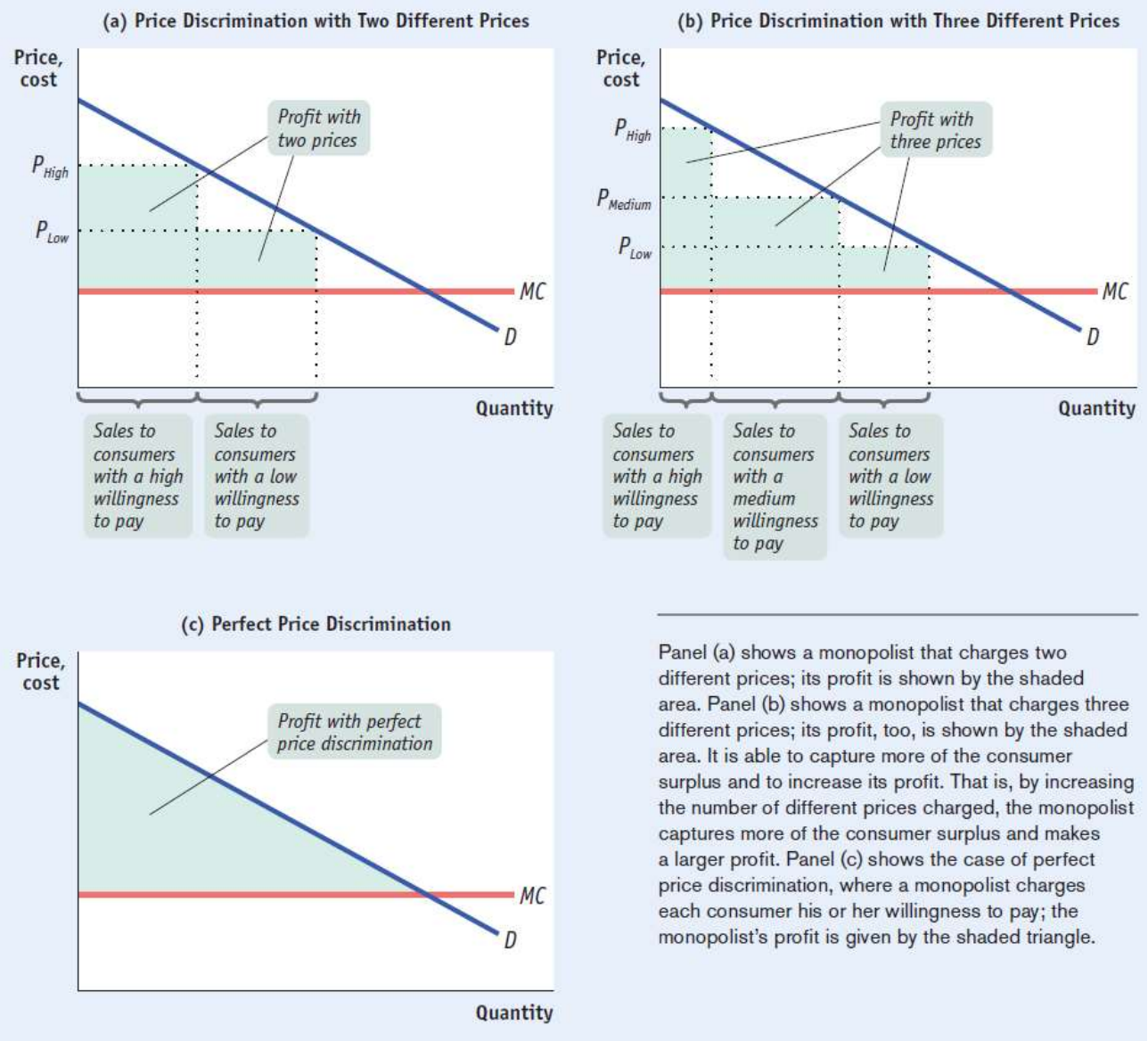
Thursday, January 12, 2017 11:41 AM

Characteristics of Monopoly

- Meaning
  - Monopolists is the **only producer** of a good with **no** close **substitutes**
- Tens to have at least one of these four barriers to entry
  - Control of a **scare** resource of **input**
    - Cecil Rhodes made De Beers what it is by controlling most of the world's diamond mines.
  - Economies of **scale**
    - large firms tend to have **cost advantages** in markets characterized by economies of scale, or a **natural monopoly**
  - **Technological** superiority
    - short-term advantage for companies although **network externalities** are very crucial as well
  - Government monopolies
    - **patent** (monopoly of invention)
    - **copyright** (monopoly of literary or artwork)

Monopoly and Price Discrimination

- Price discrimination (3rd degree)
  - policy of charging **different prices** to different consumers for the **same good**
  - ie. movie tickets, rebates, airline flights
- Perfect price discrimination (1st degree)
  - takes place when a monopolist charges each consumer his or her willingness to pay the **maximum** that the consumer is **willing** to **pay**
  - **No consumer surplus**



Panel (a) shows a monopolist that charges two different prices; its profit is shown by the shaded area. Panel (b) shows a monopolist that charges three different prices; its profit, too, is shown by the shaded area. It is able to capture more of the consumer surplus and to increase its profit. That is, by increasing the number of different prices charged, the monopolist captures more of the consumer surplus and makes a larger profit. Panel (c) shows the case of perfect price discrimination, where a monopolist charges each consumer his or her willingness to pay; the monopolist's profit is given by the shaded triangle.

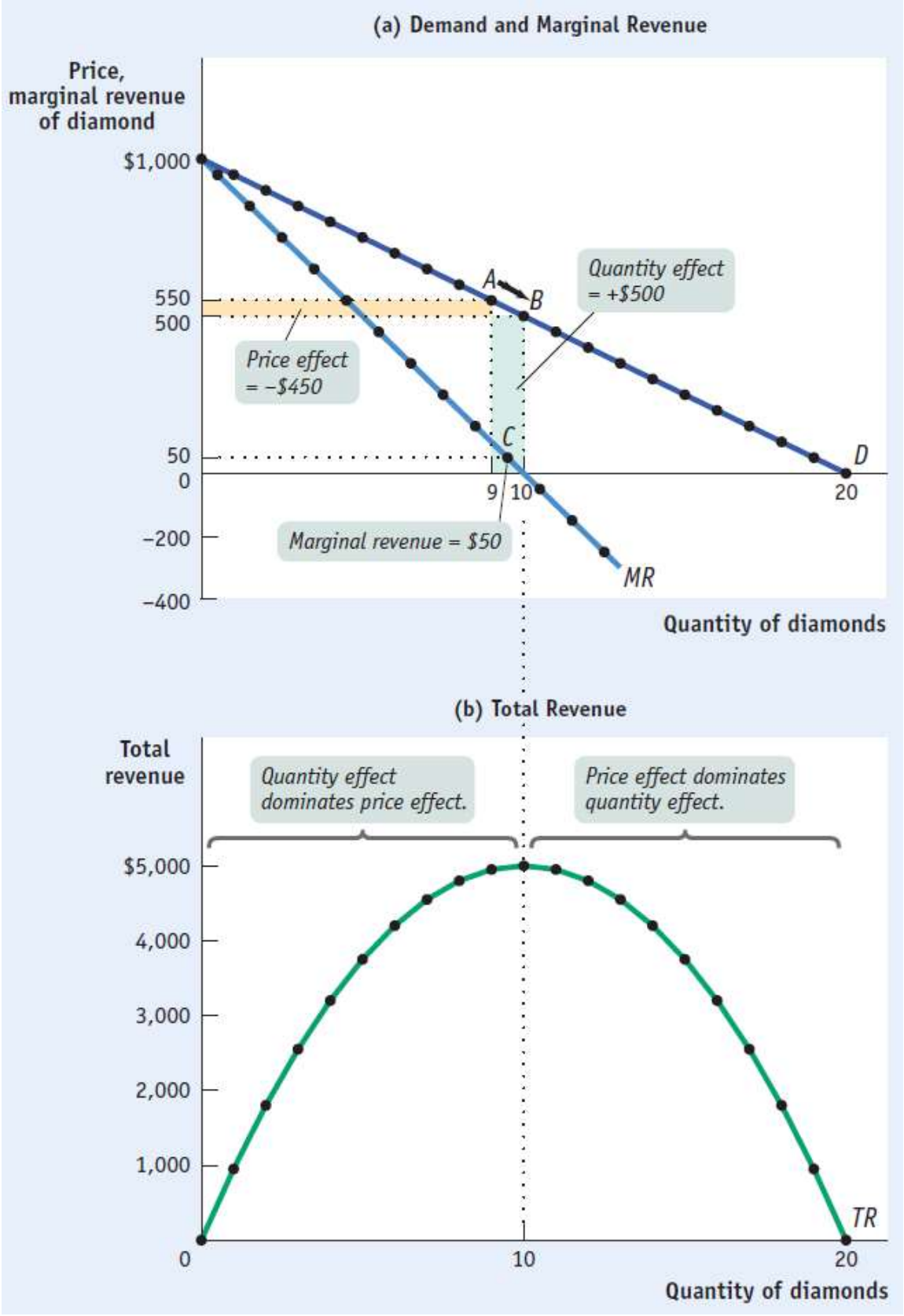
Decreasing Marginal Revenue

- The increase in production by a monopolist has two **opposing** effects on revenue
  - Quantity effect
    - One more unit is sold, **increasing total revenue** by the price at which the unit is sold
  - Price effect
    - In order to sell the last unit, the monopolist must cut market price on **all** unites sold. This **decreases total revenue**
- What is the relationship between Demand curve and MR curve in a monopoly?
  - MR curve is **below** the Demand curve and **steeper** than the Demand curve.

- Because the **price** on all units sold must **fall** if the monopoly **increases production**

- Example

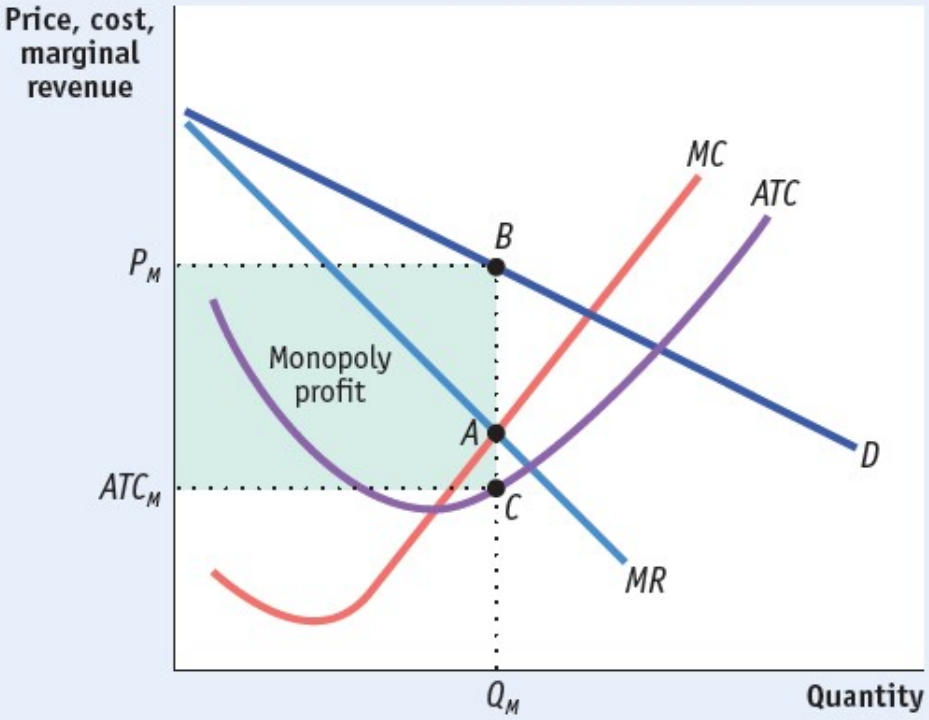
Price of diamond *P*	Quantity of diamonds *Q*	Total revenue $TR = P \times Q$	Marginal revenue $MR = \Delta TR/\Delta Q$
$1,000	0	$0	
			$950
950	1	950	
			850
900	2	1,800	
			750
850	3	2,550	
			650
800	4	3,200	
			550
750	5	3,750	
			450
700	6	4,200	
			350
650	7	4,550	
			250
600	8	4,800	
			150
550	9	4,950	
			50
500	10	5,000	
			−50
450	11	4,950	
			−150
400	12	4,800	
			−250
350	13	4,550	
			−350
300	14	4,200	
			−450
250	15	3,750	
			−550
200	16	3,200	
			−650
150	17	2,550	
			−750
100	18	1,800	
			−850
50	19	950	
			−950
0	20	0	



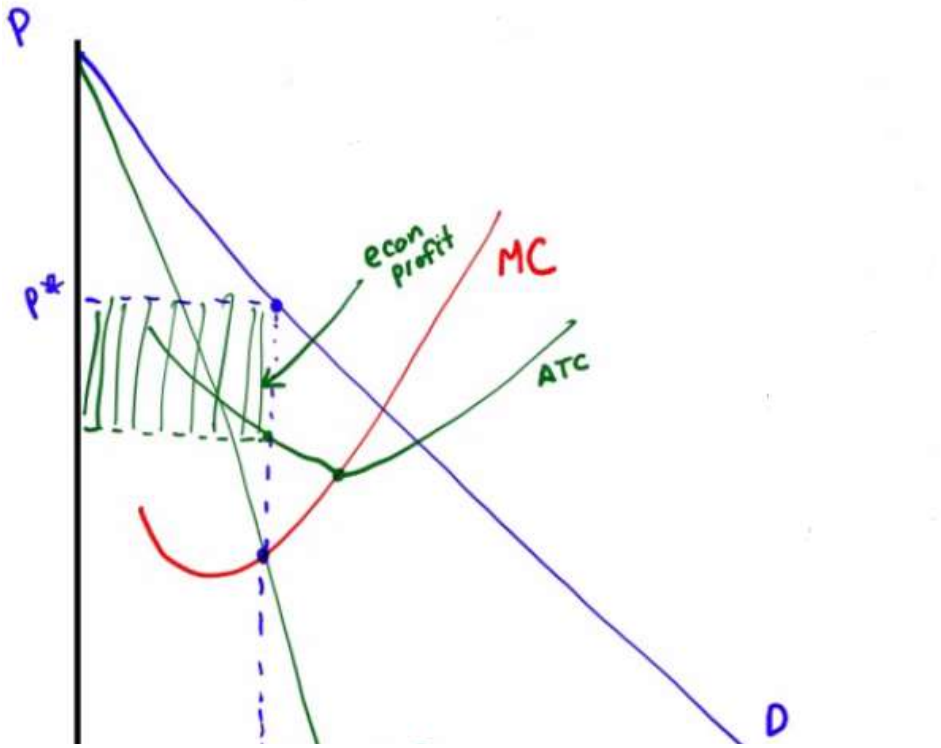
Monopoly and Profit

- Profit = TR - TC = (P * Q) - (ATC * Q)

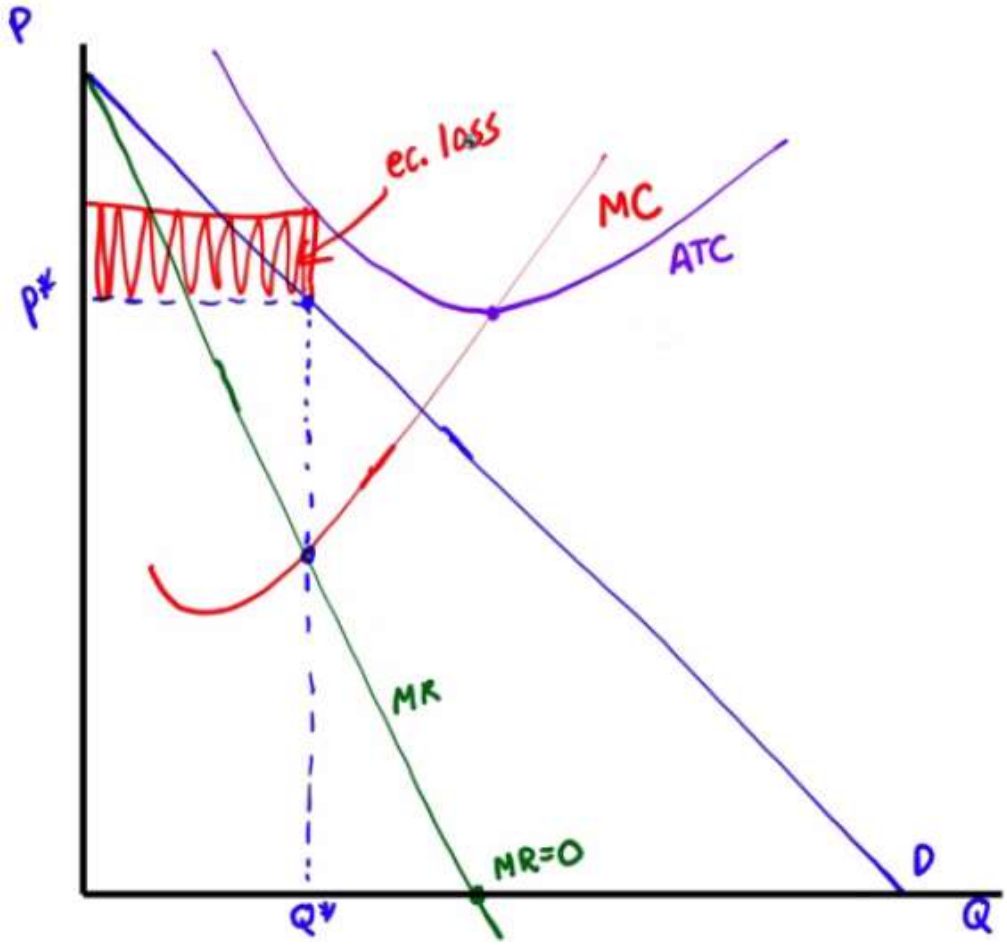
- Monopoly Making a Profit



In this case, the marginal cost curve has a "swoosh" shape and the average total cost curve is U-shaped. The monopolist maximizes profit by producing the level of output at which $MR = MC$, given by point A, generating quantity Q_M. It finds its monopoly price, P_M, from the point on the demand curve directly above point A, point B here. The average total cost of Q_M is shown by point C. Profit is given by the area of the shaded rectangle.

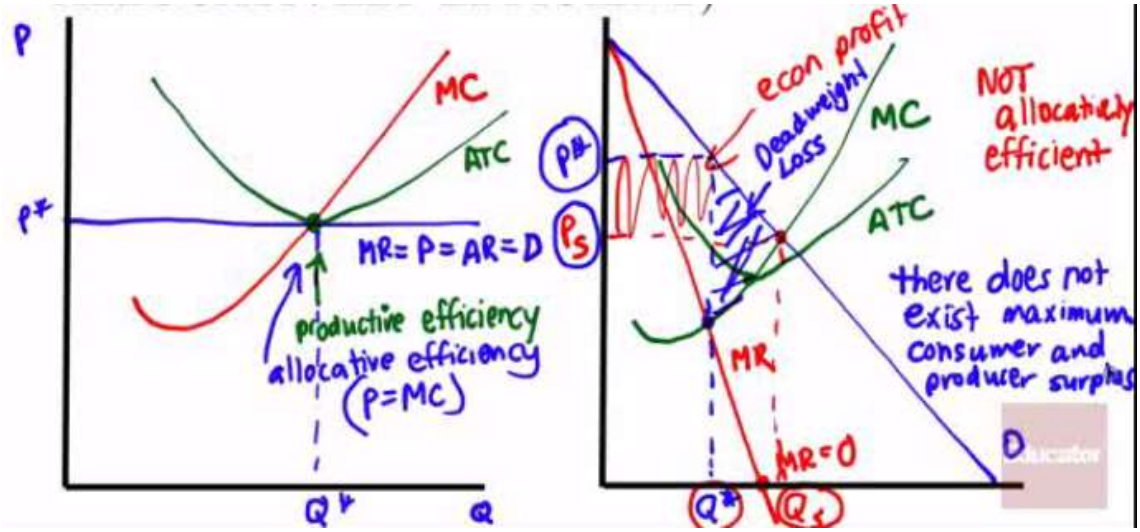


- Monopoly Incurring a Loss



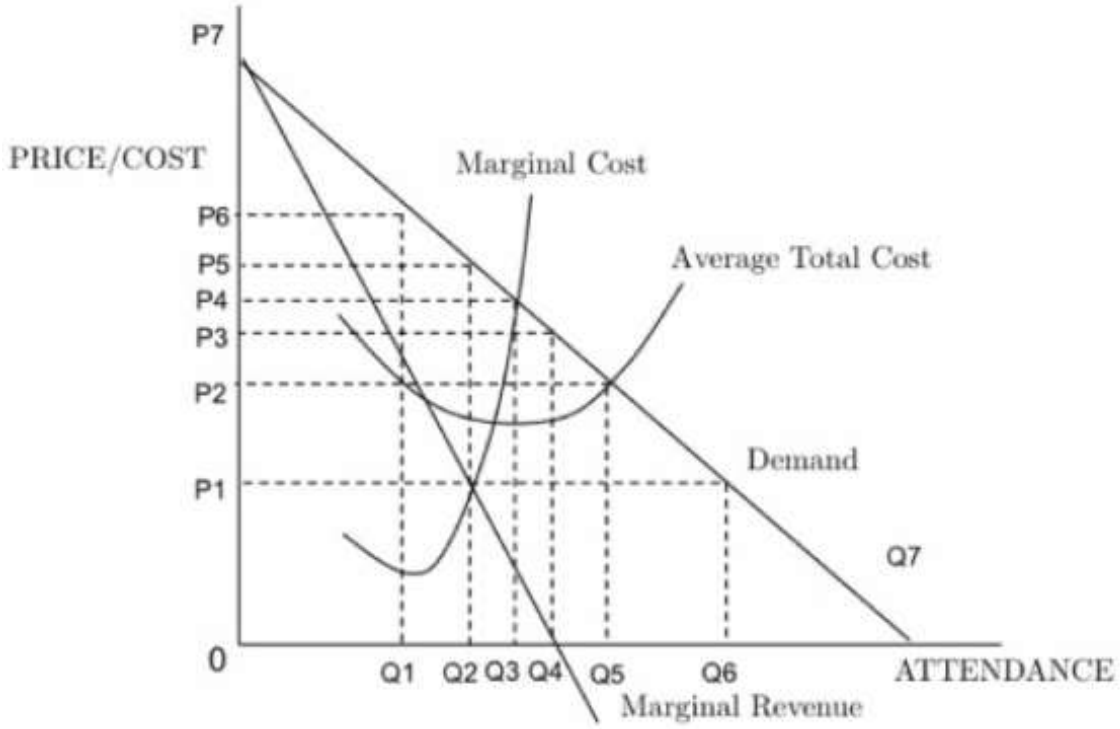
Monopoly vs. Perfect Competition

- **P = MR = MC** at the **perfectly competitive** firm's profit-maximizing quantity of output
- **P > MR = MC** at the **monopolist's** profit-maximizing quantity of output
- Monopoly charges a **higher price**, produces a **lower quantity** and earns a **profit**
- **Not Allocatively Efficient**
  - profit
  - deadweight loss
  - There does not exist maximum consumer and producer surplus



Reading a Monopoly Graph

- There is **one** stadium in Parkville. The stadium's demand and cost curves are shown below. The stadium currently relies on an **admission charge** for its revenue.



- Using the labeling of the graph above, identify the **price** and **quantity** that **maximize profit**
    - Price: P5
    - Quantity: Q2
- Using the labeling of the graph above, identify the **price** and **quantity** that **maximized** total **revenue**

    - When MR intersects the x-axis
    - Price: P3
    - Quantity: Q4
- Using the labeling of the graph above, identify the **price** and **quantity** that **maximizes attendance** while still **breaking even**
    - When demand curve intersects ATC curve
    - Price: P2
    - Quantity: Q5
- Assuming the existence of an **opportunity cost**, at P2, indicate whether stadium's **accounting profits** would be **positive**, **negative**, or **zero**. Explain why.
    - **Economic Profit = Total Revenue - Total Cost** = 0
    - **Economic Profit = Accounting Profit - Opportunity Cost** = 0
    - Accounting Profit = Opportunity Cost
    - Answer: positive
- When the attendance is Q1, is the **demand inelastic**, **elastic** or **unitary elastic**? Explain
    - Answer: Elastic
    - Explanation: **Marginal Cost** is **positive** or the price is on the **left side** of the demand curve
    - A monopolist will always **produce** on the **elastic** portion of the **demand curve**

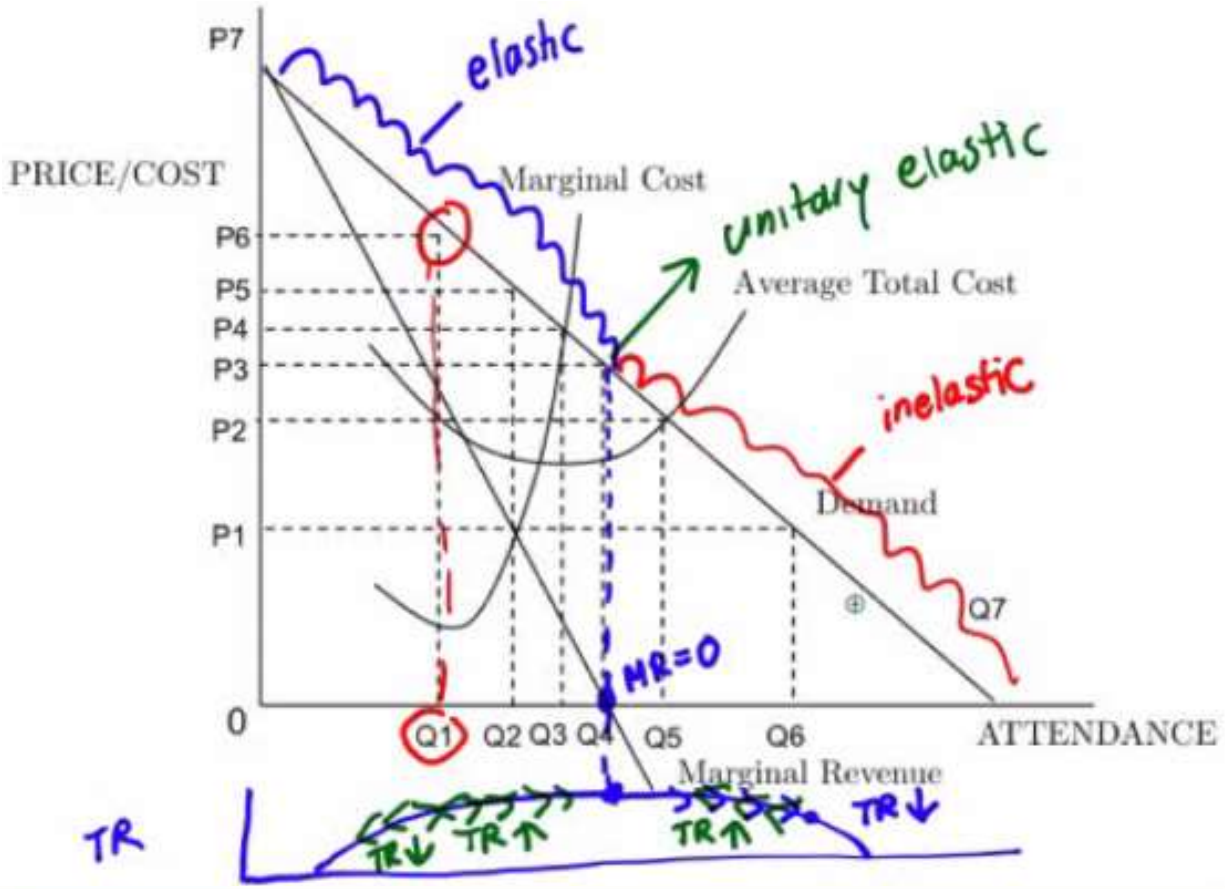
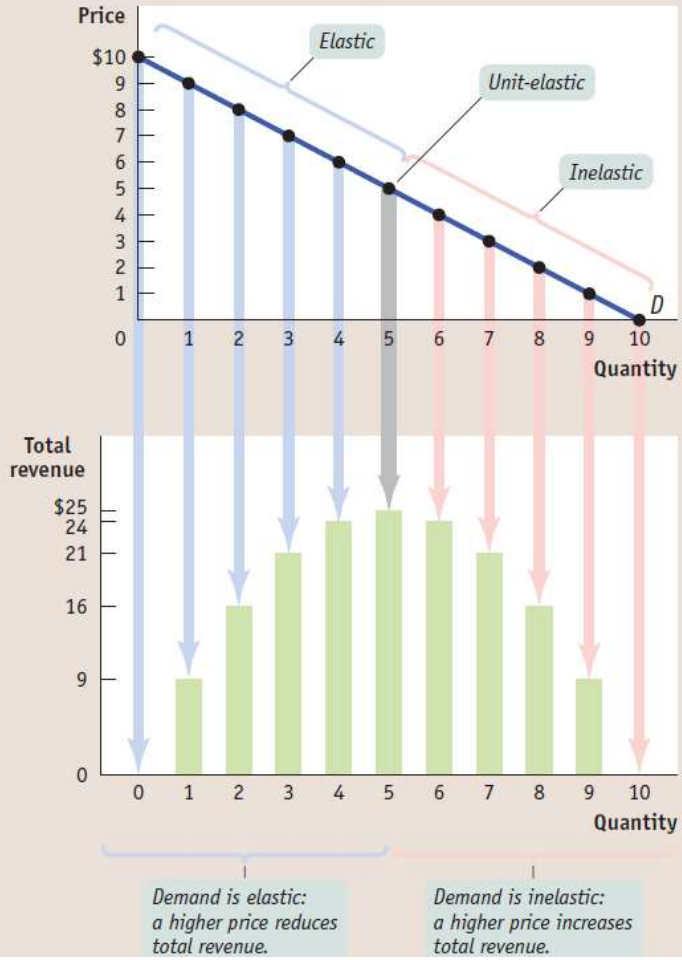


FIGURE 6-5 The Price Elasticity of Demand Changes Along the Demand Curve



Demand Schedule and Total Revenue for a Linear Demand Curve

Price	Quantity demanded	Total revenue
$0	10	$0
1	9	9
2	8	16
3	7	21
4	6	24
5	5	25
6	4	24
7	3	21
8	2	16
9	1	9
10	0	0

The upper panel shows a demand curve corresponding to the demand schedule in the table. The lower panel shows how total revenue changes along that demand curve: at each price and quantity combination, the height of the bar represents the total revenue generated. You can see that at a low price, raising the price increases total revenue. So demand is inelastic at low prices. At a high price, however, a rise in price reduces total revenue. So demand is elastic at high prices.

Demand is elastic: a higher price reduces total revenue.

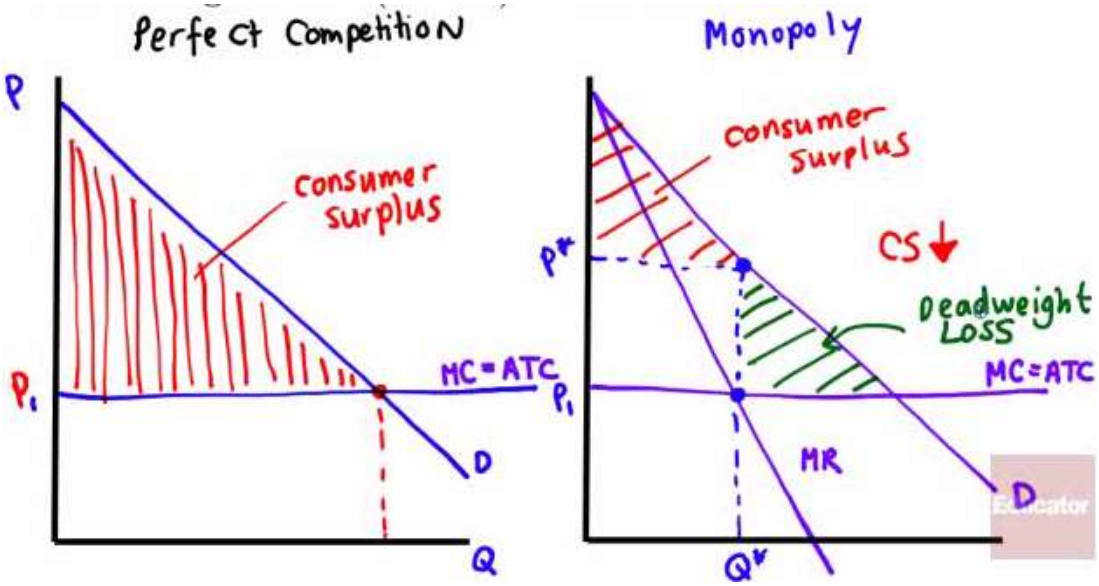
Demand is inelastic: a higher price increases total revenue.

3.3 - Monopoly & Public Policy

Thursday, January 12, 2017 3:36 PM

Welfare Effects of Monopoly

- Monopoly vs. Perfect Competition (Surplus)
  - Assume a **downward** sloping demand curve for both monopoly and prefect competition with a **constant MC** as well as **ATC**
  - In a monopoly, the **marginal revenue** will be **below** the **demand curve**.
  - Consumer **surplus** is **reduced** and **deadweight** loss (DWL) is **created**
  - Graph



- Summary
  - By holding output level **below** the level at which **marginal cost** is **equal** to the **market price**, a monopolist **increases profits** but **decreases consumer surplus**
  - Mutually beneficial transactions do not occur, but a monopolist is (**naturally**) looking out for its own interests.
  - **Perfectly competitive** firms also profit-maximize, but they produce where **P = MC**, which is also **MR = MC**
  - Monopolists produce at **MR = MC**, but **P > MC**
  - This creates **deadweight loss** or DWL

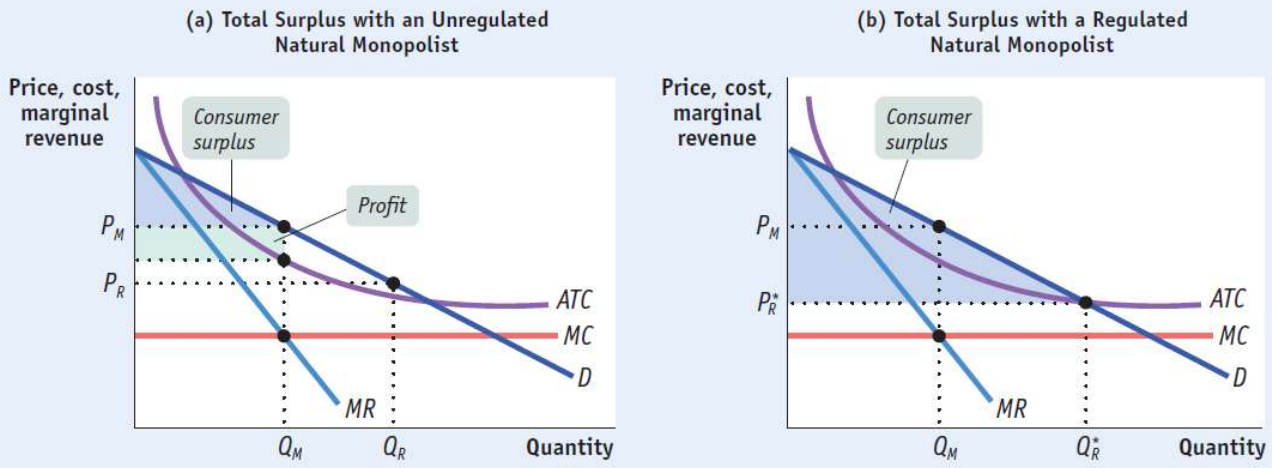
Public Ownership of Monopolies

- Many countries opt for **public ownership** of **natural monopolies** (economies of scale)
- In theory, the government can set prices based on **efficiency (P = MC)** rather than **profit maximization (MR = MC)**
- In practice, publicly owned firms have **less incentives** to **keep costs down** or **offer high quality**
- Electricity, local phone service, water and gas are examples of regulated monopolies
- Should the government regulate cable TV?

Unregulated vs. Regulated Natural Monopoly

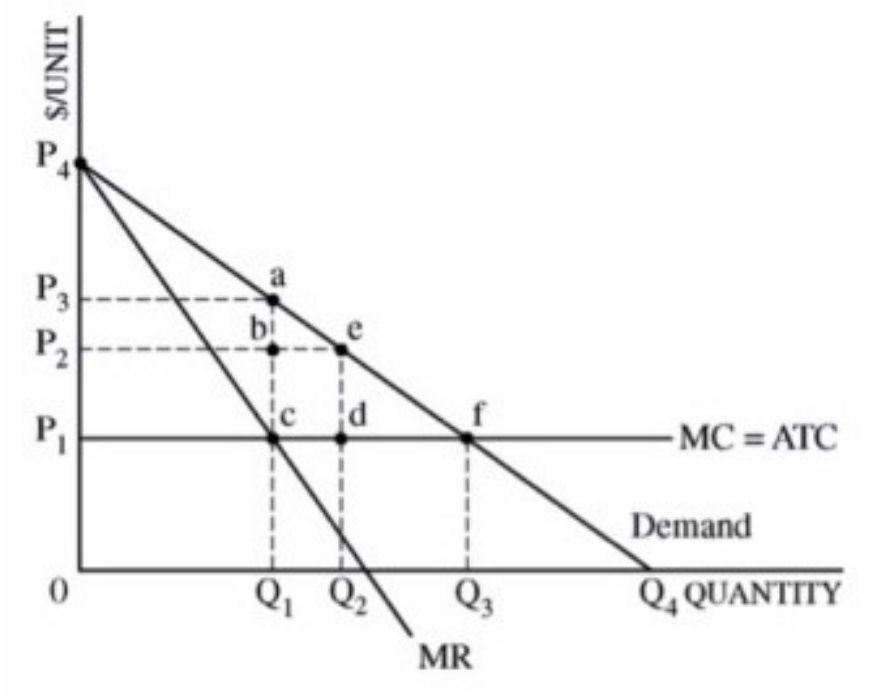
- Assume a demand curve for both situations with a demand intersecting ATC on downward-sloping portion
- **Unregulated** monopoly charges **MR = MC** (econ profit)
- **Regulated** monopoly charges (normal profit)

FIGURE 13-9 Unregulated and Regulated Natural Monopoly



This figure shows the case of a natural monopolist. In panel (a), if the monopolist is allowed to charge P_M, it makes a profit, shown by the green area; consumer surplus is shown by the blue area. If it is regulated and must charge the lower price P_R, output increases from Q_M to Q_R and consumer surplus increases. Panel (b) shows what happens when the monopolist must charge a price equal to average total cost, the price P_R^*. Output expands to Q_R^*, and consumer surplus is now the entire blue area. The monopolist makes zero profit. This is the greatest total surplus possible when the monopolist is allowed to at least break even, making P_R^* the best regulated price.

Monopoly Practice Problem

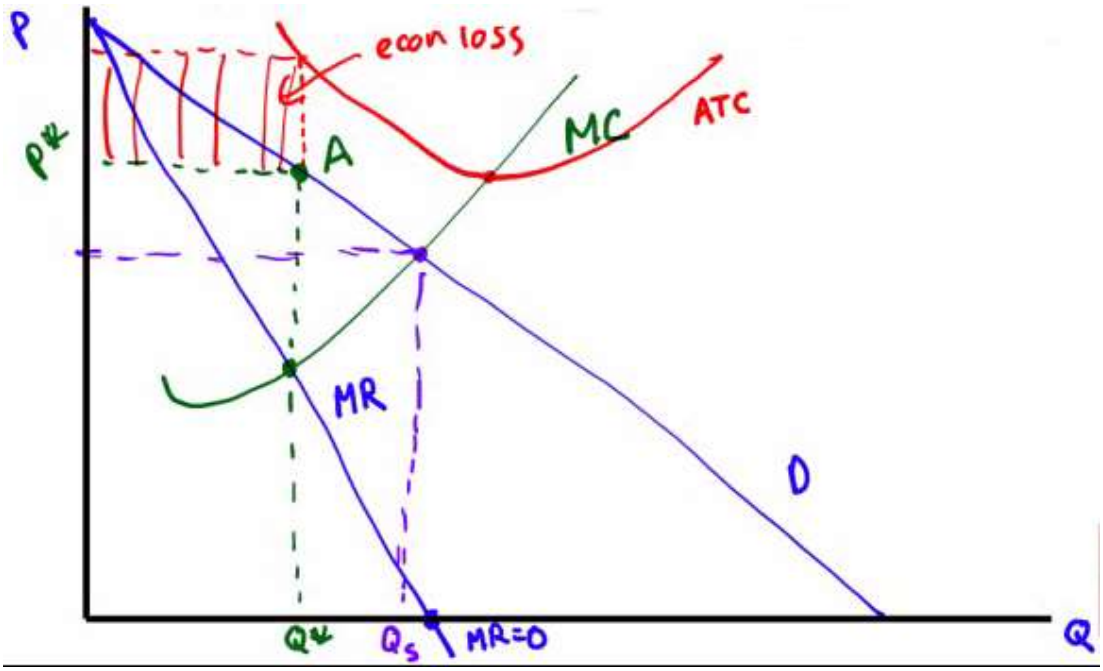


- Assume an **unregulated** monopoly.
    - The monopolist's quantity produced
        - where MR = MC, at point c
        - Answer: Q1
    - The monopolist's price
        - above point c, at point a
        - Answer: P3
    - The economic profit of the monopolist
        - between ac and the y-axis
        - Answer: acP1P3
    - The area of deadweight loss
        - between ac and demand
        - Answer: acf
- Assume the monopolist can **perfectly price discriminate**
    - The quantity produced
        - where MR = MC = D, at point f
        - Answer: Q3
    - The total **revenue** of the monopolist

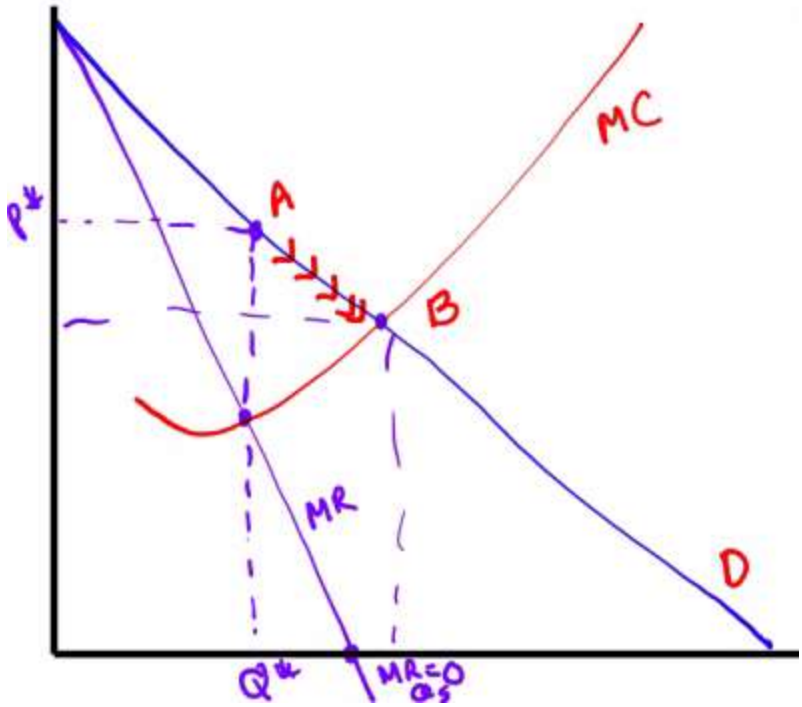
        - asking for revenue, not profit
        - Answer: P4fQ3O
- Assume a monopolist is **regulated** to maximize total surplus
    - The socially efficient quantity
        - **socially efficient** = **allocatively efficient** = when **P equals MC** = maximum of consumer surplus and producer surplus
        - Answer: Q3
    - The consumer surplus at the socially efficient quantity
        - Answer: P4P1f
    - Is the monopolist facing **regulation** earning a **positive** economic profit, earning **zero** economic profit, or incurring a **loss**? Explain your answer.
        - at point f, where price = marginal cost = average total cost
        - Accounting profit = TR - TC = Q* (P - ATC) = 0
    - Is point f in the **elastic**, **inelastic**, or **unit elastic** portion of the demand curve? Explain.
        - **MR > 0, elastic**
        - **MR < 0, inelastic**
        - **MR = 0 , unit elastic**

More Monopoly Practice Problem

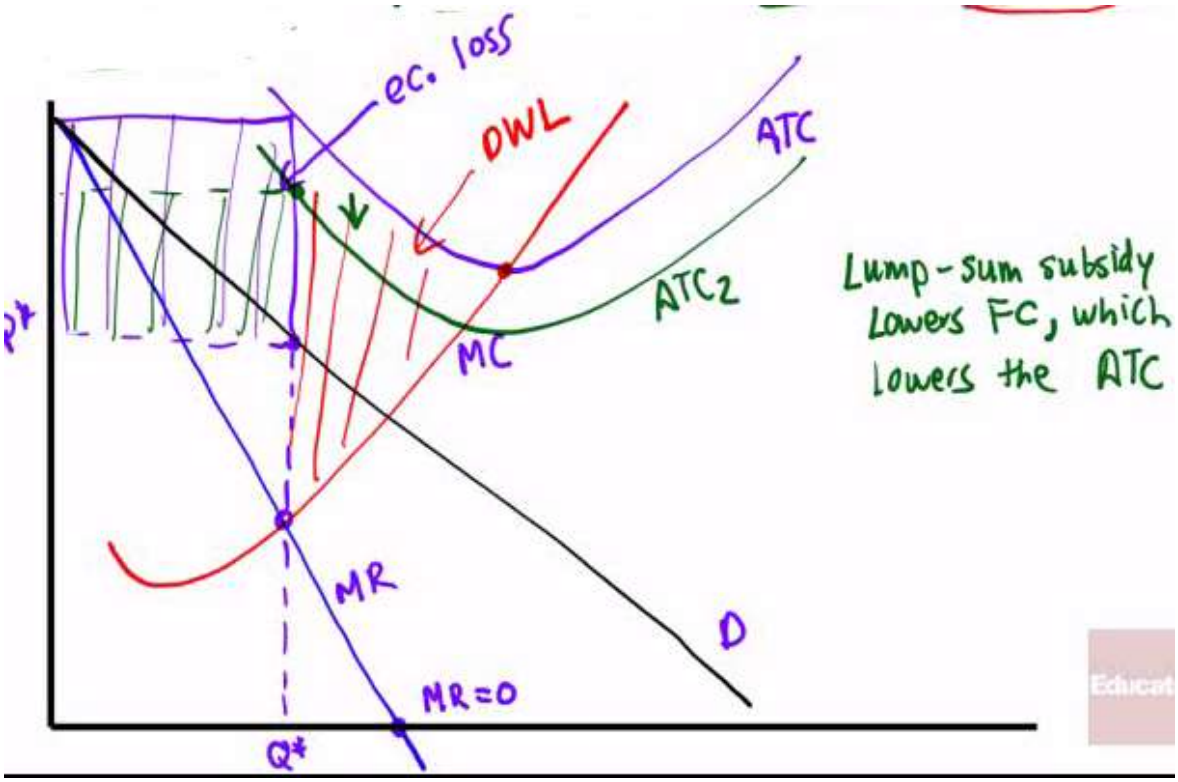
- Zachrail, the only provider of train services between two cities, is currently incuring economic losses
    - Show Zachrail's loss-minimizing price and quantity
        - **loss-minimizing = profit-maximizing**
        - the point on demand curve above the point where MR = MC
    - Show the area of economic loss
        - the point on ATC curve above the point where MR = MC
    - Identify the allocatively efficient quantity
        - the point where D = MC



- If Zachrail raised the **price** above the profit-maximizing price, would total **revenue increase**, **decrease** or **not change**? Explain.
  - **If elastic, P↑, TR↓**
  - **If elastic, P↓, TR↑**
  - **If inelastic, P↑, TR↑**
  - **If inelastic, P↓, TR↓**
- Would a per-unit **tax** or per-unit **subsidy** be advisable in this situation if the goal is to produce at the **allocatively efficient** point? Explain why.
  - Answer: Per-unit subsidy
  - Explanation: lead towards allocatively efficient point



- Assume instead that a lump-sum subsidy is provided to Zachrail. In the short run, will **deadweight loss** increase, decrease of not change? Will Zachrail's **economic losses** increase, decrease or not change?
  - **Lump-sum subsidy** lowers FC, which **lowers** the **ATC**
  - Answer: the deadweight loss will not be changed, the losses will decrease



3.4 - Oligopoly & Game Theory

Thursday, January 12, 2017 5:25 PM

Characteristics of an Oligopoly

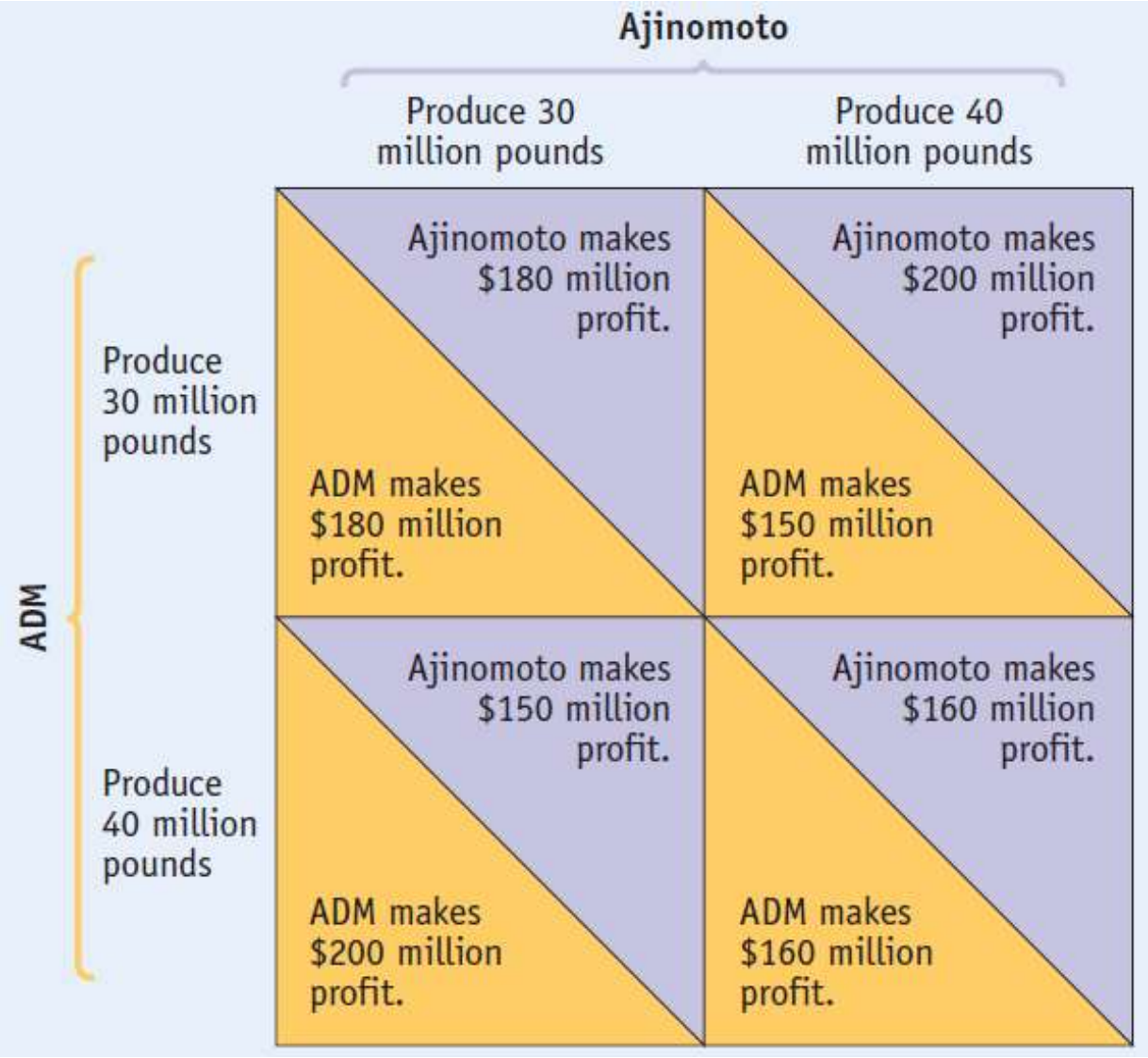
- Characterized by **interdependence**, a relationship in which the outcome of each firm **depends on** the **actions** of the **others**
- There are a "**few**" sellers in the market with **significant control** of **pricing**
- If there are only **two** sellers, it's **duopoly**
- Firms in an oligopoly have an incentive to **collude**, which is the act of "**cooperating**" or "**not cheating**" in order to **increase joint profits**
- **Cartel** is a group of producers that agree to **restrict output** in order to **increase prices** and **profits**

Game Theory

- The study of **behavior** in situations of **interdependence** is knowns as **game theory**
- We will be examining a two-player model
  - the x-player and the y-player **(x,y)**
- In our pay off matrix, there will only be **two** possible **choices**
  - High/Low
  - Confess/Not Confess
  - Early/Late
- **Two firms** are playing a "game" in which profits are **dependent** on other firms' **actions**
- **Applications** in economics, military strategy, politics
- **John Nash**, a mathematician, won the **Nobel Prize** in **economics** for his work
- **Nash equilibrium** is the result when each player chooses the action that **maximizes** his or her **payoff**, given the actions of other players

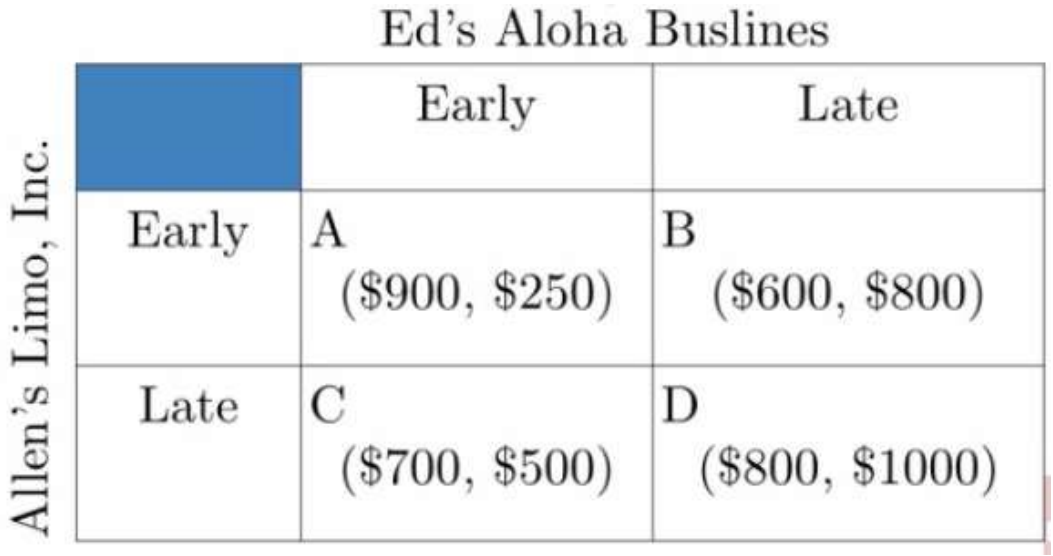
Prisoner's Dilemma

- **Dominant strategy** means that you will choose the **same option regardless** of what your **opponents** does
- Prisoner's dilemma means that there exists a **collusive outcome** that will **benefit both** players but they will have a **dominant strategy** which will yield to the Nash Equilibrium of the **lowest** combined **profit** possible
- Example 1 (classic)



  - Two firms, ADM and Ajinomoto, must decide how much lysine to produce.
  - The profits of the two firms are interdependent: Each firm's profit depends not only on its own decision but also on the other's decision.
  - Both firms will be **better off** if they **both** choose the **lower output**
  - But it is in each firm's **individual interest** to choose the **higher output**.

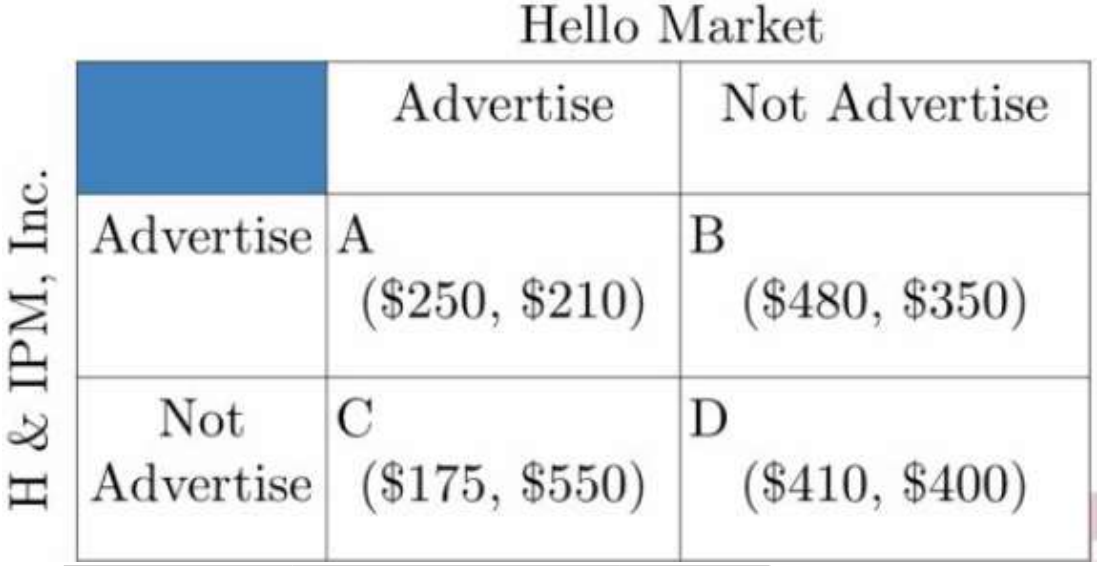
- Example 2 (One Dominant, One Not)



Ed's Aloha Buslines

Allen's Limo, Inc.	Early	Late
Early	A ($900, $250)	B ($600, $800)
Late	C ($700, $500)	D ($800, $1000)

	Allen	Ed
If early	Early	Late
If late	Late	Late
	No dominant strategy	Late
  - Nash equilibrium: D
- Overcoming prisoner's dilemma
  - **Strategic behavior** is when a firm attempts to **influence** the **future behavior** of **other** firms.
  - **Tit for tat** strategy involves playing **cooperatively** at **first** and then **adjusting** accordingly afterwards.
  - Firms in an oligopoly that do not **explicitly form** a cartel can engage in "**tacit collusion**" by limiting **production** and **raising prices** without any written agreements
  - **Collusion**, in any firm, is much more likely to take place when there are **few firms**
  - With more and **more firms**, there exists **less incentive** for a firm to "**cheat**"
- Example 3



	Hello	H & IPM
If advertise	Not advertise	Advertise
If not advertise	Advertise	Advertise
	No dominant strategy	Advertise

- Does Hello Market have a dominant strategy?
  - No
- Does H & IPM have a dominant strategy?
  - Yes, to advertise
- At the Nash Equilibrium, what is H & IPM's daily profit? What is Hello Market's daily profit?
  - Choose B
  - H & IPM's daily profit: $480
  - Hello Market's daily profit: $350
- Suppose the cost of advertising is $50 per day, redraw the matrix to include advertising costs for each firm

Hello Market

	Advertise	Not Advertise
Advertise	A ($200, $160)	B ($430, $350)
Not Advertise	C ($175, $500)	D ($410, $400)

H & I PM