N. GREGORY MANKIW

PRINCIPLES OF

ECONOMICS

Eight Edition

CHAPTER 4

The Market Forces of Supply and Demand

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Premium PowerPoint Slides by:
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 1

Look for the answers to these questions

- 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?

 2

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

 3

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
  - Buyers and sellers are so numerous that no one can affect the market price, "Price takers"

 4

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

2018/9/21 Supply and Demand Joseph Tao-yi Wang

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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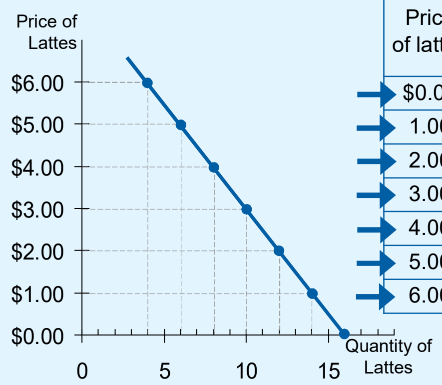
Sam's Demand Schedule

Demand schedule:
- A table, shows the relationship between the price of a good and the quantity demanded
- Example: Sam's demand for lattes
- Notice that Sam's preferences obey the law of demand.

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

Sam's Demand Schedule and Demand Curve



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

Demand

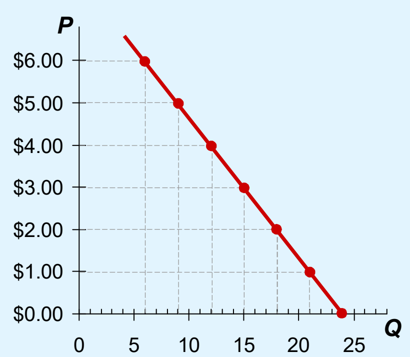
- Market demand
  - Sum of all individual demands for a good or service
  - Market demand curve: sum the individual demand curves horizontally
    - To find the total quantity demanded at any price, we add the individual quantities

Market Demand versus Individual Demand

Suppose Sam and Dean are the only two buyers in the market for lattes. (Q^d = quantity demanded)

Price	Sam's Q^d		Dean'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

The Market Demand Curve for Lattes



P	Q^d (Market)
$0.00	24
1.00	21
2.00	18
3.00	15
4.00	12
5.00	9
6.00	6

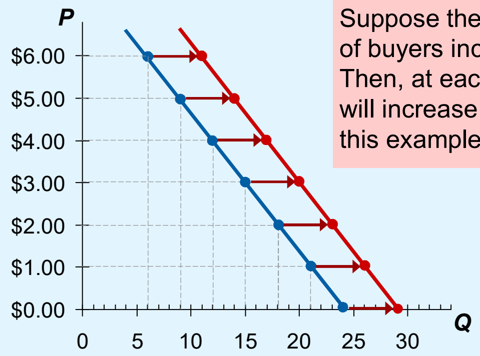
Demand Curve Shifters

- 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…

Demand Curve Shifters

- Number of buyers
  - Increase in # of buyers
    - Increases quantity demanded at each price
    - Shifts D curve to the right
  - Decrease in # of buyers
    - Decreases quantity demanded at each price
    - Shifts D curve to the left

Demand Curve Shifters: # of Buyers



Suppose the number of buyers increases. Then, at each P, Q^d will increase (by 5 in this example).

Demand Curve Shifters

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

Demand Curve Shifters

- Prices of related goods, substitutes
  - 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: Coke and Pepsi, laptops and tablets, music CDs and music downloads
    - In the news: Fresh and Frozen Vegetables after a typhoon

Demand Curve Shifters

- Prices of related goods, complements
  - Two goods are complements if
    - An increase in the price of one leads to a decrease in the demand for the other
  - Example: computers and software
    - If price of computers rises, people buy fewer computers, and therefore less software; Software demand curve shifts left
  - Other examples: College tuition and textbooks, bagels and cream cheese, eggs and bacon
  - In the news: gasoline and cars

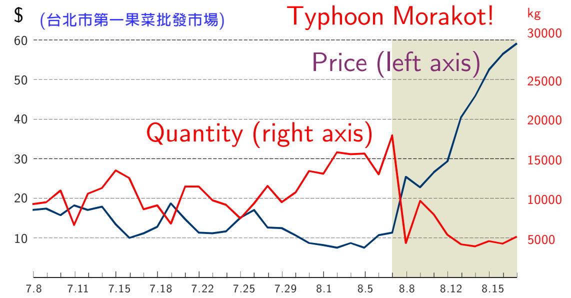
Demand Curve Shifters

- Tastes
  - Anything that causes a shift in tastes toward a good will increase demand for that good and shift its D curve to the right
  - Example:
    - Fresh milk became popular in Taiwan after powder was hit by the Melamine (三聚氰胺) incident, caused an increase in demand for fresh milk, shifted the fresh milk demand curve to the right.

Demand Curve Shifters

- Expectations about the future
  - Expect an increase in income, increase in current demand
  - Expect higher prices, increase in current demand
  - Example: If people expect their incomes to rise, their D for meals at expensive restaurants may increase now
  - In the news: Vegetable price before/after typhoons

Price and Quantity for Bok Choy



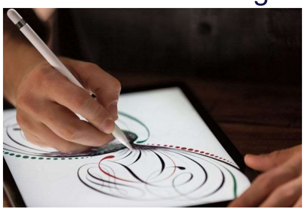
- Taipei 1st Wholesale Fruit & Vegetable Market
- What happened on 2009.8.7-8.8?

Summary: Variables That Influence Buyers

Variable	*A change in this variable…*
Price	…Represents a movement along the ***D*** curve
# of buyers	…shifts the ***D*** curve
Income	…shifts the ***D*** curve
Price of related goods	…shifts the ***D*** curve
Tastes	…shifts the ***D*** curve
Expectations	…shifts the ***D*** curve

Active Learning 1 — Demand curve

- Draw a demand curve for iPad Pro
- What happens to it in each of the following scenarios?
- Why?

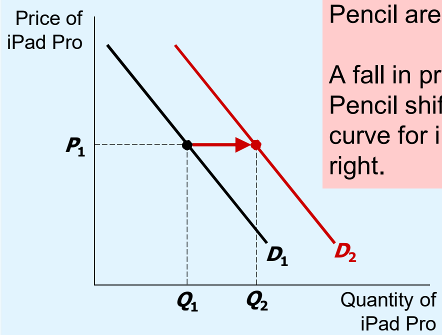


A. The price of Apple Pencil falls

B. The price of iPad Pro falls

C. The price of Surface Pro 4 falls

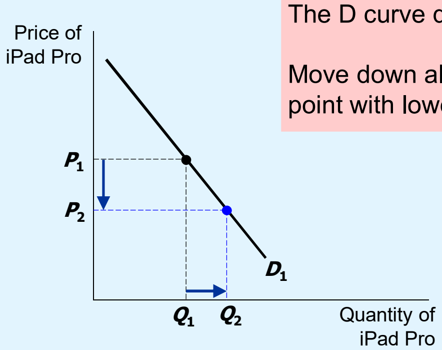
Active Learning 1 — A. Price of Apple Pencil falls



iPad Pro and Apple Pencil are complements.

A fall in price of Apple Pencil shifts the demand curve for iPad Pro to the right.

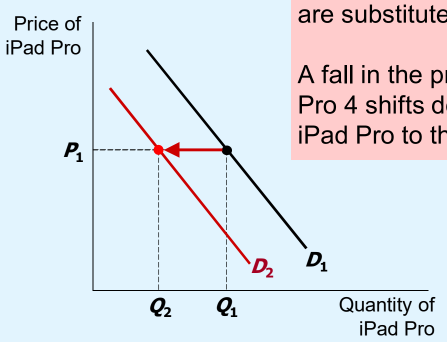
Active Learning 1 — B. The price of iPad Pro falls



The D curve does not shift.

Move down along curve to a point with lower P, higher Q.

Active Learning 1 C. The price of Surface Pro 4 falls



Surface Pro 4 and iPad Pro are substitutes.

A fall in the price of Surface Pro 4 shifts demand for iPad Pro to the left.

Supply

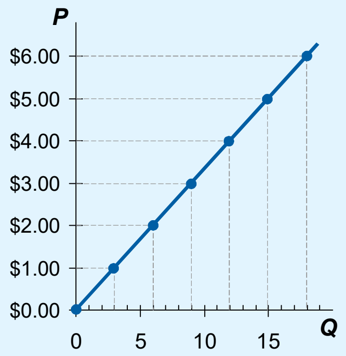
- Quantity supplied
  - Amount of a good
  - Sellers are willing and able to sell
- Law of supply
  - Other things equal
  - When the price of a good rises, the quantity supplied of the good rises
  - When the price falls, the quantity supplied falls

Starbucks' Supply Schedule

Supply schedule:
- A table, shows the relationship between the price of a good and the quantity supplied.
- Example: Starbucks' supply of lattes
- Notice that Starbucks' supply schedule obeys the law of supply

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

Starbucks' Supply Schedule and Supply Curve



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

Market Supply vs. Individual Supply

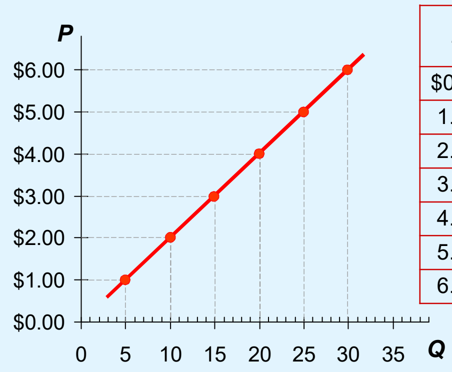
- Market supply
  - Sum of the supplies of all sellers of a good or service
  - Market supply curve: sum of individual supply curves horizontally
    - To find the total quantity supplied at any price, we add the individual quantities

Market Supply vs. Individual Supply

Suppose Starbucks and Dante 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

The Market Supply Curve



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

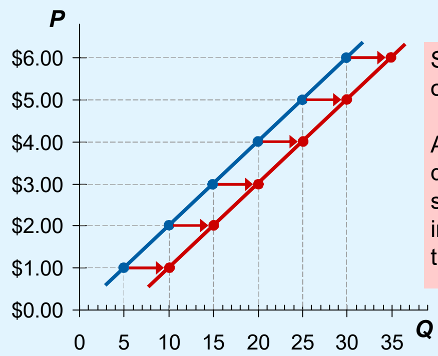
Supply Curve Shifters

- 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…

Supply Curve Shifters

- Input prices
  – Supply is negatively related to prices of inputs
  – 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 S curve shifts to the right

Supply Curve Shifters: Input Prices



Suppose the price of milk falls.

At each price, the quantity of lattes supplied will increase (by 5 in this example).

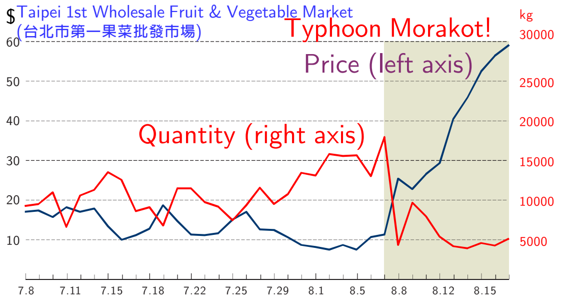
Supply Curve Shifters

- 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 S curve to the right
- Number of sellers
  – An increase in the number of sellers
    - Increases the quantity supplied at each price
    - Shifts S curve to the right

Supply Curve Shifters

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

Is Bok Choy Perishable or Not?



- Which change is driven by expectation of supply /demand?

Summary: Variables That Influence Sellers

Variable	*A change in this variable…*
Price	…represents a movement along the ***S*** curve
Input Prices	…shifts the ***S*** curve
Technology	…shifts the ***S*** curve
# of Sellers	…shifts the ***S*** curve
Expectations	…shifts the ***S*** curve

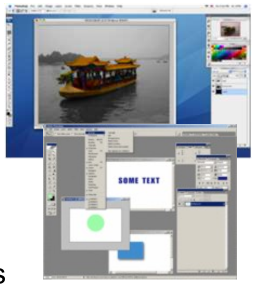
Active Learning 2 — Supply curve

Draw a supply curve for photo editing software. What happens to it in each of the following scenarios?

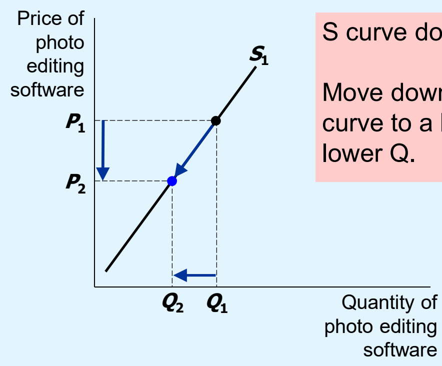
A. Retailers cut the price of the software.

B. A technological advance allows the software to be produced at lower cost.

C. Professional photo shops raise the price of the services they provide.



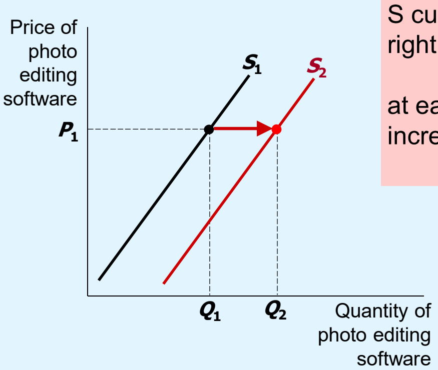
Active Learning 2 — A. Fall in price of photo editing software



S curve does not shift.

Move down along the curve to a lower P and lower Q.

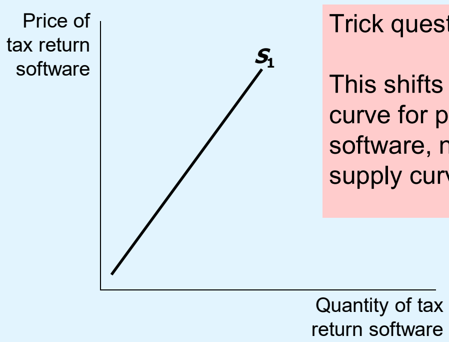
Active Learning 2 — B. Fall in cost of producing software



S curve shifts to the right:

at each price, Q increases.

Active Learning 2 — C. Professional photo shops raise their price

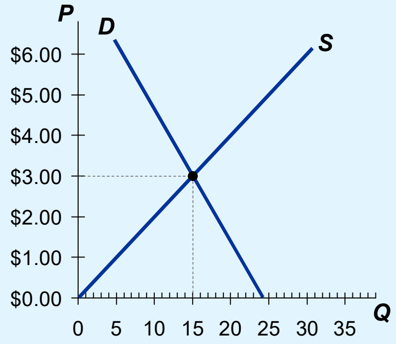


Trick question:

This shifts the demand curve for photo edit software, not the supply curve.

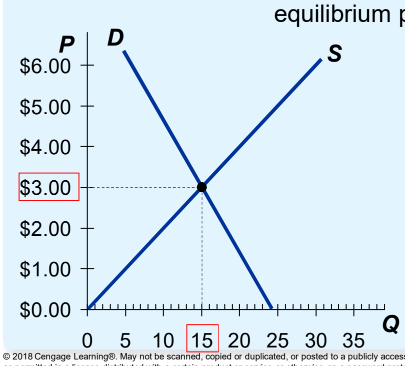
Supply and Demand Together

Equilibrium: Price has reached the level where quantity supplied equals quantity demanded



Supply and Demand Together

Equilibrium price: price where Q supplied = Q demanded
Equilibrium quantity: Q supplied and demanded at the equilibrium price



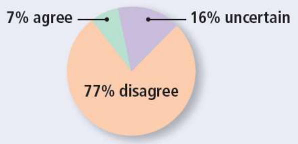
P	Q^D	Q^S
$0	24	0
1	21	5
2	18	10
3	15	15
4	12	20
5	9	25
6	6	30

ASK THE EXPERTS

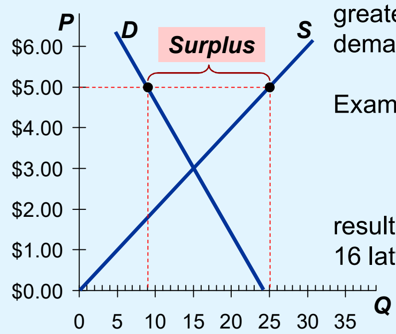
Price Gouging

"Connecticut should pass its Senate Bill 60, which states that during a 'severe weather event emergency, no person within the chain of distribution of consumer goods and services shall sell or offer to sell consumer goods or services for a price that is unconscionably excessive.'"

What do economists say?



Markets Not in Equilibrium: Surplus

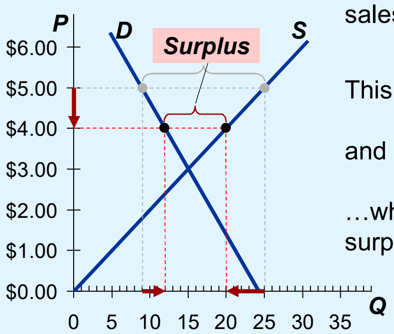


Surplus (excess supply): quantity supplied is greater than quantity demanded

Example: if P = $5,
then Q^D = 9 lattes
and Q^S = 25 lattes

resulting in a surplus of 16 lattes

Markets Not in Equilibrium: Surplus



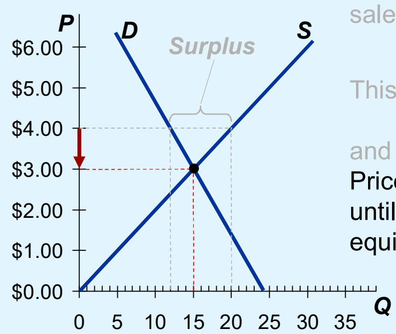
Facing a surplus, sellers try to increase sales by cutting price.

This causes Q^D to rise

and Q^S to fall…

…which reduces the surplus.

Markets Not in Equilibrium: Surplus



Facing a surplus, sellers try to increase sales by cutting price.

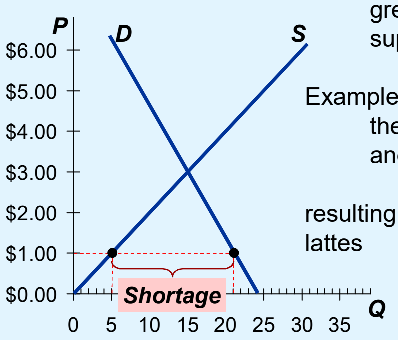
This causes Q^D to rise

and Q^S to fall…

Prices continue to fall until market reaches equilibrium.

Markets Not in Equilibrium: Shortage

Shortage (excess demand): quantity demanded is greater than quantity supplied



Example: if P = $1, then Q^D = 21 lattes and Q^S = 5 lattes

resulting in a shortage of 16 lattes

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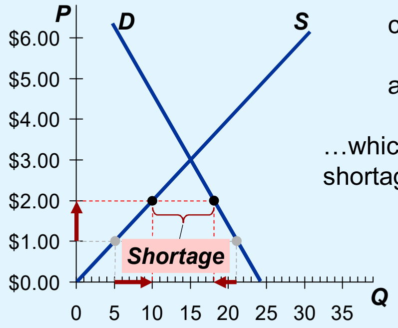
Markets Not in Equilibrium: Shortage

Facing a shortage, sellers raise the price,



causing Q^D to fall

and Q^S to rise,

…which reduces the shortage.

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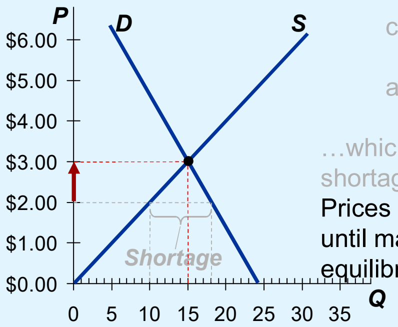
Markets Not in Equilibrium: Shortage

Facing a shortage, sellers raise the price,



causing Q^D to fall

and Q^S to rise,

…which reduces the shortage.

Prices continue to rise until market reaches equilibrium.

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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 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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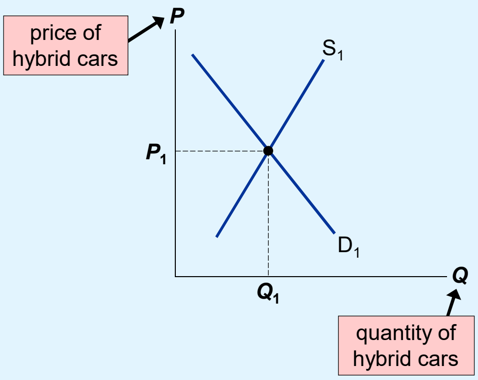
EXAMPLE: The Market for Hybrid Cars



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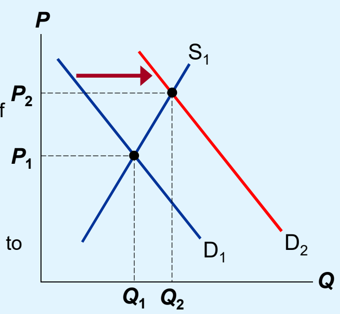
EXAMPLE 1: A Shift in Demand

EVENT TO BE ANALYZED:
Increase in the price of gas.

STEP 1: ***D*** curve shifts because price of gas affects demand for hybrids. (***S*** curve does not shift, because price of gas does not affect cost of producing hybrids)

STEP 2: ***D*** shifts <u>right</u> because high gas price makes hybrids more attractive relative to other cars.

STEP 3: The shift causes an increase in price and quantity of hybrid cars.



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Shift vs. Movement Along Curve

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

Shift vs. Movement Along Curve

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

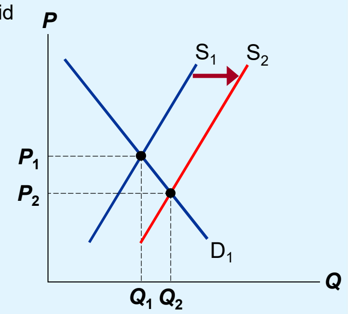
EXAMPLE 2: A Shift in Supply

EVENT: New technology reduces cost of producing hybrid cars.

STEP 1: ***S*** curve shifts because event affects cost of production. (***D*** curve does not shift, because production technology is not one of the factors that affect demand)

STEP 2: ***S*** shifts right because event reduces cost, makes production more profitable at any given price.

STEP 3: The shift causes price to fall and quantity to rise.



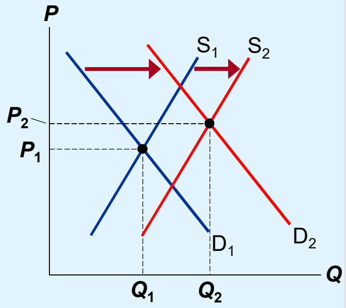
EXAMPLE 3: A Shift in Both Supply and Demand

EVENTS: Price of gas 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.

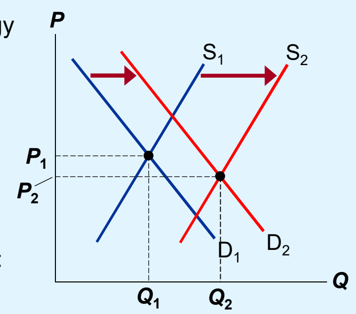


EXAMPLE 3: A Shift in Both Supply and Demand

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

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

But if supply increases more than demand, ***P*** falls.



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 Surface Pro 4

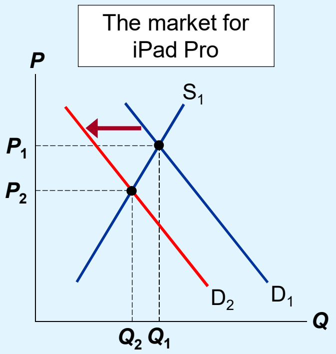
Event B: Apple Inc. negotiate a reduction in the price they must pay Foxconn for each iPad Pro they assemble.

Event C: Events A and B both occur.

Active Learning 3 A. Fall in the price of Surface Pro 4

STEPS:

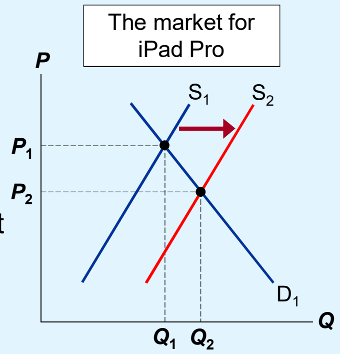
1. ***D*** curve shifts
2. ***D*** curve shifts left
3. ***P*** and ***Q*** both fall



Active Learning 3 B. Fall in assemble cost

STEPS:

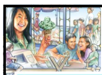
1. ***S*** curve shifts (Assemble costs are part of sellers' costs)
2. ***S*** curve shifts right
3. ***P*** falls, ***Q*** rises



Active Learning 3 C. Fall in price of Surface Pro 4 and fall in assemble cost

STEPS:

1. Both curves shift (see parts A & B)
2. D shifts left, S shifts right
3. P falls.
   Effect on Q is ambiguous:
   - the fall in demand reduces Q,
   - the increase in supply increases Q.



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

Summary

- 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

Summary

- 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

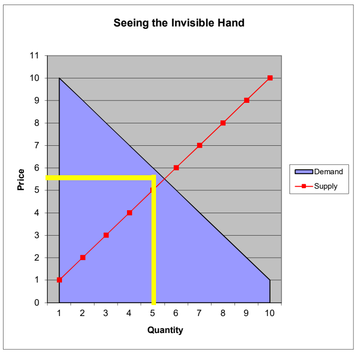
Summary

- 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.

Summary

- 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.
  1. Decide whether the event shifts the supply curve or the demand curve (or both).
  2. Decide in which direction the curve shifts.
  3. Compare the new equilibrium with the initial one.
- In market economies, prices are the signals that guide economic decisions and thereby allocate scarce resources.

Seeing the Invisible Hand (2017)



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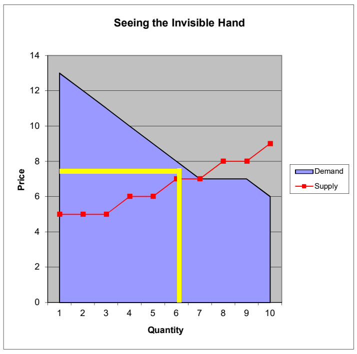
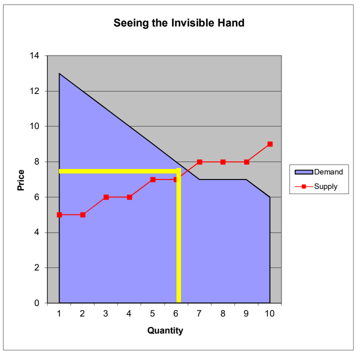


Seeing the Invisible Hand (2015)



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

Chapter 4: Challenge Questions/ex-Midterm

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

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.