Demand, Supply, and Market Equilibrium

Demand

- **Quantity demanded (Q_d)**

  Amount of a good or service consumers are willing & able to purchase during a given period of time.

- **Major six variables that influence Q_d**
  - Price of a good or service (P)
  - Incomes of Consumers (M)
  - Prices of related goods & services (P_R)
  - Taste patterns of consumers (T)
  - Expected future price of product (P_e)
  - Number of consumers in market (N)
- **Generalized demand function**
  - $Q_d = f(P, M, P_R, T, P_e, N)$

2

Demand: Normal & Inferior goods

- ***Normal goods:*** A good or service for which an increase (decrease) in income causes consumers to demand more (less) of the good, holding all other variables in the generalized demand function constant.

- ***Inferior goods:*** A good or service for which an increase (decrease) in income causes consumers to demand less (more) of the good, holding all other variables in the generalized demand function constant.

3

Demand: Substitutes & Compliments

- ***Substitutes:*** Two goods are substitutes if an increase (decrease) in the price of one of the goods causes consumers to demand more (less) of the other good, holding all other factors constant.

- ***Compliments:*** Two goods are compliments if an increase (decrease) in the price of one of the goods causes consumers to demand less (more) of the other good, holding all other factors constant.

4

Generalized Demand Function

$$Q_d = a + bP + cM + dP_R + e\Im + fP_e + gN$$

- b, c, d, e, f, & g are **slope parameters**

- Sign of parameter shows how variable is related to Q_d
  - Positive sign indicates direct relationship
  - Negative sign indicates inverse relationship

5

Generalized Demand Function

Variable	Relation to Q_d	Sign of Slope Parameter
P	Inverse	$b = \Delta Q_d/\Delta P$ is negative
M	Direct for normal goods Inverse for inferior goods	$c = \Delta Q_d/\Delta M$ is positive $c = \Delta Q_d/\Delta M$ is negative
P_R	Direct for substitutes Inverse for compliments	$d = \Delta Q_d/\Delta P_R$ is positive $d = \Delta Q_d/\Delta P_R$ is negative
T	Direct	$e = \Delta Q_d/\Delta T$ is positive
P_e	Direct	$f = \Delta Q_d/\Delta P_e$ is positive
N	Direct	$g = \Delta Q_d/\Delta N$ is positive

6

Demand Function

- ***Direct Demand function (demand):*** a table, a graph, or an equation that shows how quantity demanded is related to product price, holding constant the five other variables that influence demand.
  - $Q_d = f(P)$
- **Law of Demand**
  - Q_d increases when P falls & Q_d decreases when P rises, all else constant
  - $\Delta Q_d / \Delta P$ must be negative

7

Graphing Demand Curve

- Traditionally price *(P)* is plotted on the Y-axis & quantity demanded (Q_d) is plotted on the X-axis
- ***Inverse demand function:*** when price is expressed as a function of quantity demanded
  - $P = f(Q_d)$
- A point on a demand curve shows either:
  - Maximum amount of a good that will be purchased for a given price
  - Maximum price consumers will pay for a specific amount of the good

8

Reasons for the Inverse Relationship

- **Substitution effect**
  - When price of a good decreases, the consumer substitutes the lower priced good for the more expensive ones.
- **Income effect**
  - When price decreases, the consumer's real income (or purchasing power) increases, so he tends to buy more.

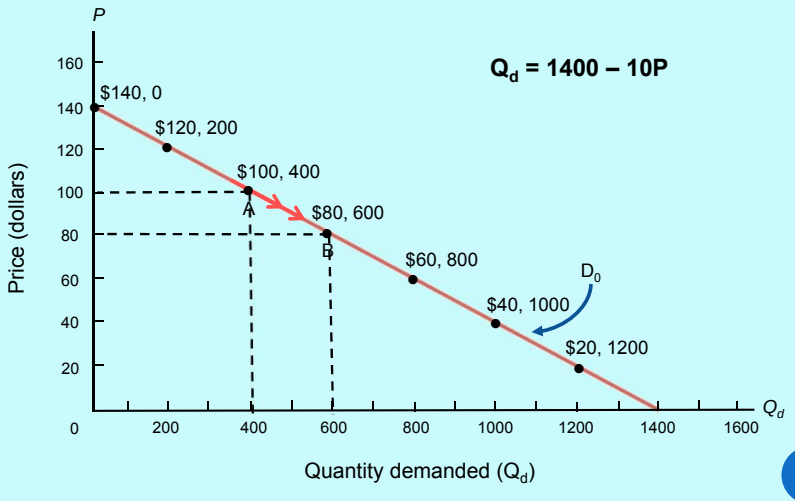
9

Movement Along Demand Curve

- **Change in quantity demanded**
  - Occurs only when **price of the good changes**
  - Movement along demand curve from one price to another price
  - As depicted in figure, the ***movement from point A to B*** due to changes in price leads to changes in quantity demanded

10

Movement Along A Demand Curve



11

Shift in Demand Curve

- **Change in demand**
  - Occurs only when one of the five variables, or ***determinants of demand (M, P_R, T, P_e and N)*** **changes**
  - **Demand curve shifts either rightward or leftward**

12

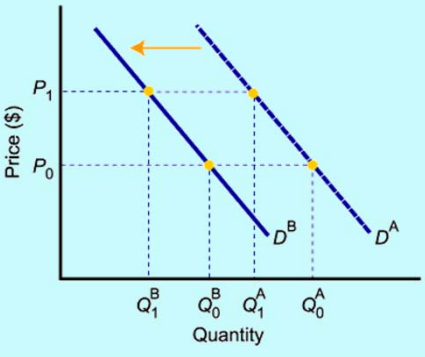
Shifts in Demand

- **Increase in demand**
  - A change in the demand function that causes an increase in quantity demanded at every price and is reflected by a rightward shift in the demand curve
- **Decrease in demand**
  - A change in the demand function that causes a decrease in quantity demanded at every price and is reflected by a leftward shift in the demand curve

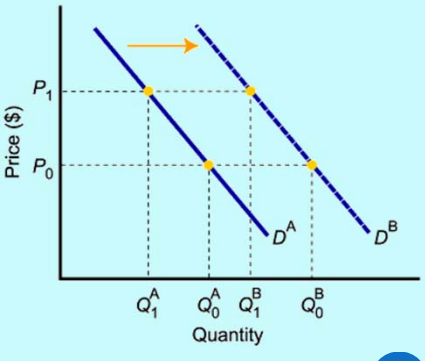
13

Impact of change in Income on Demand

- Higher income decreases the demand for an ***inferior*** good



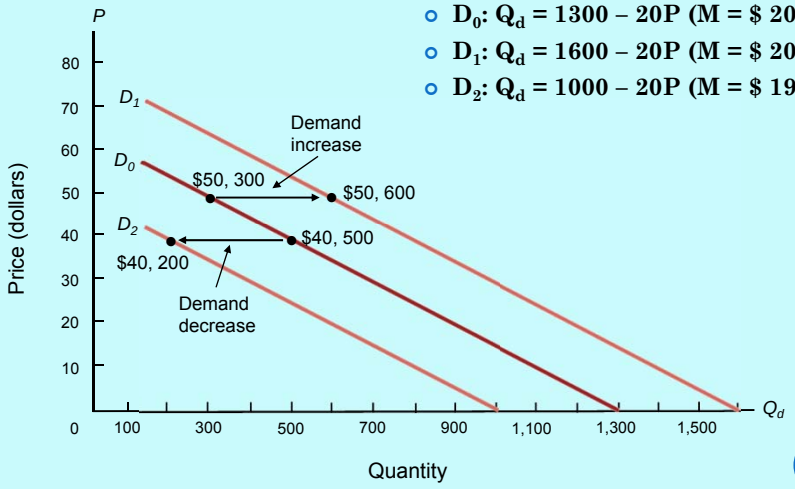
- Higher income increases the demand for a ***normal*** good



14

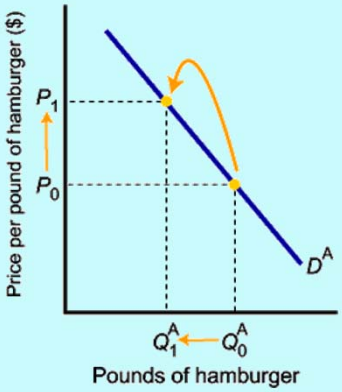
Shifts in Demand due to Income Change

- D_0: $Q_d = 1300 - 20P$ (M = \$ 20,000)
- D_1: $Q_d = 1600 - 20P$ (M = \$ 20,500)
- D_2: $Q_d = 1000 - 20P$ (M = \$ 19,500)



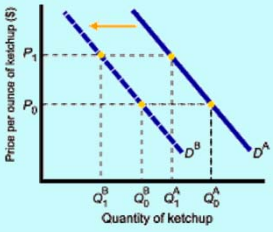
15

Impact of change in Price of Related Goods on Demand

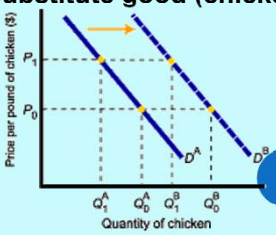


- Price of burger rises
- Quantity of burger demanded falls

- Demand for complement good (ketchup) shifts left



- Demand for substitute good (chicken) shifts right



16

Summary of Demand Shifts

Determinants of demand	Demand increases	Demand decreases	Sign of slope parameter
1. Income (M)			
Normal good	M rises	M falls	$c > 0$
Inferior good	M falls	M rises	$c < 0$
2. Price of related good (P_R)			
Substitute good	P_R rises	P_R falls	$d > 0$
Compliment good	P_R falls	P_R rises	$d < 0$
3. Consumer tastes (T)	T rises	T falls	$e > 0$
4. Expected price (P_e)	P_e rises	P_e falls	$f > 0$
5. Number of consumers (N)	N rises	N falls	$g > 0$

17

From Household to Market Demand

- Demand for a good or service can be defined for an ***individual household***, or for a group of households that make up a ***market***.
- ***Market demand*** is the sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service.

18

From Household to Market Demand

- Assuming there are only two households in the market, market demand is derived as follows:

19

Exceptions of the Law of Demand

1. Giffens Paradox: Inferior goods
2. Veblon Effect: Articles of snob appeal
3. Expectations about Future
4. Psychological bias
5. Ignorance on the part of the consumer

20

Managerial Rule of Thumb: Demand Considerations

Managers must

- **Understand what influences demand**
- **Determine which factors they can influence**
- **Determine how to handle factors they cannot influence**

21

Applicability of the Law of Demand

- Helps in understanding consumer behavior
- Useful in decision making
- Helps in making predictions about future demand i.e. in forward planning
- Helps in pricing and price discrimination
- Helps in strategizing
- Helps in policy formation regarding taxation etc
- Helps in international trade

22

Supply

- **Quantity supplied (Q_s)**
  - Amount of a good or service offered for sale during a given period of time
- **Six variables that influence Q_s**
  - Price of good or service *(P)*
  - Input prices *(P_I)*
  - Prices of goods related in production *(P_r)*
  - Technological advances *(T)*
  - Expected future price of product *(P_e)*
  - Number of firms producing product *(F)*
- **Generalized supply function**
  - $Q_s = f(P, P_I, P_r, T, P_e, F)$

23

Generalized Supply Function

$$Q_s = h + kP + lP_I + mP_r + nT + rP_e + sF$$

- *k, l, m, n, r,* & s are **slope parameters**
  - Measure effect on Q_s of changing one of the variables while holding the others constant
- Sign of parameter shows how variable is related to Q_s
  - Positive sign indicates direct relationship
  - Negative sign indicates inverse relationship

24

Generalized Supply Function

Variable	Relation to Q_s	Sign of Slope Parameter
P	Direct	$k = \Delta Q_s/\Delta P$ is positive
P_I	Inverse	$l = \Delta Q_s/\Delta P_I$ is negative
P_r	Inverse for substitutes Direct for complements	$m = \Delta Q_s/\Delta P_r$ is negative $m = \Delta Q_s/\Delta P_r$ is positive
T	Direct	$n = \Delta Q_s/\Delta T$ is positive
P_e	Inverse	$r = \Delta Q_s/\Delta P_e$ is negative
F	Direct	$s = \Delta Q_s/\Delta F$ is positive

25

Supply Function

- ***Supply function*, or supply**, shows relation between P & Q_s when all other variables are held constant
  - $Q_s = g(P)$
- **Law of Supply:** States that the quantity sold of a good or service is positively or directly related to its own price.
  - When the price increases, more of the good or service will be sold
  - When the price decreases, less of the commodity will be sold
- This means supply curve has a **positive slope**

26

Graphing Supply Curve

- A point on a supply curve shows either:
  - Maximum amount of a good that will be offered for sale at a given price
  - Minimum price necessary to induce producers to voluntarily offer a particular quantity for sale

Supply Function

- Quantity supplied *(Qs)* is expressed as a mathematical function of price *(P)*. The supply function may thus be written as:

$$Qs = c + dP$$

where

- *c* is the horizontal intercept of the equation or the quantity supplied when price is zero
- *d* is the slope of the function

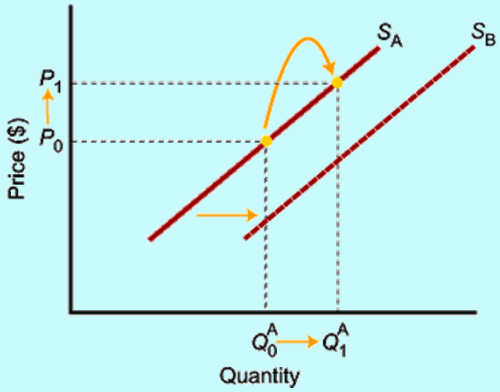
27

Movement Along Supply Curve & Change in Supply

- **Change in Quantity supplied**
  - Occurs when ***price changes***
  - Movement along supply curve
- **Change in Supply**
  - Occurs when one of the other five variables, or ***determinants of supply*, changes**
  - Supply curve ***shifts rightward or leftward***

28

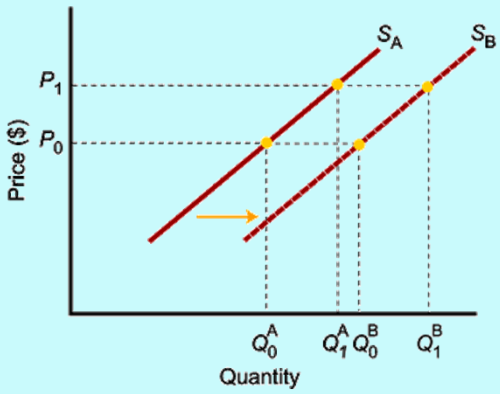
Change in Quantity Supplied



- A change in ***supply*** is not the same as a change in ***quantity supplied***.
- In this example, a higher price causes ***higher quantity supplied***, and a ***move along*** the demand curve.
- In this example, changes in determinants of supply, other than price, cause an ***increase in supply***, or a ***shift*** of the entire supply curve, from S_A to S_B.

29

Change in Supply



- When ***supply shifts*** to the right, supply increases. This causes ***quantity supplied*** to be greater than it was prior to the shift, ***for each and every price level.***

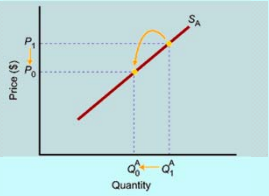
30

Movement Along Supply Curve vs. Change in Supply

To summarize:

Change in price of a good or service leads to

Change in ***quantity supplied*** (**Movement along the curve**).

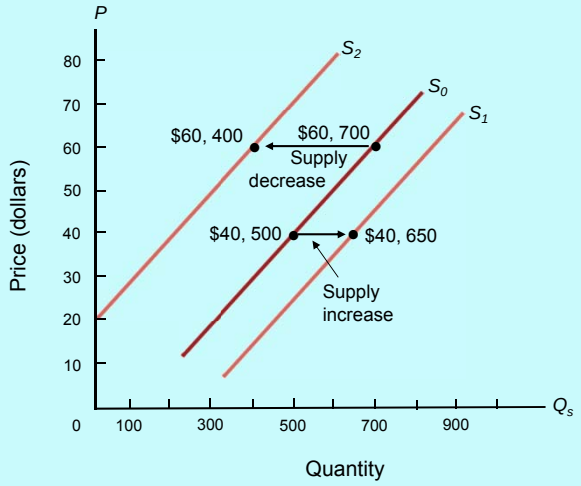


Change in costs, input prices, technology, or prices of related goods and services leads to

Change in ***supply*** (**Shift of curve**).

31

Shift in Supply



32

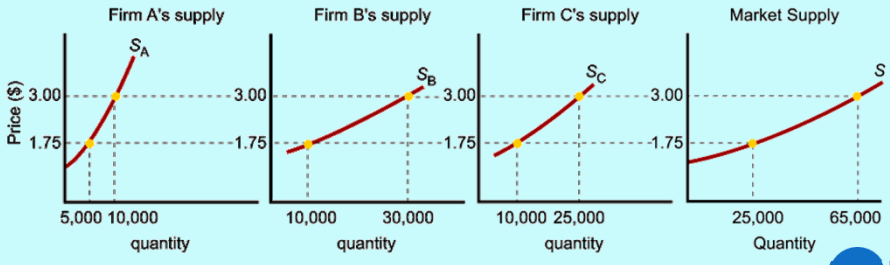
From Individual to Market Supply

- The supply of a good or service can be defined for an ***individual firm***, or for a group of firms that make up a market or an industry.
- ***Market supply*** is the sum of all the quantities of a good or service supplied per period by all the firms selling in the market for that good or service.

33

Market Supply

- As with market demand, ***market supply*** is the horizontal summation of individual firms' supply curves.



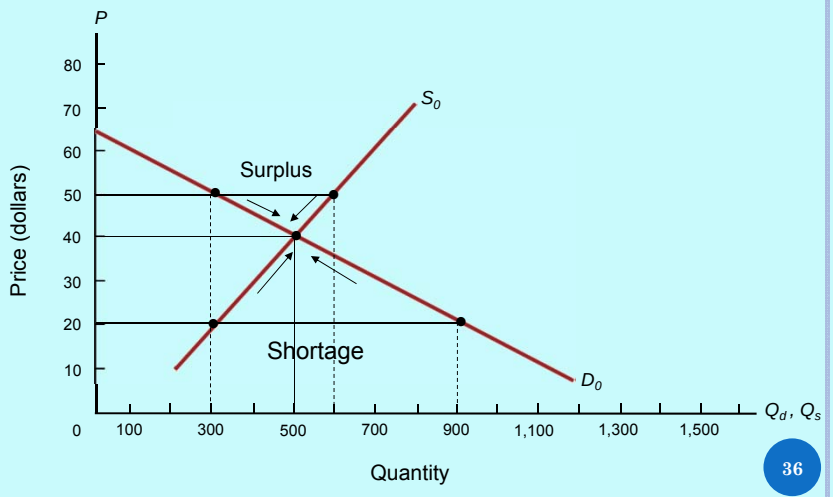
34

Market Equilibrium

- Equilibrium price and quantity are determined by the intersection of demand and supply curves
  - At the point of intersection, $Q_d = Q_s$
  - Consumers can purchase all they want and producers can sell all they want at the **"market-clearing"** price

35

Market Equilibrium



36

Market Equilibrium

TABLE 3.3. Market for Denim Pants

Price of Denim Pants (in pesos)	Quantity Demanded per month (No. of pairs)	Quantity Supplied per month (No. of pairs)
0	8	0
50	7	1
100	6	2
150	5	3
200	**4**	**4**
250	3	5
300	2	6
350	1	7
400	0	8

Equilibrium Price=200

Equilibrium Quantity=4

37

Market Equilibrium

- At prices ***above*** the equilibrium price, quantity supplied is greater than quantity demanded, resulting in a temporary **surplus**.
  - In a surplus situation, producers will try to reduce price to entice consumers to buy more denim pants. Actions by both producers and the public will wipe out the temporary surplus
- At prices ***below*** the equilibrium price, consumers desire to buy more denim pants than are available, creating a temporary **shortage**.
  - Consumers will try to outbid each other, thus pushing up the price. As price rises, firms increase their production while some consumers reduce their purchases.

38

Market Equilibrium

- Algebraic solution: equate the demand and supply equations (Qd=Qs).

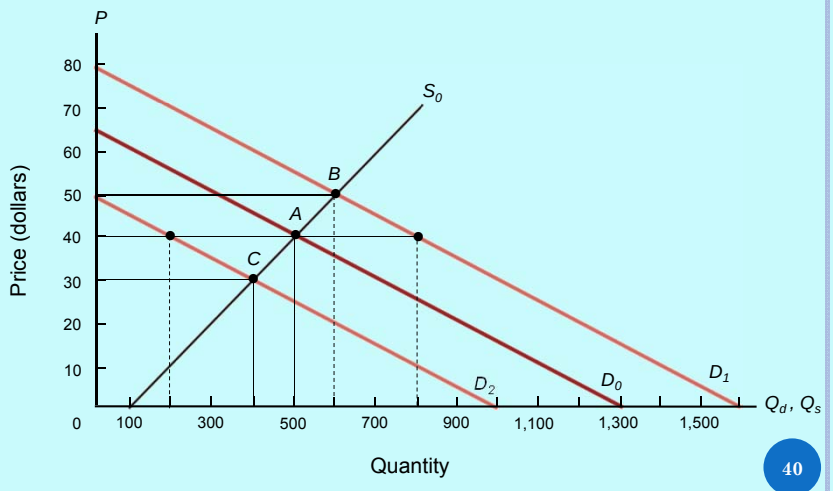
$$Qd = 8 - 0.02P$$

$$Qs = 0 + 0.02\,P$$

  - *Step by step solution:*
    - *8 - 0.02P = 0 + 0.02 P*
    - *0.04P = 8*
    - *P* = 8/0.04 = 200*
    - *Qd = 8 – 0.02(200) = 8 – 4 = 4*
- P^* =200 per unit, Q^* = 4 per month

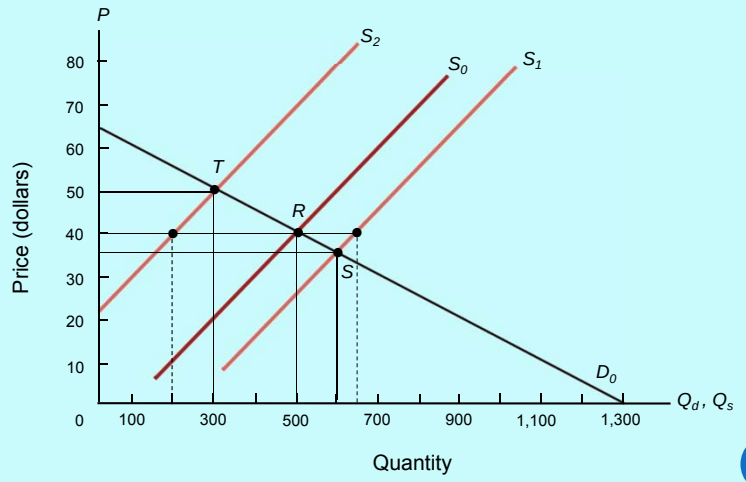
39

Demand Shifts Supply Constant



40

Supply Shifts Demand Constant



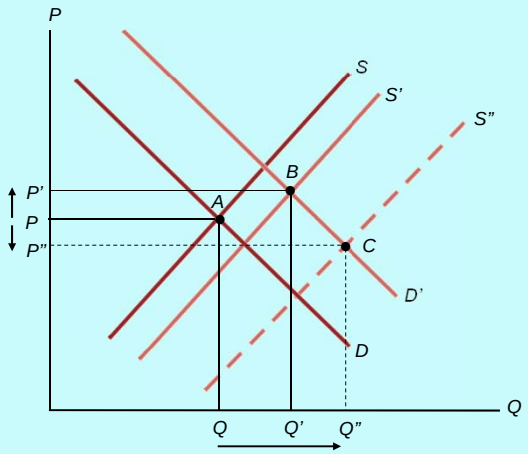
41

Simultaneous Shifts

- **When demand and supply shift simultaneously**
  - Can predict either the direction in which price changes or the direction in which quantity changes, but not both
  - The change in equilibrium price or quantity is said to be indeterminate when the direction of change depends on the relative magnitudes by which demand & supply shift

42

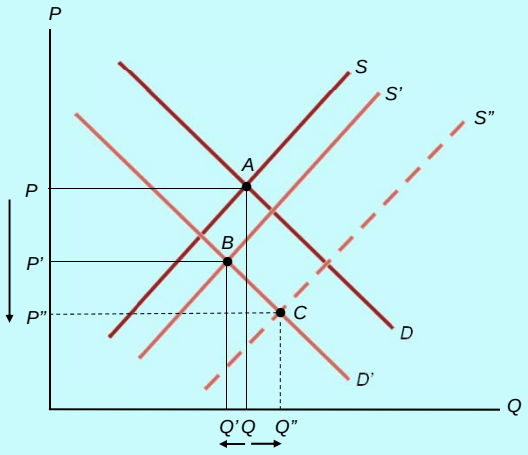
Simultaneous Shifts: (↑D,↑S)



Price may rise or fall; Quantity rises

43

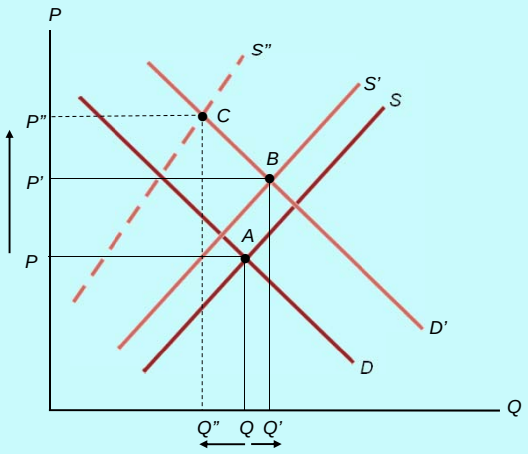
Simultaneous Shifts: (↓D,↑S)



Price falls; Quantity may rise or fall

44

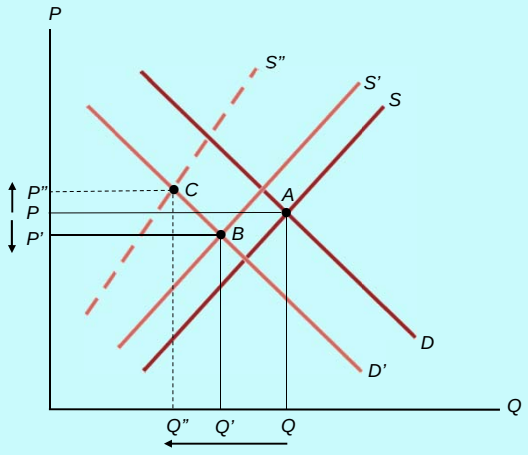
Simultaneous Shifts: (↑D,↓S)



45

Price rises; Quantity may rise or fall

Simultaneous Shifts: (↓D,↓S)



46

Price may rise or fall; Quantity falls

Summary of Shifts in Demand and Supply

	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

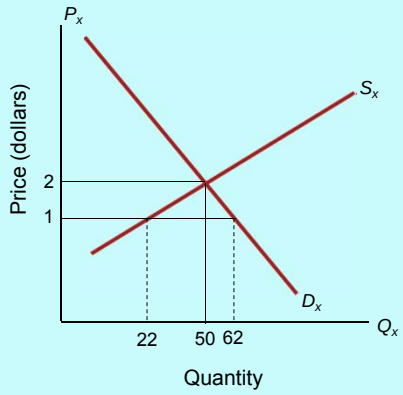
47

Ceiling Price and Floor Price

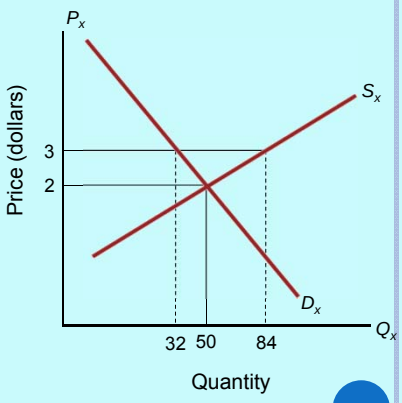
- **Ceiling price**
  - ***Maximum*** price government permits sellers to charge for a good
  - When ceiling price is below equilibrium, a ***shortage*** occurs
- **Floor price**
  - ***Minimum*** price government permits sellers to charge for a good
  - When floor price is above equilibrium, a ***surplus*** occurs

48

Ceiling Price and Floor Price



Panel A – Ceiling price



Panel B – Floor price

49

ANY QUESTIONS…?

50