

“Supply, Demand and Markets - Review”

Reynolds

I. A “**Market**” is defined as the interactions of all potential buyers and sellers of a good (or service).

A. Markets are confined to a specific period of time.

On each graph the UT stands for unit of time (hour, day, week, month, year, season, etc.)

B. Geographic features, the costs of transportation and location of resources and buyers define markets.

A market for premixed concrete is defined by the costs of transporting the good. Generally, you do not haul premixed concrete more than about 50 miles.

C. Markets may be defined by the degree of substitutability among goods. Cross elasticity of demand can be used to define the boundaries of a market.

D. The characteristics of the buyers may determine the degree of substitutability of goods and there by define a market. Are K-Mart and Nordstroms in the same market? K-Mart and Walmart?

II. Demand

A. “**law of demand**” suggests that buyers will tend to purchase more at lower prices, i.e. the demand function tends to be negatively sloped.

B. Definitions of demand

1. $Q = f(P)$ defines demand as a schedule of quantities that buyers are willing and able to buy at a schedule of prices in a given time interval, *ceteris paribus*.

2. $P = f(Q)$ defines demand as the maximum prices that buyers are willing and able to pay for each unit of a good, *ceteris paribus*. This is the same concept as the reservation prices of the buyer (RPB).

3. Demand is a set of equilibrium prices and quantities given the incomes, prices of other goods, preferences and other conditions of the buyers.

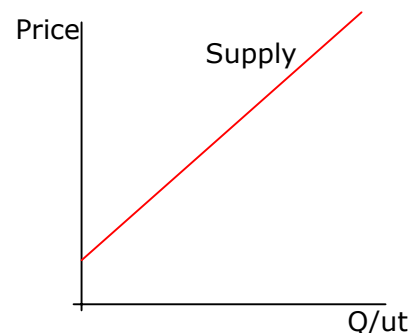
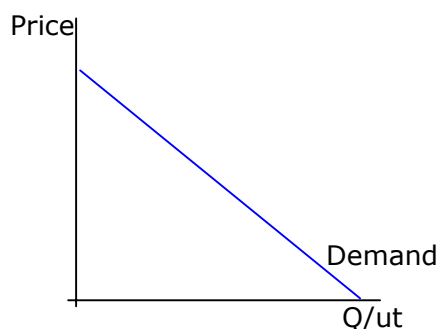
III. Supply

A. The “**law of supply**” suggests that there is a tendency for the costs of additional units of a good to rise (eventually). Therefore the supply function will tend to be “upward” sloping or a positive slope.

B. Definitions of supply

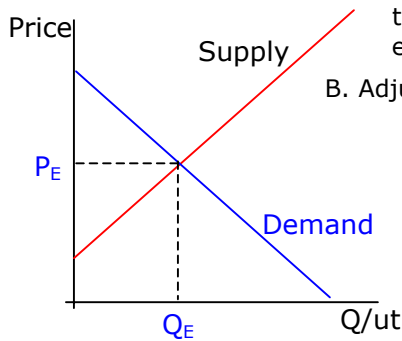
1. Supply can be thought of as a schedule of quantities that sellers will produce and offer for sale during a given interval of time, *ceteris paribus*. $Q = f(P)$

2. Alternatively, supply is the minimum prices the sellers are willing to accept for each unit of a good, i.e. it is the reservation price of the seller (RPS)



IV. Equilibrium

A. Equilibrium is the price quantity combination where the buyers can purchase all they want at that price and sellers can sell all they want. It is price quantity combination where the supply and demand curves intersect, i.e. the quantity demanded equals the quantity supplied (this is **not** "supply equals demand").



- B. Adjustment mechanism can be described in a simplistic, static model
1. If the market price is "too" high, the quantity supplied exceeds the quantity demanded and a **surplus** exists. The surplus is an addition to inventory. In order to sell the surplus, sellers will offer goods at lower price. Lower price results in a decrease in quantity supplied and an increase in quantity demanded.
 2. If the price is "too" low the quantity demanded exceeds the quantity supplied. Result is a "shortage," buyers cannot buy all they want at that price. Buyers will bid up the price. As the price rises the quantity demanded falls and the quantity supplied increases.
 3. When price is in equilibrium, the buyers can buy all they want at the equilibrium price and the sellers can sell all they want. This model assumes that both price and quantity are adjusted at with in the time interval.

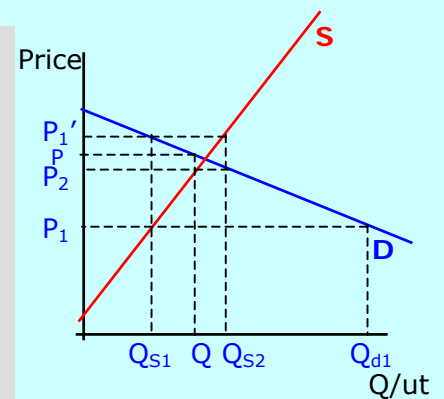
C. A Cobweb model assumes that prices can be adjusted within a time period while quantity produced is adjusted from one time period to another.

In the model to the right, the price begins at P_1 . At P_1 the quantity offered for sale is Q_{S1} and the quantity demanded is Q_{D1} , there is a shortage. If Q_{S1} amount exists the price will increase to P_1' in the first period. During the second period, suppliers will want to offer Q_{S2} for sale at the higher price of P_1' .

However, there is a surplus since the buyers will buy only Q_{S1} amount at the price of P_1' . In order to sell the quantity Q_{S2} in the second time period the price must fall to P_2 .

At a price of P_2 the quantity the sellers will produce and offer for sale in the third time period is Q . At the price P_2 buyers want Q_{S2} so there is a shortage. In the third period the price will increase to P .

Notice that in subsequent time periods the price and quantities will move toward equilibrium.



Try constructing a model where the demand is relatively more inelastic and supply is relatively more elastic. Trace the price quantity adjustments. Does the price move toward an equilibrium price?

D. Welfare properties of equilibrium

1. **Pareto efficiency** – The condition where all alternatives that will improve the welfare of at least one person without making someone else worse off have been exhausted.
2. "If price and quantity take anything other than their equilibrium values, however it will always be possible to reallocate so as to make at least some people better off without harming others." (Frank, pp 37)
3. At the equilibrium price the buyers are purchasing goods so long as their valuation of the good (or marginal benefits given their incomes and preferences or their willingness to pay) is greater than the price of the good, therefore they are "better off."

The equilibrium price of the last unit sold is exactly equal to the value the buyers put on that last unit.

- a) When the $MB > P$, Buy it!
- b) When the $MB < P$, Don't buy it!
- c) When the $MB = P$ you have captured all the net benefit (later to be called "consumer surplus") you can

- 4. The equilibrium price the sellers can obtain is greater than or equal to the costs of producing the last unit.
 - a) When the revenue obtained from an additional unit is greater than the costs of producing that unit, do it! If the $MR > MC$, do it!
 - b) If the last unit produced costs you more than the additional revenue you can get for it, don't produce it. If $MC > MR$ don't produce it!
- 5. The ideal of the market is where the price reflects the values of the buyers and sellers, $MB = P = MC$ insures Pareto efficiency.
- 6. The "efficiency" of the market is a function of the income distribution. Frank says, "Efficiency says merely that, given the low incomes of the poor, free exchange enables them to do the best that they can." (Frank, p 39)

- a) "Fairness" or equity of income distribution then determines the fairness of the market allocation.
- b) Consequentialist ethic – John Bates Clark provides the justification with the "Marginal Productivity theory of Income distribution."
- c) How to correct for perceived misallocation
 - (1) Alter income distribution
 - (2) Price controls and market regulation
 - (a) Perceived misallocation away from individuals with "highest value."
 - (b) Surplus and shortage
 - (c) Incentives and information

7. Problems

- a) Property rights issues
 - (1) Externalities
 - (2) Public or collective goods
 - (3) Common property resources

8. Rationing and Allocative functions of Prices

- a) Prices ration goods to the person who place the "highest" value on the goods and are willing to pay the highest price for the good. (Question: What role does income distribution play? If there is one liver or heart available for transplanted and two people need it, who should get it? One is an 85-year-old billionaire, the other a 14-year-old student.
- b) Prices act as **information** and an allocative mechanism to insure that resources and goods are used for their highest valued use.

E. Determinants of Demand

1. Incomes

- a) Normal goods ($1 > E_M > 0$)
- b) Superior goods ($E_M > 1$)
- c) Inferior goods ($E_M < 0$)

2. Preferences or tastes

- a) age, gender, religion etc as proxies
- b) Utility functions

3. Prices of related goods
 - a) Complements ($E_{XY} < 0$)
 - b) Substitutes ($E_{XY} > 0$)
4. Expectations
5. Population or number of buyers

F. Determinants of Supply

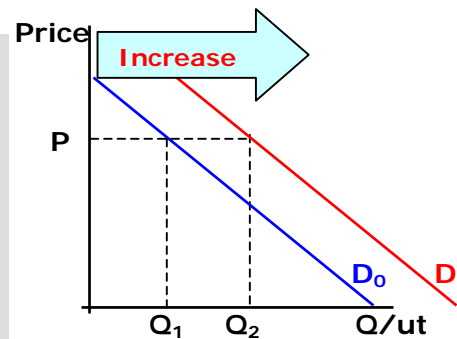
1. Technology
2. Prices of inputs or factor prices
3. Number of sellers
4. Expectations
5. Other inputs (weather, etc)
6. Laws, regulations

G. Changes in demand and changes in quantity demanded

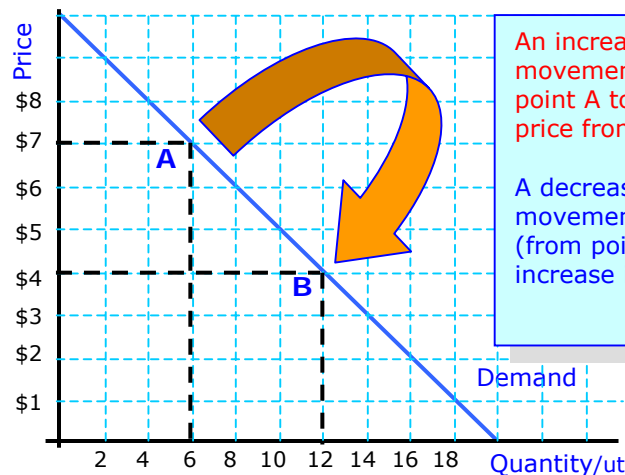
1. **"A change in demand"** is a shift in the demand schedule, i.e. the amount of a good that buyers are willing and able to buy at each price changes.
 - a) An increase in demand is a shift to the right. Buyers will purchase more at each price. Make a list of things that will increase demand. Use income and cross elasticity to measure shifts of the demand curve.
 - b) A decrease in demand is when buyers will purchase a smaller amount of a good at each price. The demand shifts to the left. Make a list of things that will decrease demand.

An **"increase in demand"** is a shift to the right, from D_0 to D_i . At each price (in this case, P) a larger amount will be bought. The amount bought increases from Q_1 to Q_2 at the price P.

- Increase income for a normal or superior good
- Decrease income for an inferior good
- Increase in the prices of substitutes
- Decrease in prices of complements
- Increase in number of buyers
- Change in preferences, etc.



2. **"A change in quantity demanded"** is a movement along a demand function due to a change in the price of the good. Use price elasticity of demand to measure the responsiveness of buyers to changes in price. A higher price will result in a smaller quantity demanded while a lower price will increase the "quantity demanded."



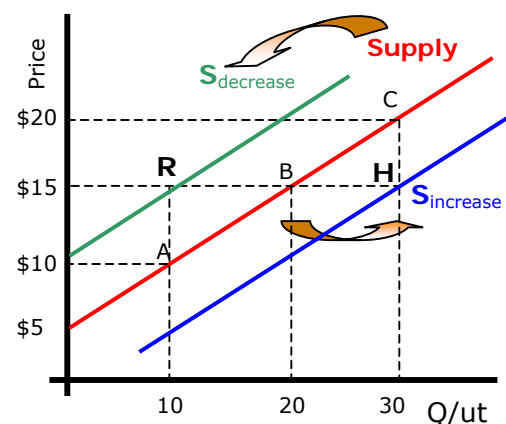
An increase in **quantity demanded** is a movement along a demand curve (from point A to B) caused by a decrease in the price from \$7 to \$4.

A decrease in **quantity demanded** is a movement along the demand function (from point B to A) caused by an increase in price from \$4 to \$7.

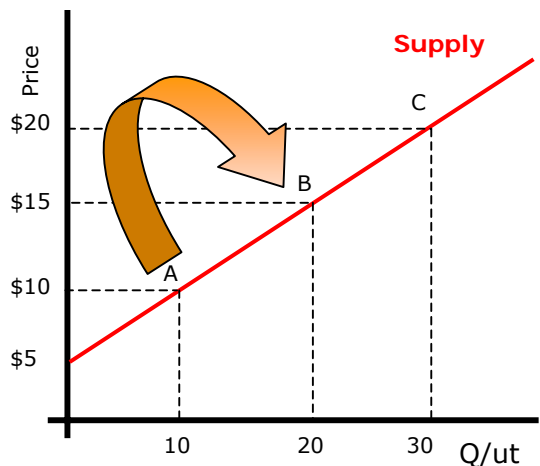
H. Changes in supply and changes in quantity supplied

1. **"A change in supply"** is a shift of the supply function, i.e. the amount that the sellers are willing to produce and offer for sale at each price changes.
 - a) An increase in supply is when the amount produced and offered for sale at each price increases, the supply function shifts to the right or "out." Make a list of things that will cause the supply function to shift.
 - b) A decrease in supply is when the amount produced and offered for sale at each price decreases, i.e. the supply function shifts to the left. Less is offered for sale at each price or the minimum price the seller will accept increases.

A **change in supply** is a "shift" of the supply function. A decrease in supply is shown as a shift from **Supply** to S_{decrease} in the graph. At a price of \$15 a smaller amount is offered for sale. This decrease in supply might be "caused" by an increase in input prices, taxes, regulations or, . . . An increase in supply can be visualized as a movement of the supply function from **Supply** to S_{increase} .



2. **"A change in quantity supplied"** refers to the change in quantity as a change in the price of a good moves the sellers along the supply function.



A **change in quantity supplied** is a movement along a supply function that is "caused" by a change in the price of the good. In the graph to the right, as price increases from \$10 to \$15 the quantity supplied increases from 10 to 20. This can be visualized as a move from point A to point B along the supply function. A decrease in supply would be a move from point B to point A as price fell from \$15 to \$10

I. Algebra of Supply and demand

1. Demand is typically negatively sloped so linear demand functions take the form;

$$Q = a + bP$$

Where:

Q = quantity

P = price

a = the quantity intercept

$$b < 0 \text{ and is } \frac{\Delta Q}{\Delta P}, \text{ or } \frac{dQ}{dP}$$

In this form the demand can be described as "a schedule of quantities that will be bought at a schedule of prices in a given period of time, *ceteris paribus*."

2. The demand can also be stated where $P = f(Q)$ in this form demand can be perceived as the set of maximum prices that buyers are willing to pay for each unit of a good in a given period of time, *ceteris paribus*.

$$P = \frac{-a}{b} + \frac{1}{b} Q$$

Where:

Q = quantity

P = price

a = the quantity intercept

$$b < 0, \text{ and is } \frac{\Delta Q}{\Delta P}, \text{ or } \frac{dQ}{dP}$$

$$\frac{1}{b} = \frac{\Delta P}{\Delta Q} \text{ or } \frac{dP}{dQ}$$

3. Note that demand is stated as $Q=f(P)$ in many cases but you are looking at a graph where P is on the vertical axis and Q on the horizontal axis. When this is the case the slope of demand in the equation is $\frac{\Delta Q}{\Delta P}$ but you are looking at a graph where $\frac{\Delta P}{\Delta Q}$.
4. Supply may be defined as a schedule of quantities that will be produced and offered for sale at a schedule of prices) during an interval of time, *ceteris paribus* ($Q=f(P)$). Alternatively, it may be defined as the minimum prices that sellers will accept for each unit of a good in a given interval of time, *ceteris paribus* ($P=f(Q)$).
5. "Equilibrium" is defined as the price and quantity combination where the quantity supplied is equal to the quantity demanded or an intersection of the supply and demand functions.

J. Problems

1. Given the demand function $Q = 100 - 4P$ and the supply function $P = 5 + 2Q$, graph the two equations and find the equilibrium price and quantity.
2. Using the supply and demand equations in problem 1, if there were a tax of \$5 per unit of output placed on the suppliers what would be the new equilibrium price and quantity.
3. From problem 2 estimate the tax burden on the buyers, i.e. how much of the tax can be shifted by the sellers?

K. Solutions – there are several ways to solve the problem of equilibrium. One way is as described in the text, set the demand equal to the supply and solve for quantity or price then substitute the price or quantity back into one or both of the original supply or demand equations and solve for the other value. In the problem the demand is stated $Q=f(P)$ and the supply is in the form $P=f(Q)$ so the first task is to put them in the same form. Since supply and demand graphs typically have price on the vertical axis (usually thought of as the dependent variable) you might as well do it that way even though the other would work.

a) Step 1:

Demand

$$Q = 100 - 4P$$

$$-4P = -100 + Q$$

$$P = \frac{(-100)}{(-4)} + \frac{1}{(-4)} Q$$

$$P = 25 - .25Q$$

b) Step 2:

Demand = Supply

$$P = 25 - .25Q = 5 + 2Q$$

$$20 = 2.25Q$$

$$Q = \frac{200}{2.25} = 8.89 \text{ units}$$

c) Step 3: (by substitution of $Q = 8.89$ units)

$$P = 25 - .25Q = 25 - .25(8.89) = \$22.78$$

or

$$P = 5 + 2Q = 5 + 2(8.89) = \$22.78$$

d) Or substitute one equation into the other and solve:

$$P = 5 + 2Q$$

$$Q = 100 - 4P$$

Substitute $(100 - 4P)$ for Q in the supply function

$$P = 5 + 2(100 - 4P)$$

$$P = 5 + 200 - 8P$$

$$P = 205 - 8P$$

$$9P = 205$$

$$P = \frac{205}{9} = \$22.778$$

Then solve for Q by substitution.