

N. GREGORY MANKIW NINTH EDITION

PRINCIPLES OF ECONOMICS



CHAPTER 4 The Market Forces of Supply and Demand

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IN THIS CHAPTER

- What factors affect buyers' **demand** for goods?
 - What factors affect sellers' **supply** of goods?
 - How do supply and demand determine the **price** of a good and the **quantity** sold?
 - How do changes in the factors that affect demand or supply affect the market price and quantity of a good?
 - How do markets allocate resources?
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Markets and Competition

• Market

- A group of buyers and sellers of a particular good or service
 - Buyers as a group
 - Determine the demand for the product
 - Sellers as a group
 - Determine the supply of the product
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Markets and Competition

• Competitive market

- Many buyers and many sellers, each has a negligible impact on market price

• Perfectly competitive market

- All goods are exactly the same
 - **Price takers**: so many buyers and sellers that no one can affect the market price
 - At the market price, buyers can buy all they want, and sellers can sell all they want
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Markets/Competition in Modern Economics

- ▶ A **market** is a group of buyers and sellers of a particular product trading under certain rules.
 - ▶ A **competitive market** is one where buyers and sellers have a negligible effect on price because there are substitutes on either side.
 - ▶ A **perfectly competitive market** is where
 - ▶ There are perfect substitutes for both buyers and sellers so you can always switch
 - ▶ No one can affect market price - each is a **price taker** since others can always switch
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Demand

• Quantity demanded

- Amount of a good that buyers are willing and able to purchase

• Law of demand

- Other things equal
 - When the price of a good rises, the quantity demanded of the good falls
 - When the price falls, the quantity demanded rises
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Demand Schedule and Demand Curve

- **Demand schedule:**
 - A table that shows the relationship between the price of a good and the quantity demanded
- **Demand curve**
 - A graph of the relationship between the price of a good and the quantity demanded

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EXAMPLE 1A: Sofia's Demand for Muffins

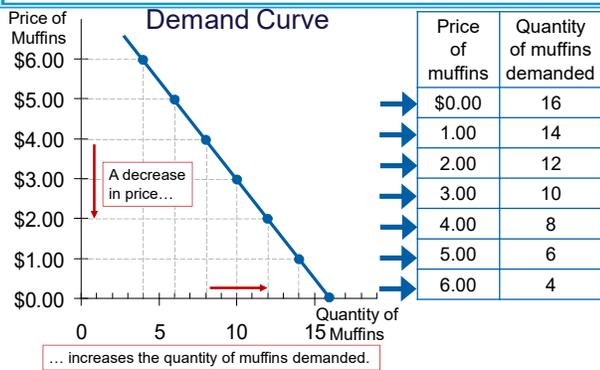
Sofia's demand schedule for muffins

Price of muffins	Quantity of muffins demanded
\$0.00	16
1.00	14
2.00	12
3.00	10
4.00	8
5.00	6
6.00	4

- Notice that Sofia's preferences obey the **law of demand**.

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EXAMPLE 1B: Sofia's Demand Schedule and Demand Curve



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Market Demand

- **Market Demand**
 - Sum of all individual demands for a good or service
 - Market demand curve: sum the individual demand curves horizontally
 - To find the total quantity demanded at any price, we add the individual quantities

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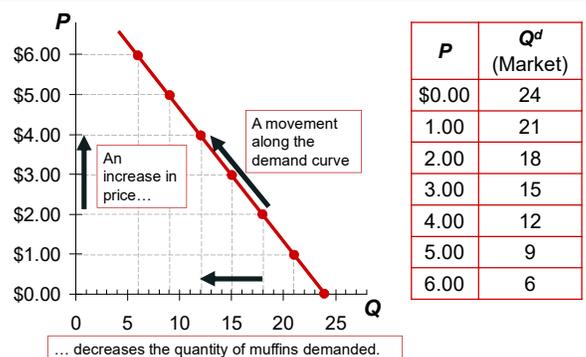
EXAMPLE 1C: Market vs. Individual Demand

Suppose Sofia and Diego are the only two buyers in the market for muffins. (Q^d = quantity demanded)

Price	Sofia's Q^d	Diego's Q^d	Market Q^d
\$0.00	16	8	24
1.00	14	7	21
2.00	12	6	18
3.00	10	5	15
4.00	8	4	12
5.00	6	3	9
6.00	4	2	6

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EXAMPLE 1D: Market Demand Curve for Muffins



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Demand Curve Shifters – 1

- The demand curve
 - Shows how price affects quantity demanded, other things being equal
- These “other things” are non-price determinants of demand
 - Things that determine buyers’ demand for a good, other than the good’s price
- Changes in them shift the **D** curve

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Demand Curve Shifters – 2

- Shifts in the demand curve are caused by changes in:
 - Number of buyers
 - Income
 - Prices of related goods
 - Tastes
 - Expectations

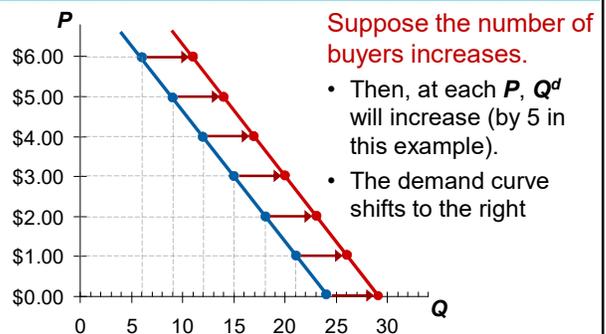
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Changes in Number of Buyers

- Increase in number of buyers
 - Increases the quantity demanded at each price
 - Shifts the demand curve to the right
- Decrease in number of buyers
 - Decreases the quantity demanded at each price
 - Shifts the demand curve to the left

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EXAMPLE 1E: Demand Curve Shifts



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Changes in Income

- Normal good, other things constant
 - An increase in income leads to an increase in demand
 - Shifts the demand curve to the right
- Inferior good, other things constant
 - An increase in income leads to a decrease in demand
 - Shifts the demand curve to the left

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Changes in Prices of Related Goods – 1

- Two goods are substitutes if
 - An increase in the price of one leads to an increase in the demand for the other
- Example: pizza and hamburgers
 - An increase in the price of pizza increases demand for hamburgers, shifting hamburger demand curve to the right
- Other examples:
 - Movie streaming and movie theater, laptops and tablets, [fresh/frozen vegetables \(News\)](#)

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Changes in Prices of Related Goods – 2

- Two goods are **complements** if
 - An increase in the price of one leads to a decrease in the demand for the other
- **Example: smartphones and apps**
 - If price of smartphones rises, people buy fewer smartphones, and therefore fewer apps; App demand curve shifts to the left
- **Other examples:**
 - College tuition and textbooks, bagels and cream cheese, [gasoline and cars \(News\)](#)

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Changes in Tastes

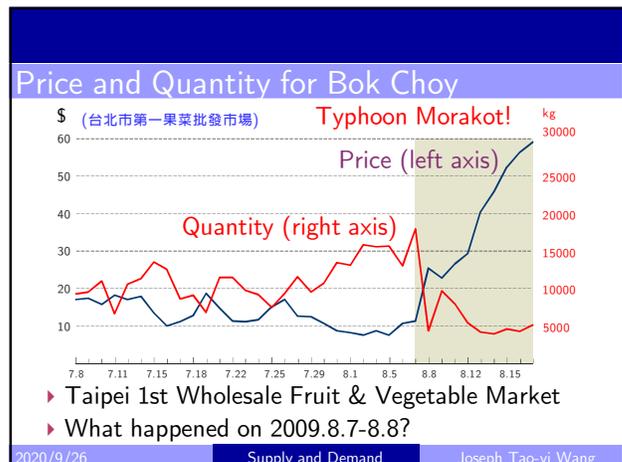
- **Tastes**
 - Anything that causes a shift in tastes toward a good will increase demand for that good and shift its demand curve to the right
- **Example:**
 - Milk power in China hit by the Melamine (三聚氰胺) incident:
 - [Taiwan's Demand for fresh milk increases](#)

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Expectations about the Future

- People expect an increase in income
 - The current demand increases
- People expect higher prices
 - The current demand increases
- **Example:**
 - If people expect their incomes to rise, e.g. got promoted at work, their demand for meals at expensive restaurants may increase now
 - [Vegetable price rise BEFORE typhoons](#)

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Shift vs. Movement Along Curve

- **Change in demand:**
 - A shift in the demand curve
 - Occurs when a non-price determinant of demand changes (like income or number of buyers)
- **Change in the quantity demanded:**
 - A movement along a fixed demand curve
 - Occurs when the price changes

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Summary: Variables that Influence Buyers

Variable	A change in this variable...
Price of the good itself	... Represents a movement along the Demand curve
Income	... shifts the Demand curve
Price of related goods	... shifts the Demand curve
Tastes	... shifts the Demand curve
Expectations	... shifts the Demand curve
# of buyers	... shifts the Demand curve

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Active Learning 1: The Demand Curve

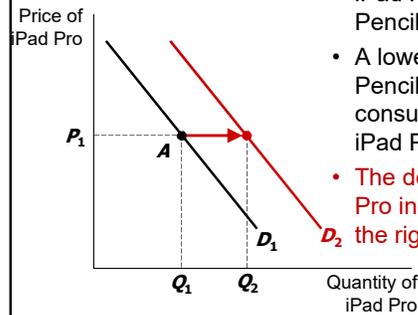
Draw the demand curve for iPad Pro, D_1 , and a point A (P_1, Q_1) on the demand curve. What happens in each of the following scenarios? Why?



- A. The price of Apple Pencil falls
- B. The price of iPad Pro falls
- C. Consumers' income falls (and iPad Pro is a normal good)

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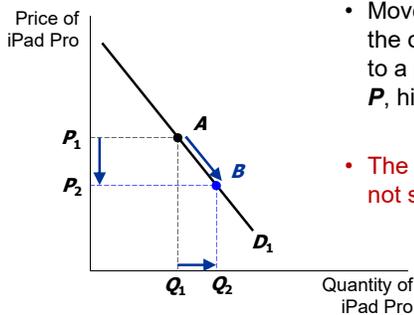
Active Learning 1A. The Price of Apple Pencil Falls



- iPad Pro and Apple Pencil are **complements**.
- A lower price of Apple Pencil prompts consumers to buy more iPad Pro (at P_1)
- **The demand for iPad Pro increases (shifts to the right)**

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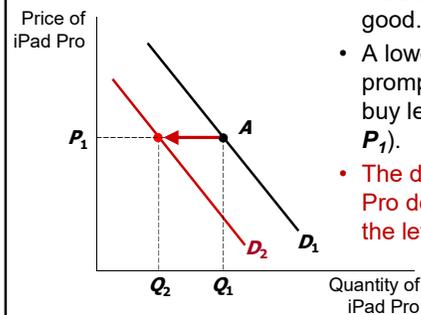
Active Learning 1B. The Price of iPad Pro Falls



- Move down along the demand curve to a point with lower P , higher Q .
- **The D curve does not shift.**

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Active Learning 1C. Consumers' Income Falls



- iPad Pro is a normal good.
- A lower income prompts consumers to buy less iPad Pro (at P_1).
- **The demand for iPad Pro decreases (shifts to the left)**

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Supply

- **Quantity supplied**
 - Amount of a good
 - Sellers are willing and able to sell
- **Law of supply**
 - Other things equal
 - When the price of a good rises, the quantity supplied of the good rises
 - When the price falls, the quantity supplied falls

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Supply Schedule and Supply Curve

- **Supply schedule:**
 - A table that shows the relationship between the price of a good and the quantity supplied
- **Supply curve**
 - A graph of the relationship between the price of a good and the quantity supplied

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EXAMPLE 2A: Starbucks' Supply of Muffins

Starbucks' supply schedule of muffins

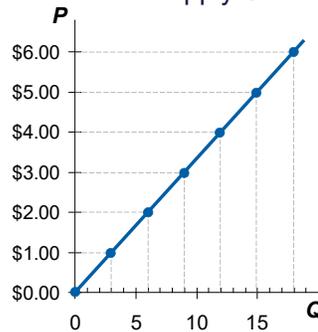
- Notice that Starbucks' supply schedule obeys the **law of supply**

Price of muffins	Quantity of muffins supplied
\$0.00	0
1.00	3
2.00	6
3.00	9
4.00	12
5.00	15
6.00	18

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EXAMPLE 2B: Starbucks' Supply Schedule and Supply Curve

Supply Curve



Price of muffins	Quantity of muffins supplied
\$0.00	0
1.00	3
2.00	6
3.00	9
4.00	12
5.00	15
6.00	18

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Market Supply vs. Individual Supply

• **Market Supply**

- Sum of the supplies of all sellers of a good or service
- **Market Supply Curve:** sum of individual supply curves horizontally
 - To find the total quantity supplied at any price, we add the individual quantities

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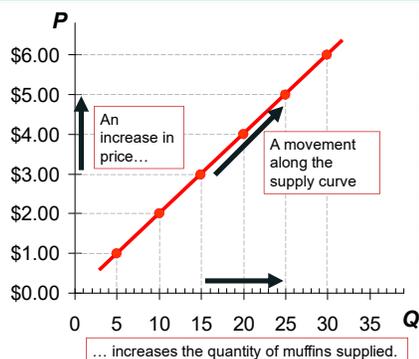
EXAMPLE 2C: Market vs. Individual Supply

Suppose Starbucks and Dante Coffee are the only two sellers in this market. (Q_s = quantity supplied)

Price	Q_s Starbucks	+	Q_s Dante	=	Market Q_s
\$0.00	0	+	0	=	0
1.00	3	+	2	=	5
2.00	6	+	4	=	10
3.00	9	+	6	=	15
4.00	12	+	8	=	20
5.00	15	+	10	=	25
6.00	18	+	12	=	30

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EXAMPLE 2D: Market Supply Curve of Muffins



P	Q_s (Market)
\$0.00	0
1.00	5
2.00	10
3.00	15
4.00	20
5.00	25
6.00	30

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Supply Curve Shifters – 1

• **The supply curve**

- Shows how price affects quantity supplied, other things being equal

• **These "other things"**

- Are non-price determinants of supply

• **Changes in them shift the S curve...**

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Supply Curve Shifters – 2

- Shifts in the supply curve are caused by changes in:
 - Input prices
 - Technology
 - Number of sellers
 - Expectations about the future

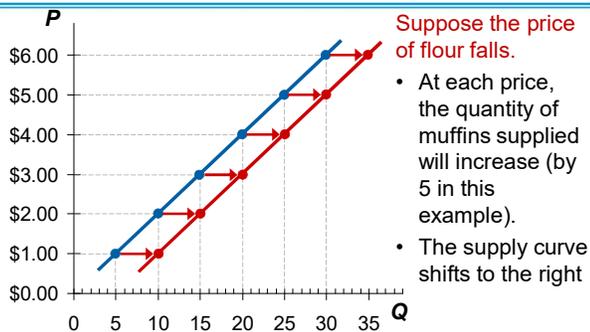
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Changes in Input Prices

- Examples of input prices
 - Wages, prices of raw materials
- A fall in input prices
 - Makes production more profitable at each output price
 - Firms supply a larger quantity at each price: the supply curve shifts to the right
 - Supply is negatively related to prices of inputs

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EXAMPLE 2E: Changes in Input Prices



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Changes in Technology

- Technology
 - Determines how much inputs are required to produce a unit of output
- A cost-saving technological improvement
 - Has the same effect as a fall in input prices
 - Shifts the supply curve to the right

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Changes in Number of Sellers

- An increase in the number of sellers
 - Increases the quantity supplied at each price
 - Shifts the supply curve to the right
- A decrease in the number of sellers
 - Decreases the quantity supplied at each price
 - Shifts the supply curve to the left

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Expectations about Future

- Example: Events in the Middle East lead to expectations of higher oil prices
 - Owners of Texas oil fields reduce supply now, save some inventory to sell later at the higher price
 - The supply curve shifts left
- Sellers may adjust supply* when their expectations of future prices change (*If good not perishable)

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Shift vs. Movement Along the Supply

- Change in supply:**
 - A shift in the supply curve
 - Occurs when a non-price determinant of supply changes (like technology or costs)
- Change in the quantity supplied:**
 - A movement along a fixed supply curve
 - Occurs when the price changes

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Summary: variables that influence sellers

Variable	A change in this variable...
Price of the good itself	...represents a movement along the Supply curve
Input Prices	...shifts the Supply curve
Technology	...shifts the Supply curve
Expectations	...shifts the Supply curve
# of Sellers	...shifts the Supply curve

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Active Learning 2: The Supply Curve

Draw a supply curve for apple juice, S_1 , and a point A (P_1, Q_1) on the supply curve. What happens to it in each of the following scenarios? Why?

- Grocery stores cut the price of apple juice.
- A technological advance allows apple juice to be produced at lower cost.
- Grocery stores cut the price of orange juice.

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Active Learning 2A. Decrease in Price of Apple Juice

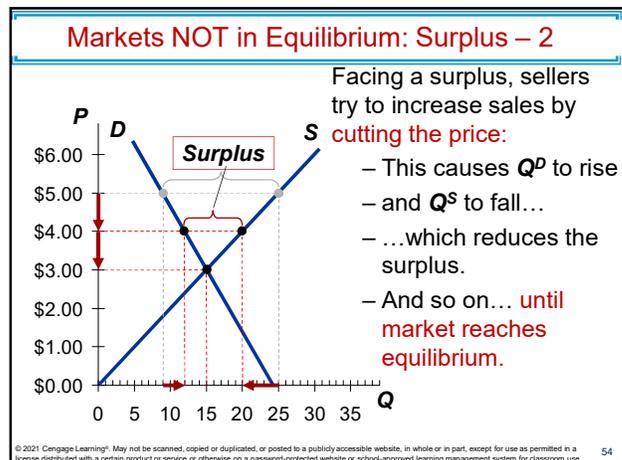
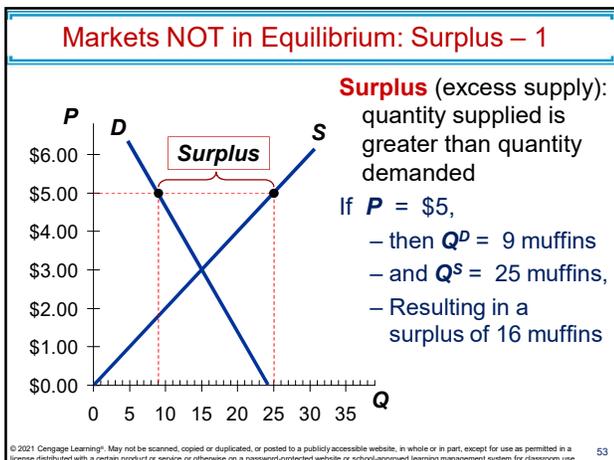
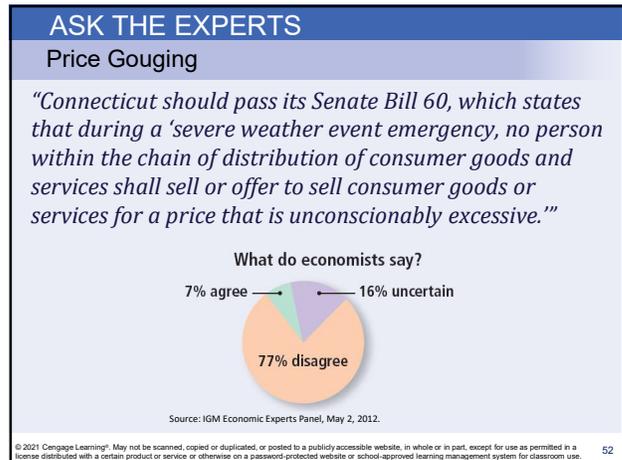
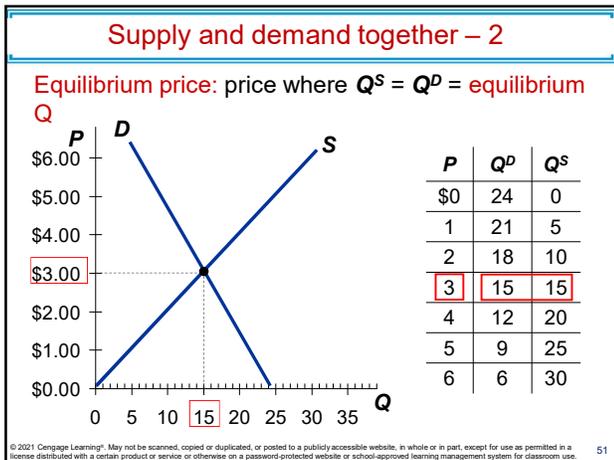
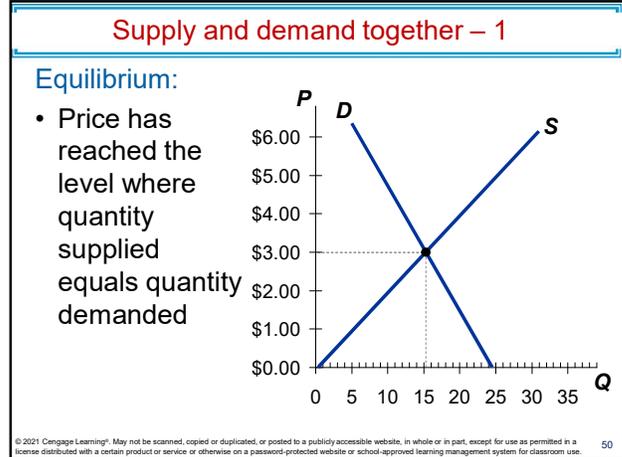
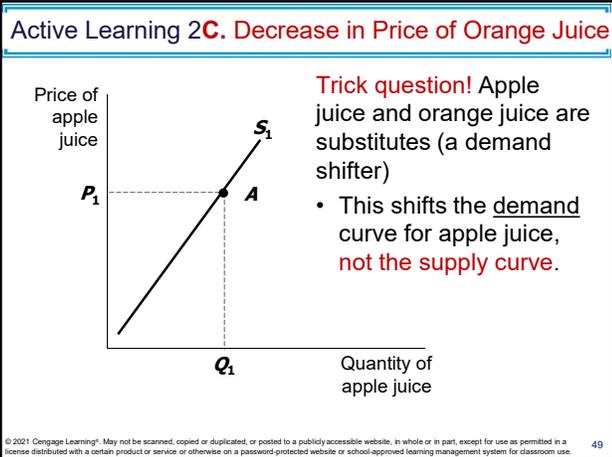
- Move down along the supply curve to a lower P and lower Q .
- S curve does not shift.

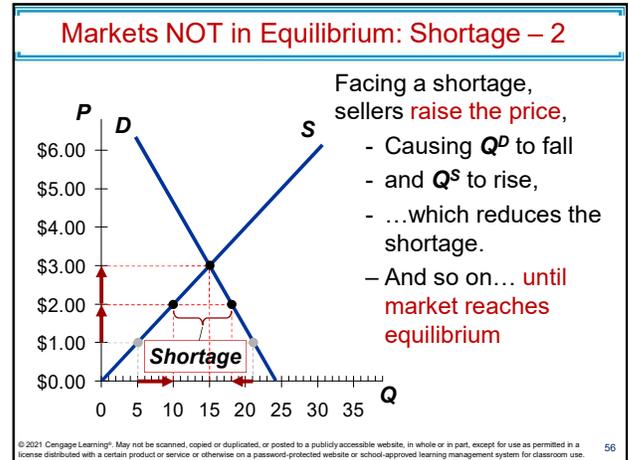
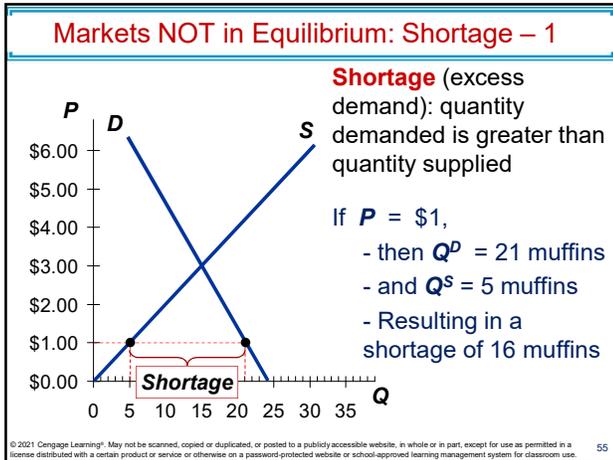
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Active Learning 2B. Technological Advance

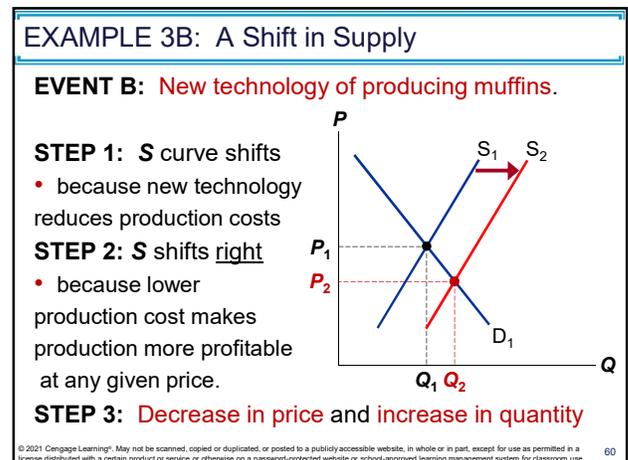
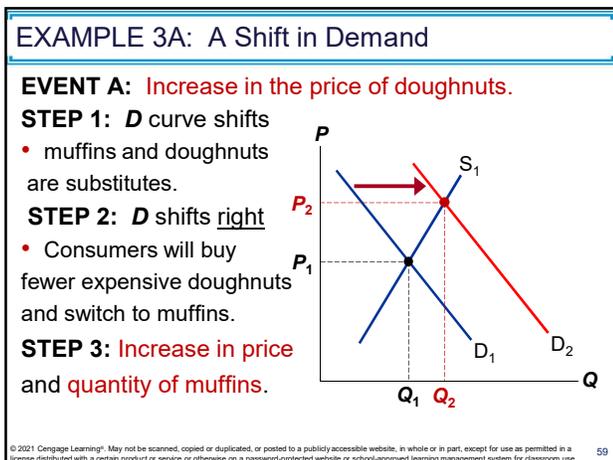
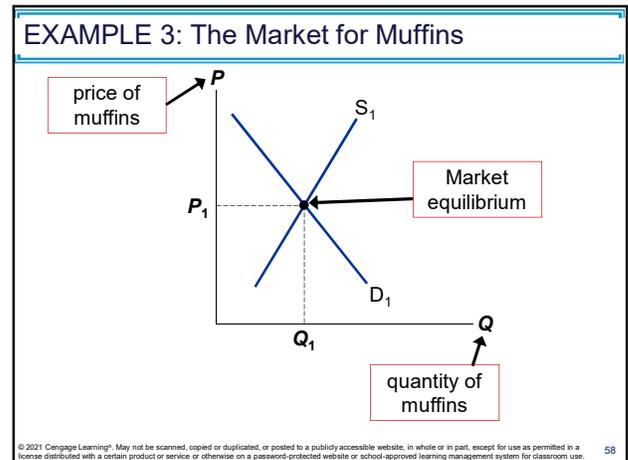
- Better technology reduces production costs
- At each price, Q_S increases.
- The supply curve shifts to the right

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- ### Supply and Demand Together
- Three steps to analyzing changes in equilibrium:
1. Decide whether the event shifts the supply curve, the demand curve, or, in some cases, both curves
 2. Decide whether the curve(s) shifts to the right or to the left
 3. Use the supply-and-demand diagram
 - Compare the initial and the new equilibrium
 - Effects on equilibrium price and quantity
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EXAMPLE 3C: A shift in Both S and D – 1

EVENTS: Price of doughnuts rises AND new technology reduces production costs.

STEP 1: Both curves shift.
STEP 2: Both shift to the right.

STEP 3: Q rises but the effect on P is ambiguous:

If demand increases more than supply, P rises.

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EXAMPLE 3C: A Shift in Both S and D – 2

EVENTS: Price of doughnuts rises AND new technology reduces production costs

STEP 3: Q rises, but the effect on P is ambiguous:

If supply increases more than demand, P falls.

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How Prices Allocate Resources

- “Markets are usually a good way to organize economic activity”
- In market economies
 - Prices adjust to balance supply and demand
- These equilibrium prices
 - Are the signals that guide economic decisions and thereby allocate scarce resources

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Active Learning 3: Shifts in Supply and Demand

Use the three-step method to analyze the effects of each event on the equilibrium price and quantity of iPad Pro.

Event A: A fall in the price of Galaxy Tab S7+

Event B: The price of Apple A12Z CPU falls because of an abundant supply of CPUs beyond TSMC.

Event C: Events A and B both occur simultaneously.

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Active Learning 3A. Galaxy Tab S7+ Prices Fall

STEPS:

1. D curve shifts
2. D curve shifts left
3. P and Q both fall

The market for iPad Pro

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Active Learning 3B. Fall in Price of A12Z CPUs

STEPS:

1. S curve shifts
2. S curve shifts right
3. P falls, Q rises

The market for iPad Pro

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Active Learning 3C. Events A and B Together

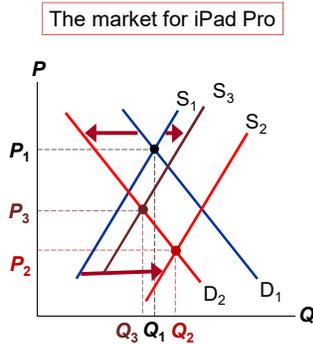
STEPS:

- Both curves shift
(see parts A & B)
- D shifts left, S shifts right
- P falls.

Effect on Q is

ambiguous:

- the fall in demand reduces Q ,
- the increase in supply increases Q .



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THINK-PAIR-SHARE

You are watching a national news broadcast. It is reported that a typhoon is heading for the coast of Madou (麻豆) and that it will likely destroy much of this year's pomelo (文旦) crop. Your roommate says, "This is not going to affect me, I don't eat pomelos, I only drink grapefruit juice."

- As an eager economics student, what's your response going to be? Explain.
- What other markets will be impacted by the destroyed pomelo crop? How?

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CHAPTER IN A NUTSHELL

- Economists use the model of supply and demand to analyze competitive markets.
 - Many buyers and sellers, all are price takers
- The demand curve shows how the quantity of a good demanded depends on the price.
 - Law of demand: as the price of a good falls, the quantity demanded rises; the D curve slopes downward
- Other determinants of demand: income, prices of substitutes and complements, tastes, expectations, and number of buyers.
 - If one of these factors changes, the D curve shifts

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CHAPTER IN A NUTSHELL

- The supply curve shows how the quantity of a good supplied depends on the price.
 - Law of supply: as the price of a good rises, the quantity supplied rises; the S curve slopes upward.
- Other determinants of supply: input prices, technology, expectations, and number of sellers.
 - If one of these factors changes, supply curve shifts.
- The intersection of the supply and demand curves determines the market equilibrium.
 - At the equilibrium price, quantity demanded = quantity supplied

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CHAPTER IN A NUTSHELL

- The behavior of buyers and sellers naturally drives markets toward their equilibrium.
 - When the market price is above the equilibrium price, there is a surplus of the good, which causes the market price to fall.
 - When the market price is below the equilibrium price, there is a shortage, which causes the market price to rise.

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CHAPTER IN A NUTSHELL

- To analyze how any event influences a market, we use the supply-and-demand diagram to examine how the event affects the equilibrium price and quantity.
 - Decide whether the event shifts the supply curve or the demand curve (or both).
 - Decide in which direction the curve shifts.
 - Compare the new equilibrium with the initial one.
- In market economies, prices are the signals that guide economic decisions and thereby allocate scarce resources.

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Chapter 4: Supply and Demand

- ▶ **Supply, Demand, and Equilibrium**
 - ▶ Step 1: Identify which curve shifts (or both)
 - ▶ Step 2: Identify what direction did it shift
 - ▶ Step 3: Use the S/D graph to find how equilibrium price and quantity change
- ▶ **Homework:**
 - ▶ Mankiw, Chap.4, Problem 1, 2, 5, 8, 10, 11

2020/9/26

Supply and Demand

Joseph Tao-yi Wang

Chapter 4: Challenge Questions/ex-Midterm

- ▶ 2007 - Part Q1, Q4a, Q6a
- ▶ 2008 - Part A (+ Multi-Choice Q3)
- ▶ 2009 - (Multi-Choice Q4-9)
- ▶ 2010 - (True/False Q3)
- ▶ 2012 - Part A1-A6 (+ True/False Q1-Q2)
- ▶ 2013 - Part A1-A2
- ▶ 2015 - (True/False A1-A3)
- ▶ 2016 - Part B1-B2
- ▶ 2019 - Part A1-A2

2020/9/26

Supply and Demand

Joseph Tao-yi Wang

Chapter 4: Additional Homework Questions

- ▶ **True or False.** If the demand for lettuce falls, the price will fall, causing the demand to go back up.
- ▶ **True or False.** Suppose the enrollment at your university unexpectedly declines. Then the apartment owners in the area will face higher vacancy rates and might raise their rents to compensate.
- ▶ **True or False.** The discovery of a new method of birth control that is safer, cheaper, more effective, and easier to use than any other method would reduce the number of unwanted pregnancies.

2020/9/26

Supply and Demand

Joseph Tao-yi Wang