



Elasticity of Demand and Supply

Siddique Ahmed
Assistant Professor
IIUC
Mobile: 01711572520

Elasticity of demand

Elasticity of demand

- is a measure of the *responsiveness* of *the quantity demanded* of a good to *a change in an exogenous variable*.
- $$\frac{\% \text{ change in } X}{\% \text{ change in exogenous variable}}$$
 Why?



Classification of Elasticities of Demand

Classification according to the exogenous variable concerned

Type of elasticity of demand	Exogenous variable concerned
<i>Price</i> elasticity of demand	<i>Price of the good</i>
<i>Income</i> elasticity of demand	<i>Income</i>
<i>Cross</i> elasticity of demand	<i>Price of related good</i>

Classification according to the formula adopted in calculation

- ◆ **Point** elasticity of demand

$$\% \Delta = \frac{X_2 - X_1}{X_1} \times 100\%$$

Situations applied: when the % change are

*very
small*

- ◆ **Arc** elasticity of demand

$$\% \Delta = \frac{X_2 - X_1}{(X_1 + X_2)/2} \times 100\%$$

Situations applied: when the % change are

*significant
t*

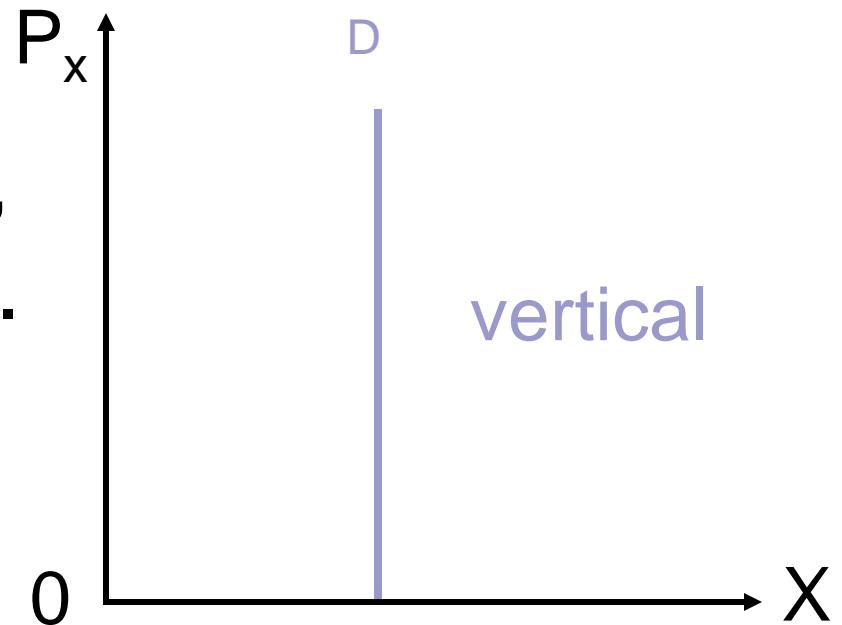
Classification according to the size of the elasticity

1. *Perfectly inelastic* ($E_d = 0$)

- The exogenous variable changes but X remains unchanged

i.e. $\% \Delta \text{ in } X = \underline{\textcolor{red}{0}}$.

- In the case of price elasticity, the demand curve is *vertical*.



Classification according to the size of the elasticity

2. **Inelastic** ($E_d < 1$)

% Δ in X ~~X~~ _____ % Δ in exogenous variable

3. **Unitarily elastic** ($E_d = 1$)

% Δ in X _____ % Δ in exogenous variable

=

4. **Elastic** ($E_d > 1$)

% Δ in X _____ % Δ in exogenous variable

>

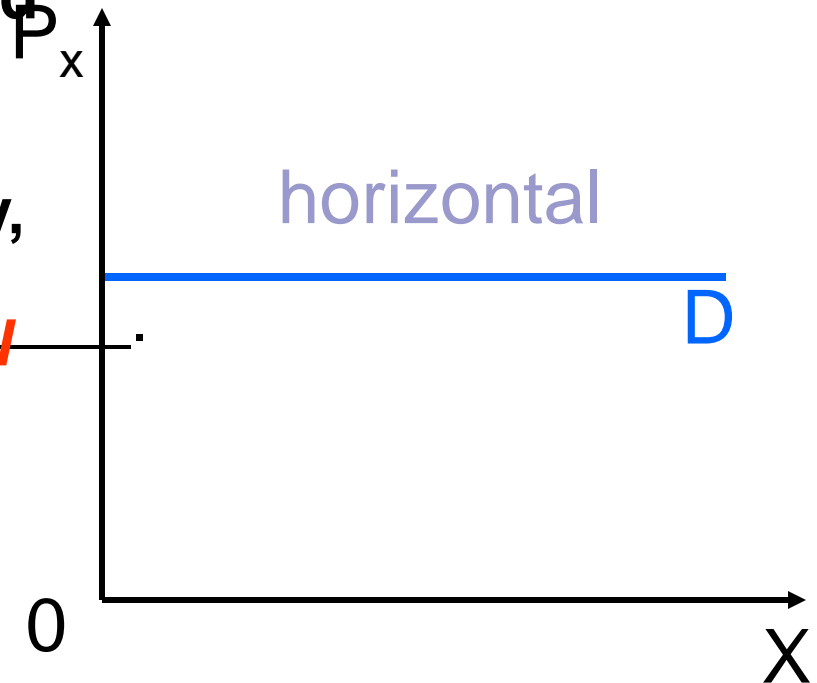
Classification according to the size of the elasticity

5. *Perfectly elastic* ($E_d = \text{infinity}$)

- A negligible change in the exogenous variable brings an infinite change in Q_d

i.e. $\% \Delta \text{ in } X = \text{---} \text{infinity} \text{---}$

- In the case of price elasticity, the demand curve is *horizontal*





Price Elasticity of Demand

Price Elasticity of Demand

- Law of demand tells us that consumers will buy more of a product when its price declines and less when its price increases.
 - How much? *Varies from product to product and over different price ranges for the same product.*
- The responsiveness of consumers to a change in the price of a product is measured by the **Price Elasticity of Demand**.
- Some products are more responsive than others.

Price Elasticity of Demand

- Percentage change in quantity demanded divided by the percentage change in price
- $E_d = \frac{\text{\% change in quantity demanded}}{\text{\% change in price}}$

Mathematical Example

- Suppose that Price goes from \$1.10 to \$0.90, causing quantity demanded to change from 95,000 to 105,000

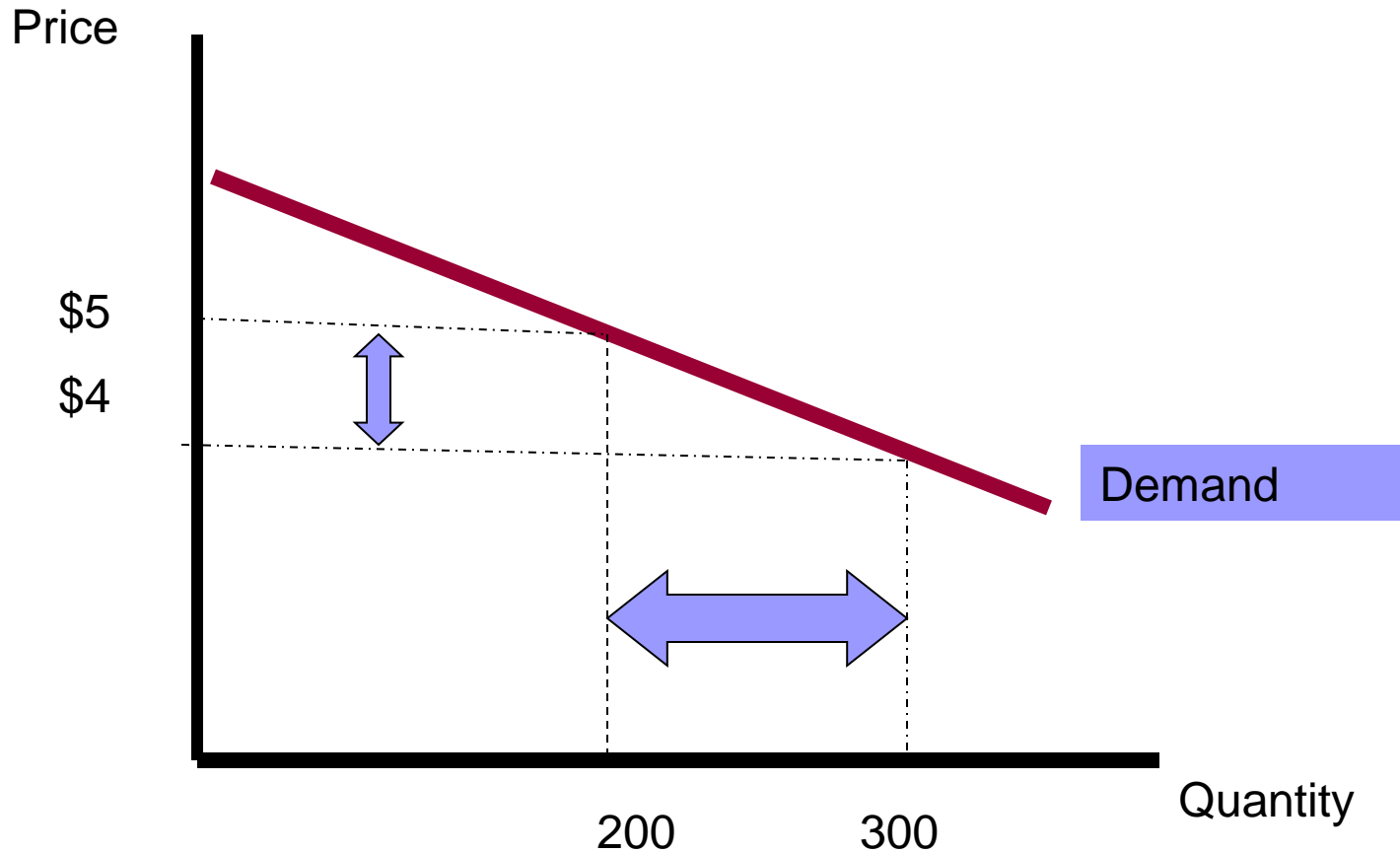
- $$E_d = \frac{(10,000/(95,000 + 105,000)/2}{(\$1.00/(\$1.10 + \$0.90)/2}$$
$$= 10\%/-20\% = -50\%$$

Interpretations

■ ***Elastic Demand***

- Change in Price < Change in Quantity Demanded
- $E > 1$
- The change in price is less than the change in the quantity demanded.
- TVs
- If price decreases then total revenue increases.
- Luxuries
- Many substitutes
- Price and total revenue moves in opposite directions

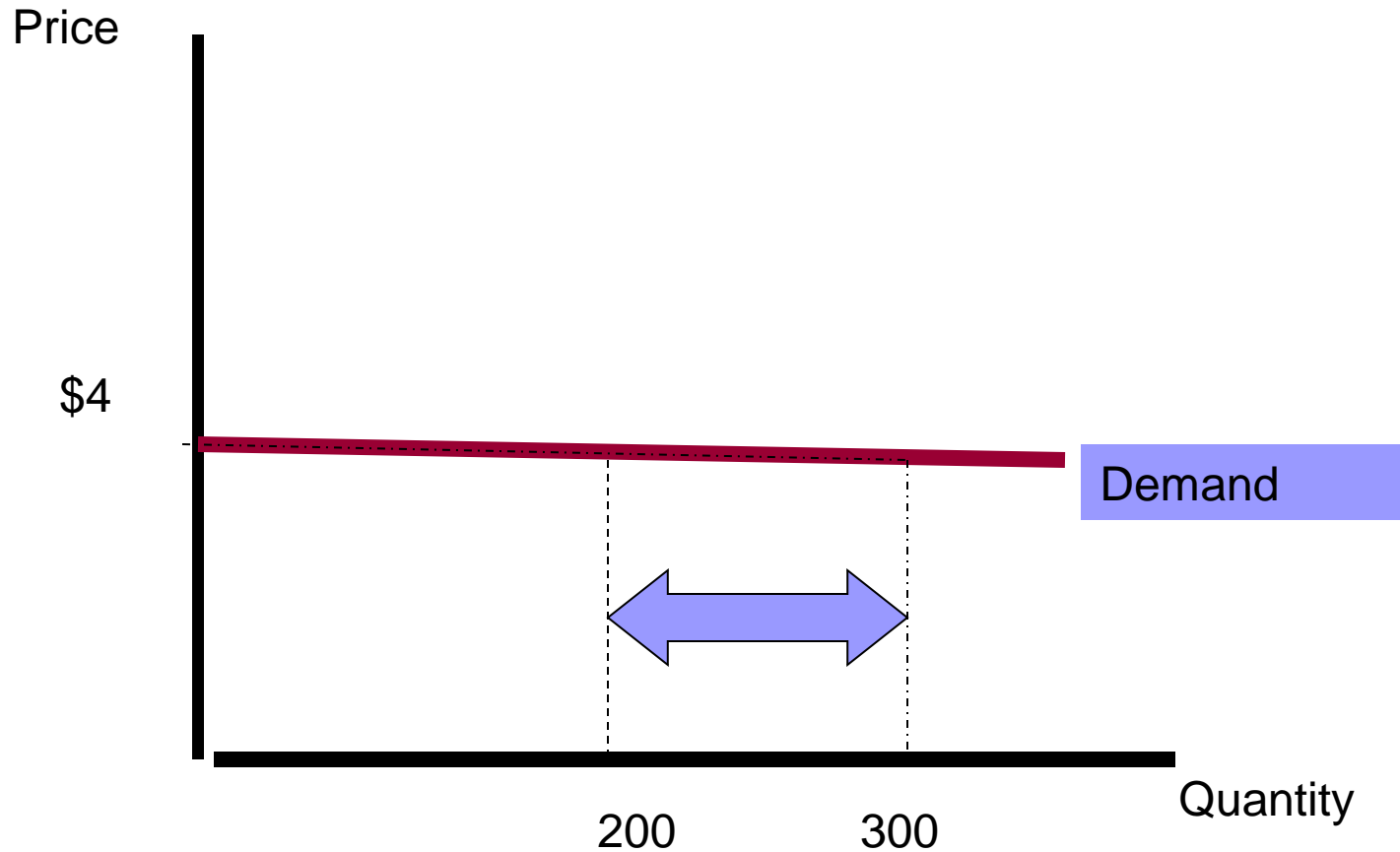
Elastic Demand



Perfectly Elastic Demand

- Change in Price: causes a infinite change in quantity demanded
- $E = \infty$
- Horizontal demand curve exists
- A small reduction in price will cause buyers to purchase from ZERO to all they can
- If price changes then there is no quantity demanded by consumers
- Wheat

Perfectly Elastic Demand

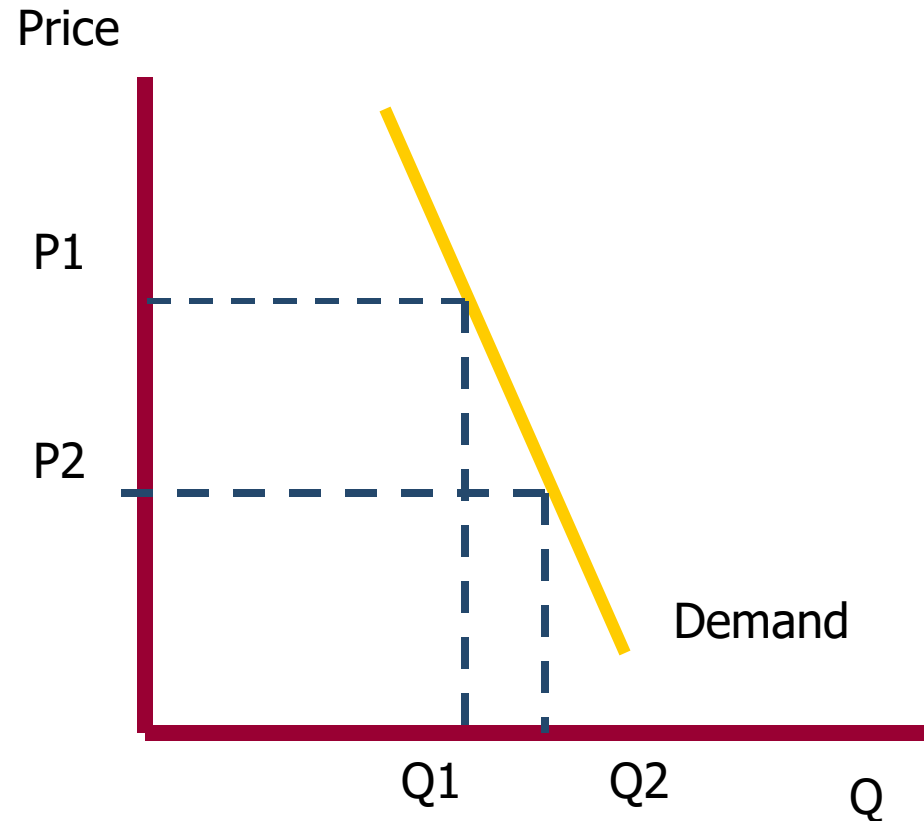


Inelastic Demand

- Change in Price $>$ Change in Quantity Demanded
- $E < 1$
- The change in price is greater than the change in the quantity demanded.
- Electricity
- Necessities

Inelastic Demand

- Relatively inelastic demand
 - A somewhat vertical line
 - Any price change has little effect on the quantity demanded
 - $E_d < 0$
 - Few substitutes
 - Electricity



Inelastic Demand

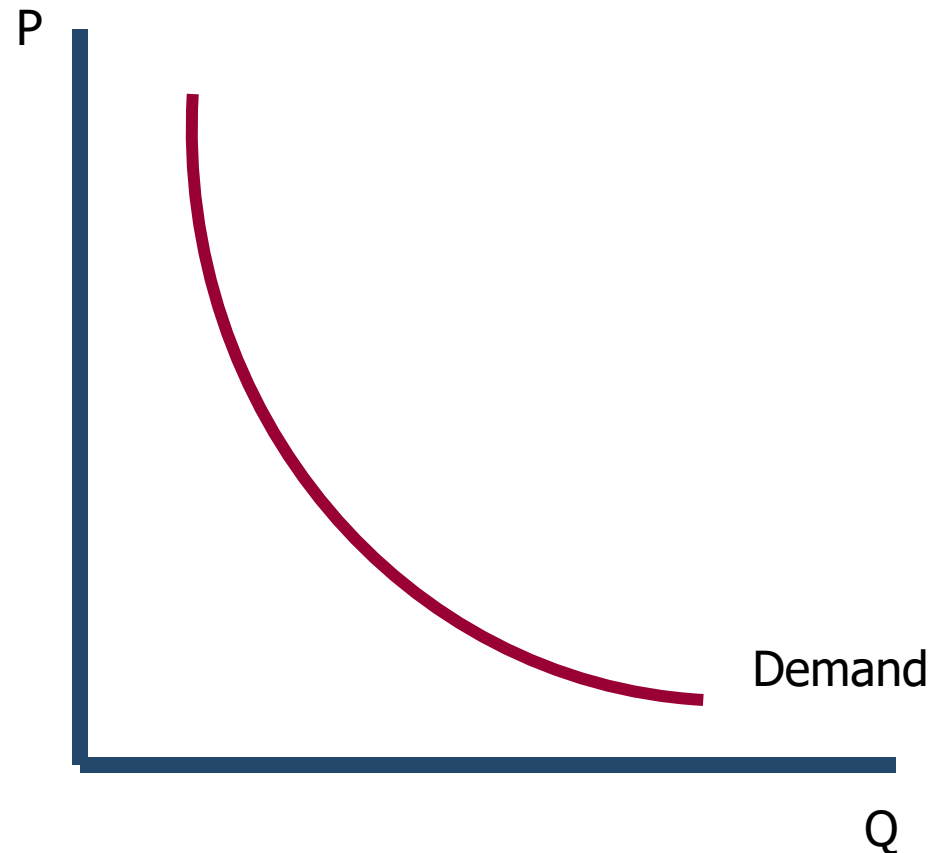
■ Perfectly Inelastic Demand

- A vertical line
- Any price change has no effect on the quantity demanded
- $E_d = 0$
- No substitutes
- Insulin



Unit Elasticity

- Everywhere along the demand curve
 - percentage change in price = percentage change in Quantity demanded
 - No change in total revenue
 - $E = 1$
 - Movies



Total Revenue

- The importance of elasticity for firms relates to the effect of price changes on total revenue and thus on profits.
- **Profits = Total revenue – Total cost**
- **Total revenue = Price X Quantity**
- Total revenue and price elasticity of demand are related. The relationship will tell you if demand is elastic or inelastic.

Total Revenue & Elastic Demand

- If demand is elastic, a **decrease in price will increase total revenue**
- Even though a lesser price is received per unit, enough additional units are sold to more than make up for the lower price.
- For example:
 - Price of TVs is \$200 per unit and 600 units is sold.
 - Now price of the TVs is \$150 per unit and 900 units are sold
 - Total revenue = $P \times Q = \$200 \times 600 = \$120,000$
 - Total revenue = $\$150 \times 900 = \$135,000$
 - Revenue increased by \$15,000

Total Revenue & Inelastic Demand

- If demand is inelastic, a price **decrease will reduce total revenue.**
- The modest increase in price will not offset the decline in revenue per unit.
- For example:
 - Price of insulin is \$9 per injection and 1,000 units are sold
 - Price of insulin decreases to \$7 per injection and 1,100 units are sold
 - Total revenue = $\$9 \times 1,000 = \$9,000$
 - Total revenue = $\$7 \times 1,100 = \$7,700$
 - Total revenue decreases \$1,300

Total Revenue & Unitary Elastic

- **An increase or decrease in the price leaves total revenue unchanged.**
- The loss in revenue from a lower price is exactly offset by the gain in revenue from accompanying increase in sales.
- For example:
 - Price of movie tickets is \$6 per ticket and 1,000 tickets are sold
 - Price of movie tickets goes to \$5 per ticket and 1,200 tickets are sold
 - Total revenue = $\$6 \times 1,000 = \$6,000$
 - Total revenue = $\$5 \times 1,200 = \$6,000$
 - No change in total revenue

Determinants of Elasticity of Demand

- Substitutability
 - The larger the number of substitute goods that are available, the greater the price elasticity of demand
- Proportion of income
 - The higher the price of a good relative to consumers' income, the greater the price elasticity of demand
- Luxuries vs. necessities
 - The more that a good is considered to be a luxury rather than a necessity the greater is the price elasticity of demand
 - Time
- Product demand is more elastic the longer the time period under consideration



Price Elasticity of Supply

- Law of supply tells us that producers will respond to a decline in prices with a decrease in quantity supplied.
- The responsiveness of suppliers to a change in the price of a product is measured by the **Price Elasticity of Supply**.
- Some products are more responsive than others.
- If producers are relatively responsive to price changes, supply is elastic
- If they are relatively insensitive to price changes, supply is inelastic

Price Elasticity of Supply

- $E_d = \frac{\% \text{ change in quantity supplied}}{\% \text{ change in price}}$

Price Elasticity of Supply

■ The Market Period:

- Is the period that occurs when the time immediately after a change in market price is too short for producers to respond with a change in quantity supplied.
- Therefore, elasticity of supply is perfectly inelastic during this period

■ Short run:

- The plant capacity of individual producers and of the entire industry is fixed.
- Firms do have to use their fixed plants more or less intensively
- Elastic supply

■ Long Run:

- Is a time period long enough for firms to adjust their plant sizes and for new firms to enter or existing firms to leave the industry
- More elastic supply

Cross Elasticity of Demand

- Measures how sensitive consumer purchases of one product are to a change in the price of some other product
- **Substitutes**: if cross elasticity of demand is POSITIVE, meaning that sales of X move in the same direction as a change in the price of Y then X and Y are substitutes
- **Complementary goods**: when cross elasticity is NEGATIVE. We know that X and Y go together, an increase in the price of one decreases the demand for the other
- **Independent goods**: a zero or near zero cross elasticity suggests that the two products being considered as unrelated or independent goods.

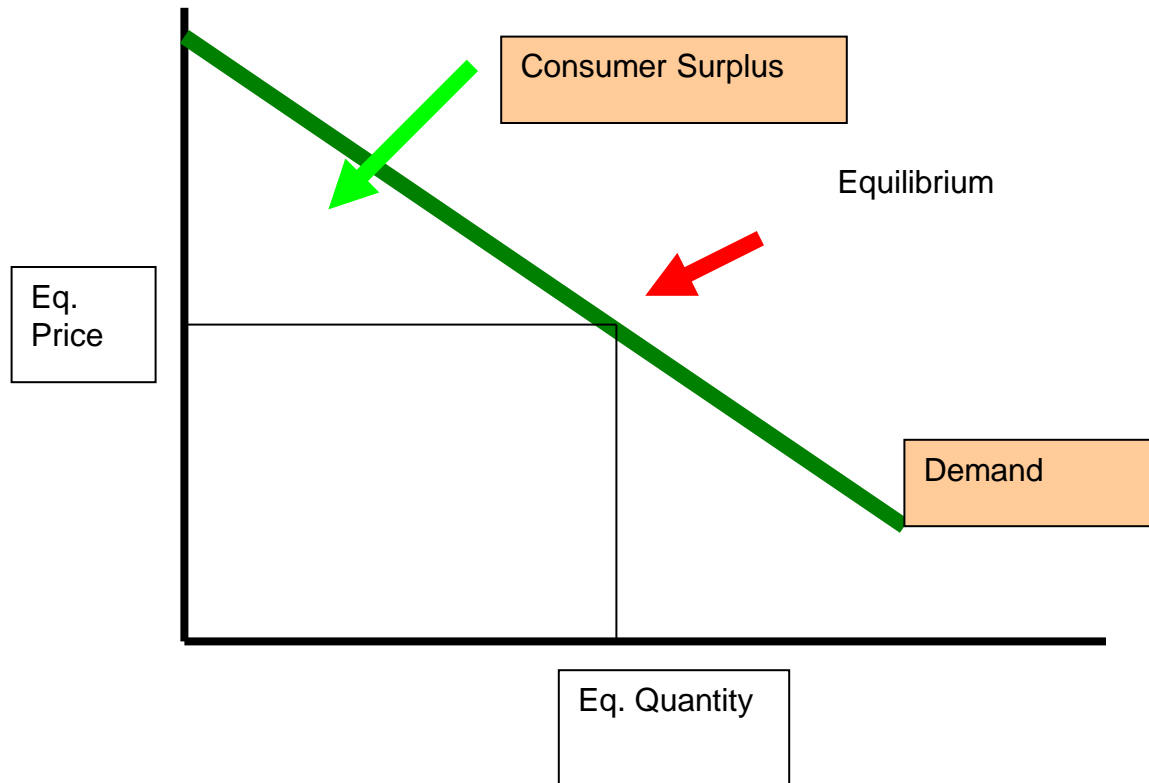
Income Elasticity of Demand

- Measures the degree to which consumers respond to a change in their incomes by buying more or less of a particular good.
- **Normal goods** – $E_i > 1$
 - meaning that more of the good is demanded as incomes rise
- **Inferior goods** - $E_i < 1$
 - Meaning that less of the good is demanded as incomes rise

Consumer Surplus

- The benefit surplus received by a consumer or consumers in a market.
- It is the difference between the maximum price a consumer is willing to pay for a product and the actual price.
- The utility surplus = consumers receive a greater total utility in dollar terms from their purchases than the amount of their expenditures from their purchases than the amount of their expenditures
 - This is caused because all consumers pay the equilibrium price even though many would be willing to pay more than that price to obtain the product.

Consumer Surplus



Consumer Surplus

■ Example: Suppose that a product sells for an equilibrium price of \$8. Here are consumers willingness to pay.

Person	Max Price willing to pay	Actual Price	Consumer Surplus
May	\$13	\$8	\$5
Jon	\$12	\$8	\$4
Aron	\$11	\$8	\$3
Dixie	\$9	\$8	\$1



Consumer Surplus

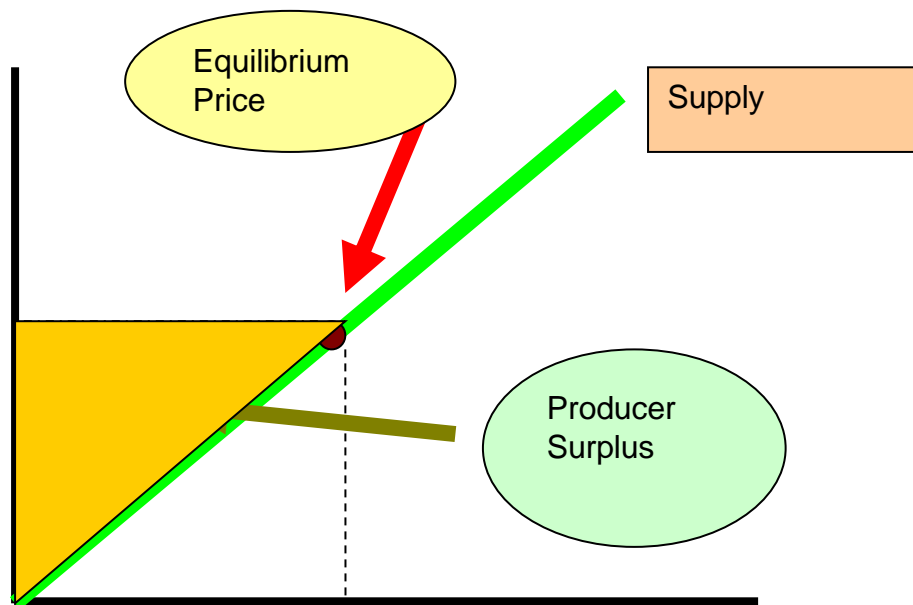
- Consumer surplus and price are inversely related. Higher prices reduce consumer surplus, lower prices increase it.



Producer Surplus

- Is the difference between the actual price a producer receives and the minimum acceptable price.
- Sellers collectively receive a producer surplus in most markets because most sellers are willing to accept a lower than equilibrium price if that is required in order to sell the product.

Producer Surplus

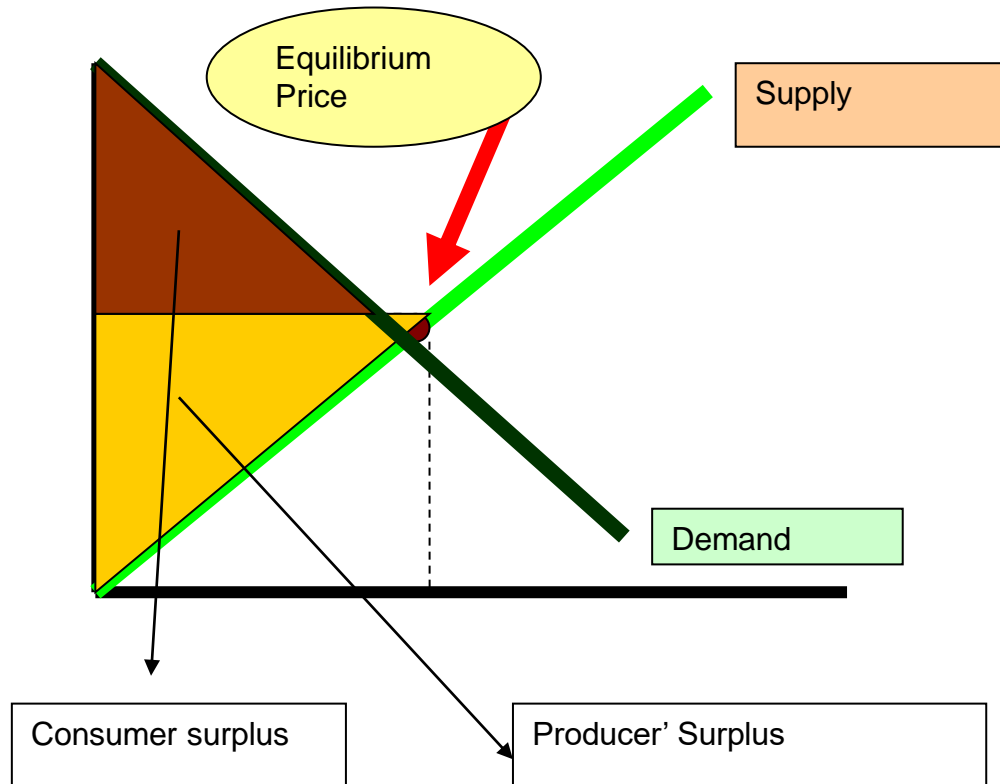




Producer's Surplus

- There is a direct relationship between equilibrium price and the amount of producer surplus.
- Lower prices reduce producer surplus and higher prices increase it.

Efficiency





Efficiency

- All markets that have downward sloping demand curves and upward sloping supply curves yield consumer and producer surplus.
- Equilibrium quantity reflects economic efficiency.
- Productive efficiency is achieved because competition forces producers to use the best techniques and combinations of resources. Production costs are minimized

Efficiency

- Allocative Efficiency is achieved because the correct quantity of output is produced relative to other goods and services.
- Occurs when
 - $\text{Marginal benefit} = \text{Marginal cost}$
 - $\text{Maximum willingness to pay} = \text{minimum acceptable price}$
 - Combined consumer and producer surplus is at a maximum.