Chapter 2

The Basics of Supply and Demand

Topics to Be Discussed

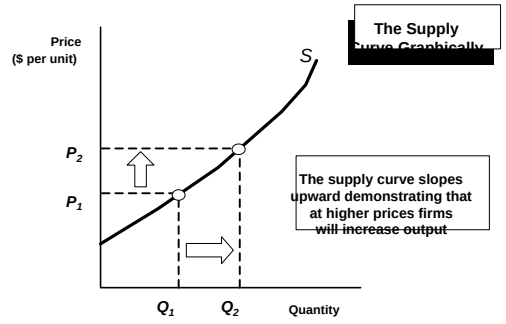
- Supply and Demand
- The Market Mechanism
- Changes in Market Equilibrium
- Elasticities of Supply and Demand
- Short-Run Versus Long-Run Elasticities
- Effects of Government Intervention--Price Controls

Supply and Demand

- The Supply Curve
  - This price-quantity relationship can be shown by the equation:

$$Q_s = Q_s(P)$$

Supply and Demand



Supply and Demand

- Non-price Determining Variables of Supply
  - Costs of Production
    - Labor
    - Capital
    - Raw Materials

Supply and Demand

- Supply - A Review
  - *Changes in quantity supplied* are shown by movements along the supply curve and are caused by a change in the price of the product.
  - Changes in supply are shown by shifting the entire supply curve.

Supply and Demand

- The Demand Curve
  - The demand curve shows how much of a good consumers are willing to buy as the price per unit changes holding non-price factors constant.
  - This price-quantity relationship can be shown by the equation:

$$Q_D = Q_D(P)$$

Supply and Demand

- Non-price Determining Variables of Demand
  - Income
  - Consumer Tastes
  - Price of Related Goods
    - Substitutes
    - Complements

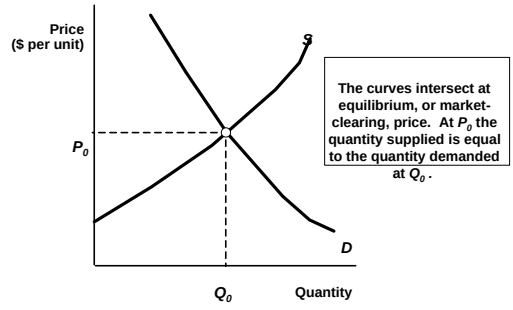
Shifts in Supply and Demand

- Demand - A Review
  - Demand is determined by non-price demand-determining variables, such as, income, price of related goods, and tastes.
  - Changes in demand are shown by shifting the entire demand curve.
  - *Changes in quantity demanded* are shown by movements along the demand curve.

Related Goods

- Substitutes: If price of A increases, the quantity demanded of B increases. Milk and soybean milk
- Complements: If price of A increases, the quantity demanded of B decreases. Cars and gas.

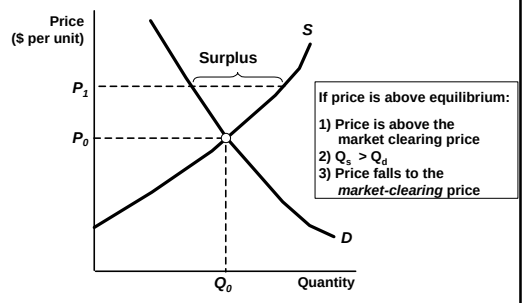
The Market Mechanism



The Market Mechanism

- Characteristics of the equilibrium or market clearing price:
  - $Q_D = Q_S$
  - No shortage
  - No excess supply
  - No pressure on the price to change

The Market Mechanism

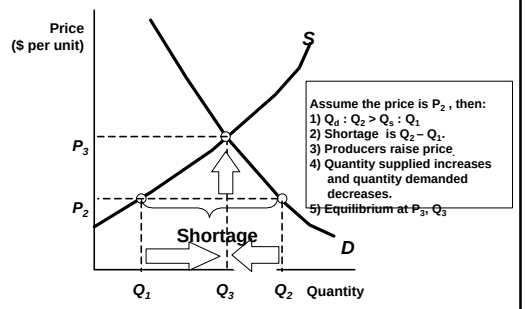


The Market Mechanism

A Surplus

- The market price is above equilibrium
  - There is excess supply
  - Producers lower prices
  - Quantity demanded increases and quantity supplied decreases
  - The market continues to adjust until the equilibrium price is reached.

The Market Mechanism



The Market Mechanism

Shortage

- The market price is below equilibrium:
  - There is a shortage
  - Producers raise prices
  - Quantity demanded decreases and quantity supplied increases
  - The market continues to adjust until the new equilibrium price is reached.

The Market Mechanism

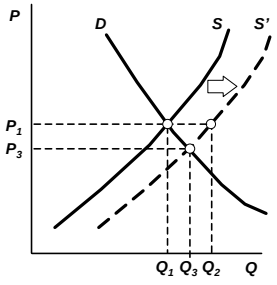
- Market Mechanism Summary
  1) Supply and demand interact to determine the market-clearing price.
  2) When not in equilibrium, the market will adjust to alleviate a shortage or surplus and return the market to equilibrium.
  3) Markets must be competitive for the mechanism to be efficient.

Changes In Market Equilibrium

- Equilibrium prices are determined by the relative level of supply and demand.
- Supply and demand are determined by particular values of supply and demand determining variables.
- Changes in any one or combination of these variables can cause a change in the equilibrium price and/or quantity.

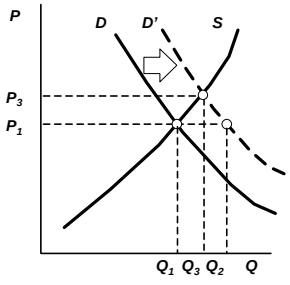
Changes In Market Equilibrium

- Raw material prices fall
  - *S* shifts to *S'*
  - Surplus @ P_1 of $Q_2 - Q_1$.
  - Equilibrium @ P_3, Q_3



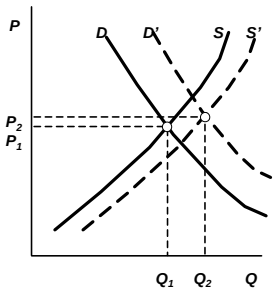
Changes In Market Equilibrium

- Income Increases
  - Demand shifts to *D'*
  - Shortage @ P_1 of $Q_2 - Q_1$
  - Equilibrium @ P_3, Q_3



Changes In Market Equilibrium

- Income Increases & raw material prices fall
  - The increase in *D* is greater than the increase in *S*
  - Equilibrium price and quantity increase to P_2, Q_2



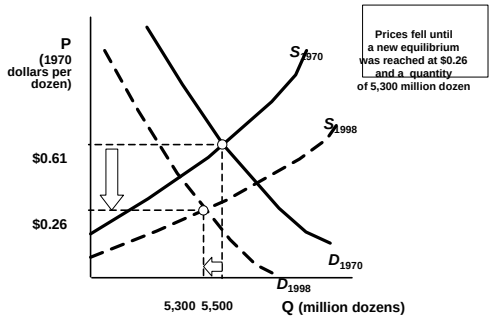
Shifts in Supply and Demand

- When supply and demand change simultaneously, the impact on the equilibrium price and quantity is determined by:
  1) The relative size and direction of the change
  2) The shape of the supply and demand models

The Price of Eggs

- The real price of eggs fell 59% from 1970 to 1998.
- Supply increased due to the increased mechanization of poultry farming and the reduced cost of production.
- Demand decreased due to the increasing consumer concern over the health and cholesterol consequences of eating eggs.

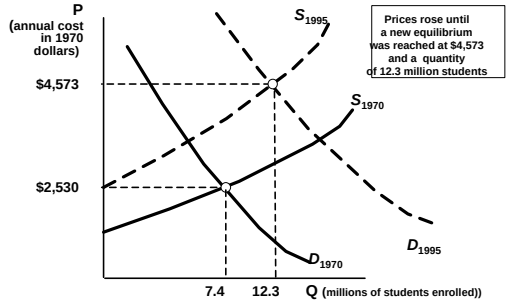
Market for Eggs



The Price of a College Education

- The real price of a college education rose 68 percent from 1970 to 1995.
- Supply decreased due to higher costs of equipping and maintaining modern classrooms, laboratories and libraries, and higher faculty salaries.
- Demand increased due to a larger percentage of a growing number of high school graduates attending college.

Market for a College Education



Elasticities of Supply and Demand

- Generally, elasticity is a measure of the sensitivity of one variable to another.
- It tells us the percentage change in one variable in response to a one percent change in another variable.

Elasticities of Supply and Demand

Price Elasticity of Demand

- Measures the sensitivity of quantity demanded to price changes.
  - It measures the percentage change in the quantity demanded for a good or service that results from a one percent change in the price.

Elasticities of Supply and Demand

- The price elasticity of demand is:

$$E_P = (\%\Delta Q)/(\%\Delta P)$$

Elasticities of Supply and Demand

- The percentage change in a variable is the absolute change in the variable divided by the original level of the variable.

Elasticities of Supply and Demand

Price Elasticity of Demand

- So the price elasticity of demand is also:

$$E_P = \frac{\Delta Q/Q}{\Delta P/P} = \frac{P}{Q}\frac{\Delta Q}{\Delta P}$$

Elasticities of Supply and Demand

- Interpreting Price Elasticity of Demand Values
  1) Because of the inverse relationship between P and Q; E_P is negative.
  2) If $|E_P| > 1$, the percent change in quantity is greater than the percent change in price. We say the *demand is price elastic*.

Elasticities of Supply and Demand

- Interpreting Price Elasticity of Demand Values
  3) If $|E_P| < 1$, the percent change in quantity is less than the percent change in price. We say the *demand is price inelastic*.

Elasticities of Supply and Demand

Price Elasticity of Demand

- The primary determinant of price elasticity of demand is the *availability of substitutes.*
  - Many substitutes: demand is price elastic
  - Few substitutes: demand is price inelastic

Elasticities of Supply and Demand

- Income elasticity of demand measures the percentage change in quantity demanded resulting from a one percent change in income.

Elasticities of Supply and Demand

- The income elasticity of demand is:

$$E_I = \frac{\Delta Q/Q}{\Delta I/I} = \frac{I}{Q}\frac{\Delta Q}{\Delta I}$$

Elasticities of Supply and Demand

Other Demand Elasticities

- Cross price elasticity of demand measures the percentage change in the quantity demanded of one good that results from a one percent change in the price of another good.
- For example consider the substitute goods, banana and mango.

Elasticities of Supply and Demand

- The cross price elasticity of demand is:

$$E_{Q_b P_m} = \frac{\Delta Q_b / Q_b}{\Delta P_m / P_m} = \frac{P_m}{Q_b}\frac{\Delta Q_b}{\Delta P_m}$$

- The cross price elasticity for substitutes is positive, while that for complements is negative.

Elasticities of Supply and Demand

Elasticities of Supply

- Price elasticity of supply measures the percentage change in quantity supplied resulting from a one percent change in price.
- The elasticity is usually positive because price and quantity supplied are positively related.
  - Higher price gives producers an incentive to increase output

Elasticities of Supply and Demand

Elasticities of Supply

- We can refer to elasticity of supply with respect to interest rates, wage rates, and the cost of raw materials.

Elasticities of Supply and Demand

- 1981 Supply Curve for Wheat
  - Q_S = 1,800 + 240P
- 1981 Demand Curve for Wheat
  - Q_D = *3,550* - 266P
- What is the equilibrium price? quantity?
- What is the (price) elasticity of demand? Elasticity of supply?

Elasticities of Supply and Demand

- Equilibrium: $Q_S = Q_D$

$$1{,}800 + 240P = 3{,}550 - 266P$$

$$506P = 1{,}750$$

$$P = 3.46 / bushel$$

$$Q = 1{,}800 + (240)(3.46) = 2{,}630 \text{ million bushels}$$

Elasticities of Supply and Demand

The Market for Wheat

$$E_P^D = \frac{P}{Q}\frac{\Delta Q_D}{\Delta P} = \frac{3.46}{2{,}630}(-266) = -0.35 \text{ Inelastic}$$

$$E_P^S = \frac{P}{Q}\frac{\Delta Q_S}{\Delta P} = \frac{3.46}{2{,}630}(240) = 0.32 \text{ Inelastic}$$

Short-Run Versus Long-Run Elasticities

Demand

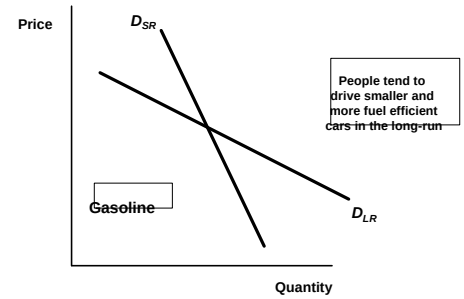
- Price elasticity of demand varies with the amount of time consumers have to respond to a price.

Short-Run Versus Long-Run Elasticities

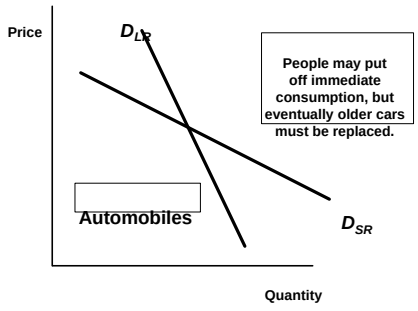
Demand

- Most goods and services:
  - Short-run elasticity is less than long-run elasticity. (e.g. gasoline, healthcare.)
- Other Goods (durables):
  - Short-run elasticity is greater than long-run elasticity (e.g. automobiles)

Gasoline: Short-Run and Long-Run Demand Curves



Automobiles: Short-Run and Long-Run Demand Curves



Short-Run Versus Long-Run Elasticities

Income Elasticity

- Income elasticity also varies with the amount of time consumers have to respond to an income change.

Short-Run Versus Long-Run Elasticities

Income Elasticities

- Most goods and services:
  - Income elasticity is greater in the long-run than in the short run.
    - Higher incomes may be converted into bigger cars so the income elasticity of demand for gasoline increases with time.

Short-Run Versus Long-Run Elasticities

Income Elasticities

- Other Goods (durables):
  - Income elasticity is less in the long-run than in the short-run.
    - Originally, consumers will want to hold more cars.
    - Later, purchases will only to be to replace old cars.

Short-Run Versus Long-Run Elasticities

The Demand for Gasoline and Automobiles

- Gasoline and automobiles are complementary goods.

Short-Run Versus Long-Run Elasticities

The Demand for Gasoline and Automobiles

- Gasoline
  - The long-run price and income elasticities are larger than the short-run elasticities.
- Automobiles
  - The long-run price and income elasticities are smaller than the short-run elasticities.

Short-Run Versus Long-Run Elasticities

	Years Following Price or Income Change					
Elasticity	**1**	**2**	**3**	**4**	**5**	**6**
Price	**-0.11**	**-0.22**	**-0.32**	**-0.49**	**-0.82**	**-1.17**
Income	**0.07**	**0.13**	**0.20**	**0.32**	**0.54**	**0.78**

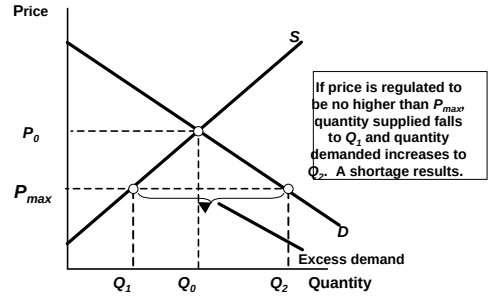
Short-Run Versus Long-Run Elasticities

	Years Following Price or Income Change					
Elasticity	**1**	**2**	**3**	**4**	**5**	**6**
Price	**-1.20**	**-0.93**	**-0.75**	**-0.55**	**-0.42**	**-0.40**
Income	**3.00**	**2.33**	**1.88**	**1.38**	**1.02**	**1.00**

Effects of Government Intervention -- Price Controls

- Price ceiling: If the government decides that the equilibrium price is too high, they may establish a maximum allowable *ceiling price.*
- Price floor.
- Effective or not?

Effects of Price Controls



Price Controls and Natural Gas Shortages

- In 1954, the federal government began regulating the wellhead price of natural gas.
- In 1962, the ceiling prices that were imposed became binding and shortages resulted.

Price Controls and Natural Gas Shortages

- Price controls created an excess demand of 7 trillion cubic feet.
- Price regulation was a major component of U.S. energy policy in the 1960s and 1970s, and it continued to influence the natural gas markets in the 1980s. But the price controls were largely removed during the 80s under the Natural Gas Policy Act of 1978.

Price Controls and Natural Gas Shortages

Supply: $Q_S=14+2P_G+0.25P_O$
Demand: $Q_D= - 5P_G+3.75P_O$

We know price of oil $P_O=8$.

Equilibrium price and quantity of gas?

Price elasticity of supply? Cross-price elasticity of supply?

Price elasticity of demand? Cross-price elasticity of demand?

Summary

- Supply-demand analysis is a basic tool of microeconomics.
- The market mechanism is the tendency for supply and demand to equilibrate, so that there is neither excess demand nor excess supply

Summary

- Elasticities describe the responsiveness of supply and demand to changes in price, income, and other variables.
- LR vs. SR Elasticities.
- Simple numerical analysis can often be done by fitting linear supply and demand curves to data on price and quantity and to estimates of elasticities.