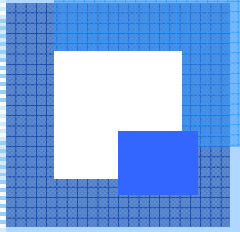


Chapter 4

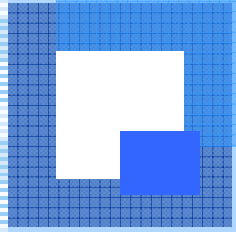
Demand Elasticity

*Managerial Economics: Economic
Tools for Today's Decision Makers, 4/e
By Paul Keat and Philip Young*



Demand Elasticity

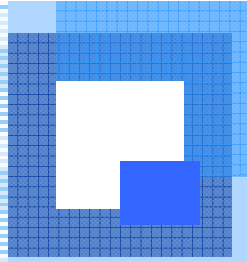
- The Economic Concept of Elasticity
- The Price Elasticity of Demand
- The Cross-Elasticity of Demand
- Income Elasticity
- Other Elasticity Measures
- Elasticity of Supply



The Economic Concept of Elasticity

Elasticity: The sensitivity of one variable to another or, more precisely, the percentage change in one variable relative to a percentage change in another.

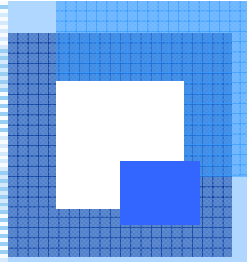
$$\text{Coefficient of Elasticity} = \frac{\text{percent change in A}}{\text{percent change in B}}$$



The Price Elasticity of Demand

Price elasticity of demand: The percentage change in quantity demanded caused by a 1 percent change in price.

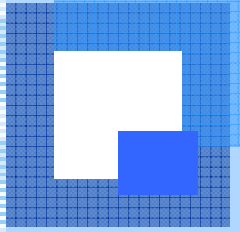
$$E_p = \frac{\% \Delta \text{ Quantity}}{\% \Delta \text{ Price}}$$



The Price Elasticity of Demand

Arc elasticity: Elasticity which is measured over a discrete interval of a demand (or a supply) curve.

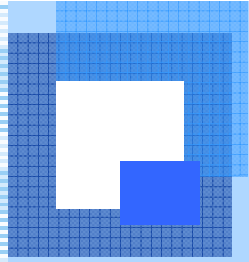
$$E_p = \frac{Q_2 - Q_1}{(Q_1 + Q_2) / 2} \div \frac{P_2 - P_1}{(P_1 + P_2) / 2}$$



The Price Elasticity of Demand

Point elasticity: Elasticity measured at a given point of a demand (or a supply) curve.

$$\varepsilon_P = \frac{dQ}{dP} \times \frac{P_1}{Q_1}$$



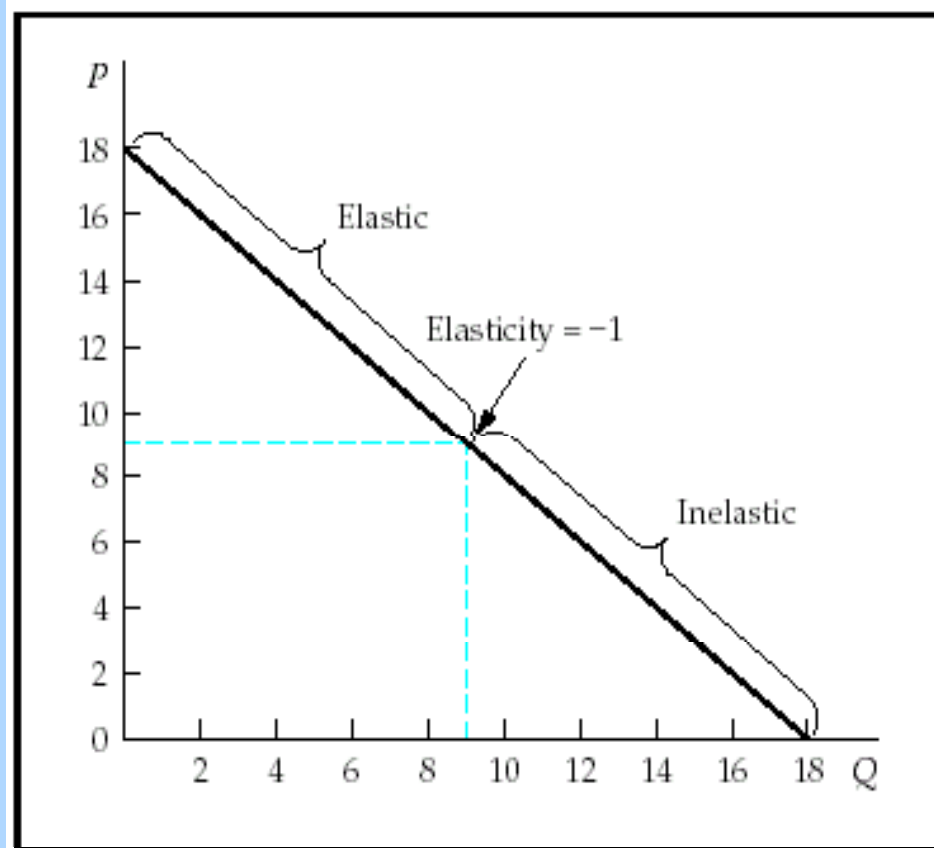
The Price Elasticity of Demand

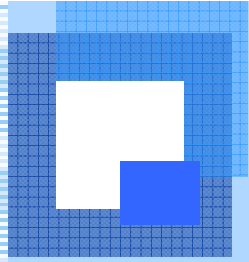
The point elasticity of a linear demand function can be expressed as:

$$\varepsilon_P = \frac{\Delta Q}{\Delta P} \times \frac{P_1}{Q_1}$$

The Price Elasticity of Demand

Elasticity differs along a linear demand curve.





The Price Elasticity of Demand

Categories of Elasticity

1. Relative elasticity of demand

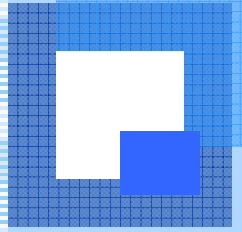
$$E_p > 1$$

2. Relative inelasticity of demand

$$E_p < 1$$

3. Unitary elasticity of demand

$$E_p = 1$$



The Price Elasticity of Demand

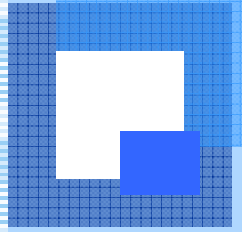
Limiting cases

1. Perfect elasticity

$$E_p = \infty$$

2. Perfect inelasticity

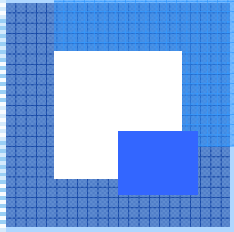
$$E_p = 0$$



The Price Elasticity of Demand

Determinants of Elasticity

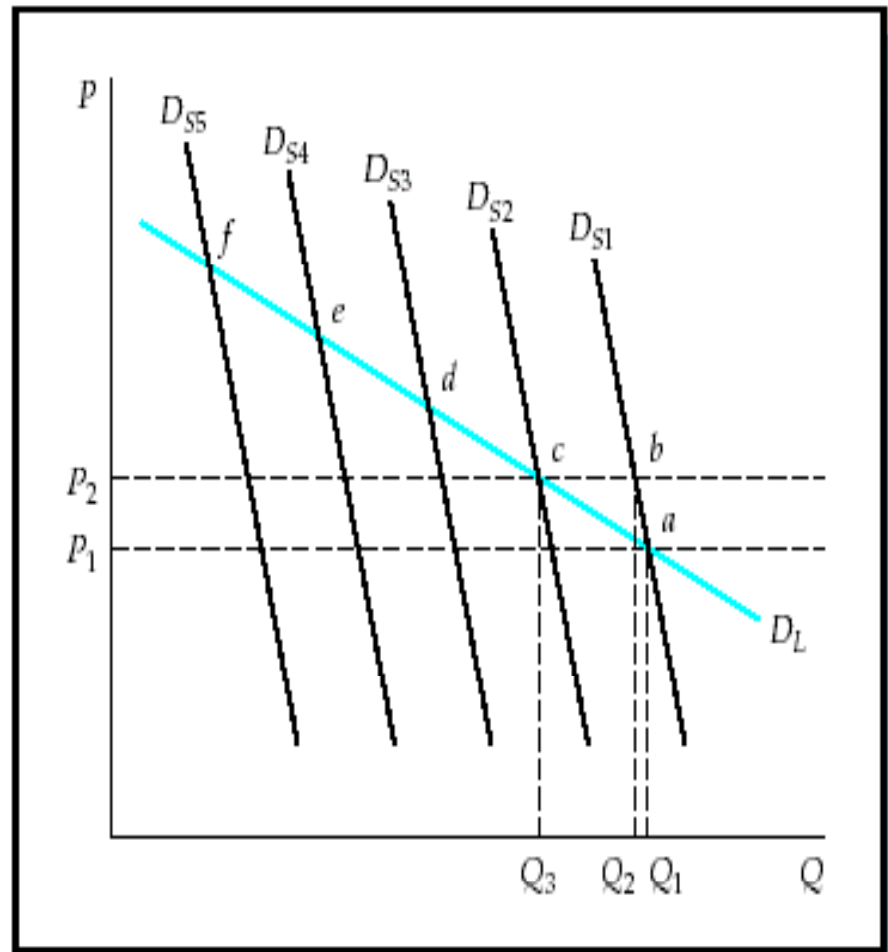
- Ease of substitution
- Proportion of total expenditures
- Durability of product
 - Possibility of postponing purchase
 - Possibility of repair
 - Used product market
- Length of time period

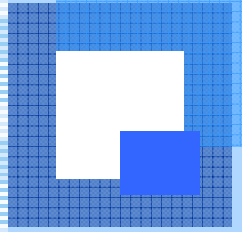


The Price Elasticity of Demand

A long-run demand curve will be more elastic than a short-run curve.

As the time period lengthens consumers find way to adjust to the price change

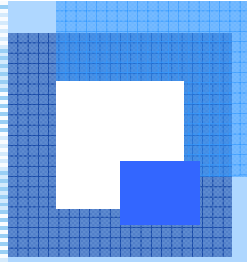




The Price Elasticity of Demand

Derived demand: The demand for products or factors that are not directly consumed, but go into the production of a final product.

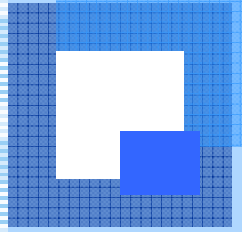
The demand for such a product or factor exists because there is demand for the final product.



The Price Elasticity of Demand

The derived demand curve will be more inelastic:

1. the more essential is the component in question.
2. the more inelastic is the demand curve for the final product.
3. the smaller is the fraction of total cost going to this component.
4. the more inelastic is the supply curve of cooperating factors.



The Price Elasticity of Demand

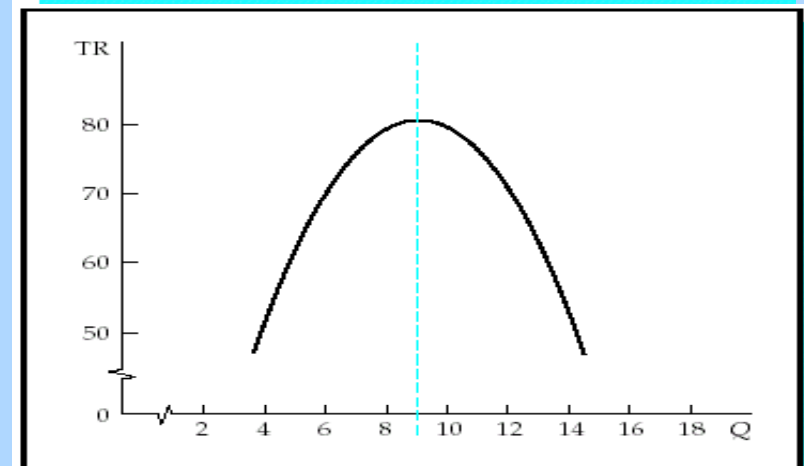
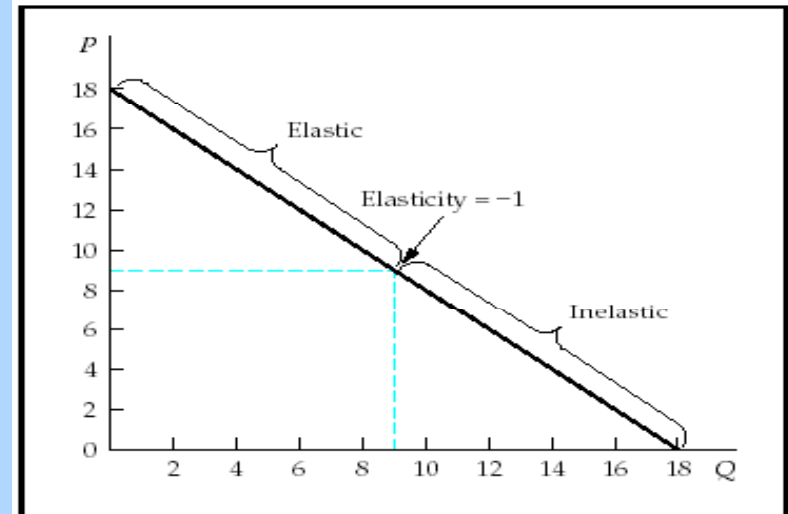
There is a relationship between the price elasticity of demand and revenue received.

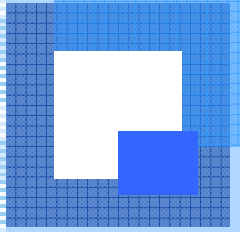
- If price decreases and, in percentage terms, quantity rises more than price dropped, then total revenue will increase.
- If price decreases and, in percentage terms, quantity rises less than price dropped, then total revenue will decrease.

The Price Elasticity of Demand

As price decreases

- revenue rises when demand is elastic
- falls when it is inelastic
- reaches its peak when elasticity of demand equals 1.





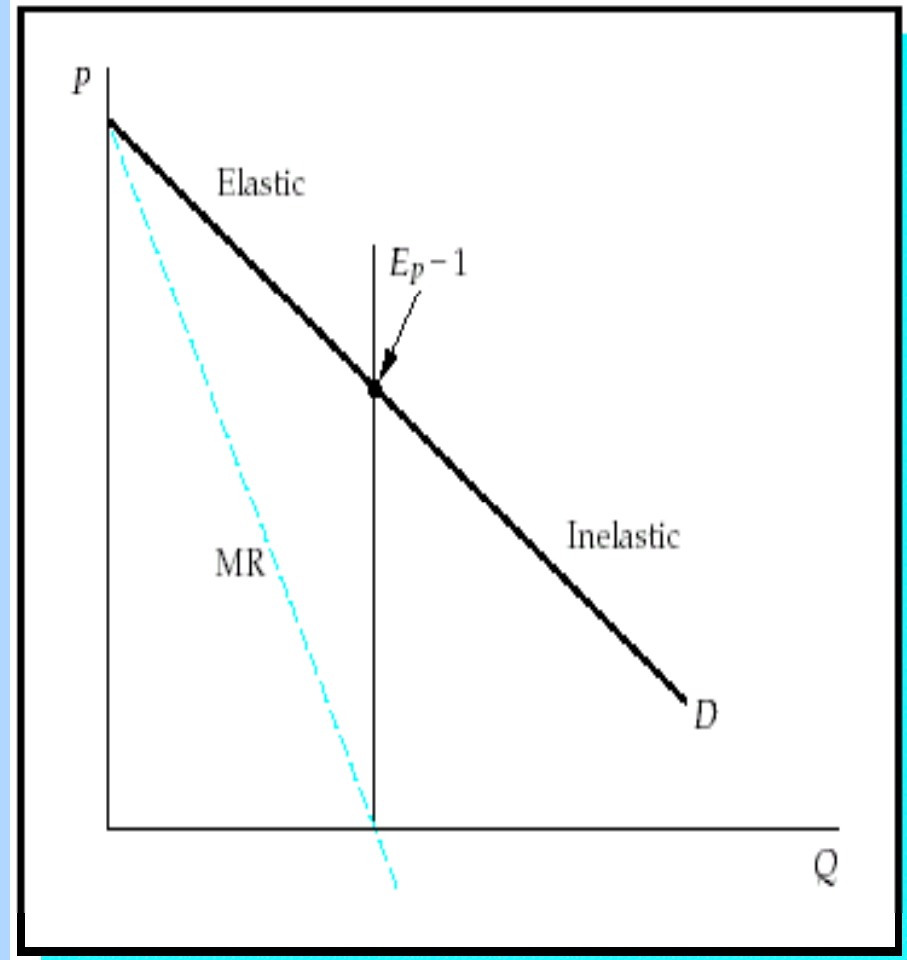
The Price Elasticity of Demand

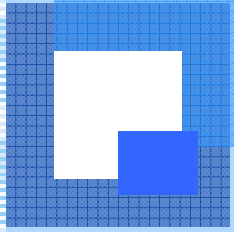
Marginal Revenue: The change in total revenue resulting from changing quantity by one unit.

$$MR = \frac{\Delta \text{ Total Revenue}}{\Delta \text{ Quantity}}$$

The Price Elasticity of Demand

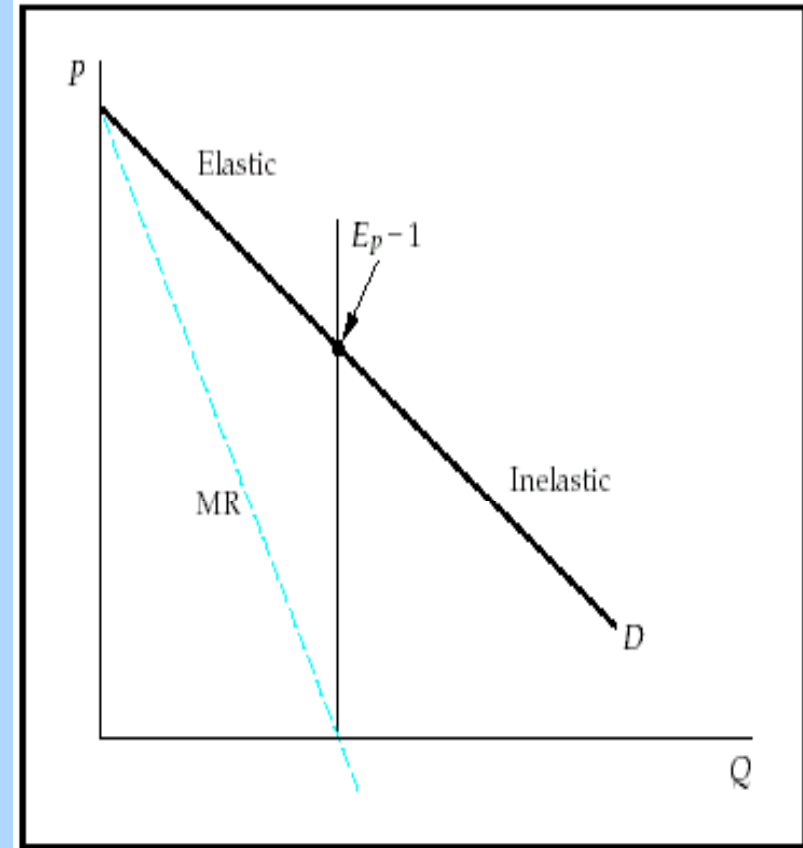
For a straight-line demand curve the marginal revenue curve is twice as steep as the demand.

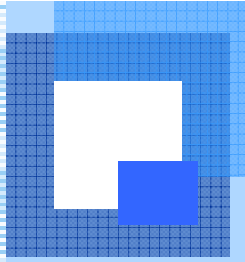




The Price Elasticity of Demand

At the point where marginal revenue crosses the X-axis, the demand curve is unitary elastic and total revenue reaches a maximum.

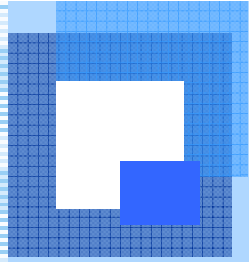




The Cross-Elasticity of Demand

Cross-elasticity of demand: The percentage change in quantity consumed of one product as a result of a 1 percent change in the price of a related product.

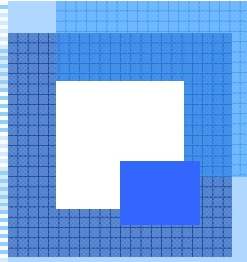
$$E_x = \frac{\% \Delta \text{ Quantity of good } A}{\% \Delta \text{ Price of good } B}$$



The Cross-Elasticity of Demand

Arc Elasticity

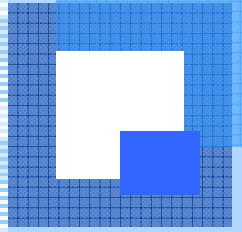
$$E_x = \frac{Q_{2A} - Q_{1A}}{(Q_{1A} + Q_{2A}) / 2} \div \frac{P_{2B} - P_{1B}}{(P_{1B} + P_{2B}) / 2}$$



The Cross-Elasticity of Demand

Point Elasticity

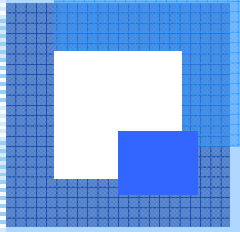
$$\epsilon_x = \frac{dQ_A}{dP_B} \times \frac{P_B}{Q_A}$$



The Cross-Elasticity of Demand

The sign of cross-elasticity for substitutes is positive.

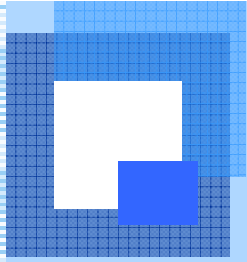
The sign of cross-elasticity for complements is negative.



Income Elasticity

Income Elasticity of Demand: The percentage change in quantity demanded caused by a 1 percent change in income.

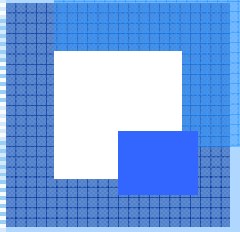
$$E_Y = \frac{\% \Delta \text{Quantity}}{\% \Delta \text{Income}}$$



Income Elasticity

Arc Elasticity

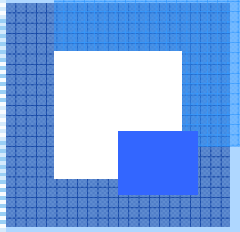
$$E_Y = \frac{Q_2 - Q_1}{(Q_1 + Q_2) / 2} \div \frac{Y_2 - Y_1}{(Y_1 + Y_2) / 2}$$



Income Elasticity

Point Elasticity

$$\varepsilon_Y = \frac{dQ}{dY} \times \frac{Y}{Q}$$



Income Elasticity

Categories of income elasticity

- Superior goods

$$E_Y > 1$$

- Normal goods

$$0 \leq E_Y \leq 1$$

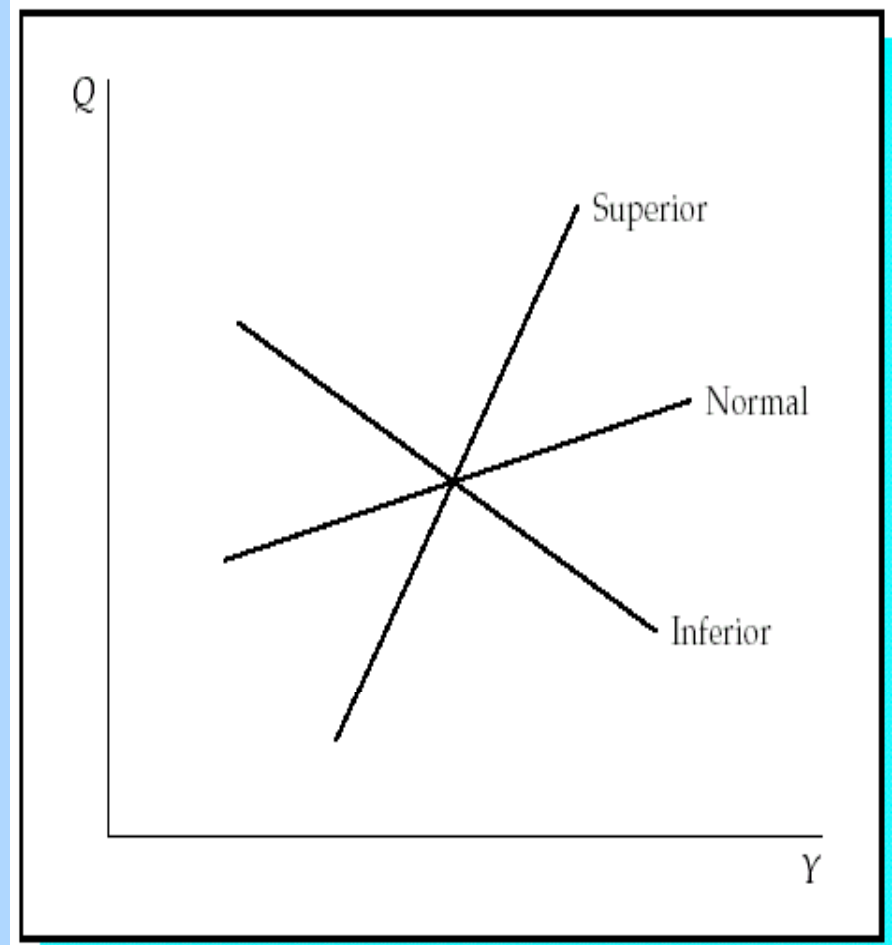
- Inferior goods

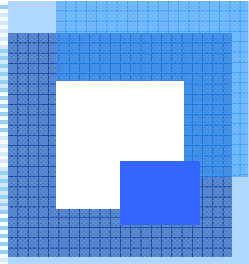
$$E_Y < 1$$

Income Elasticity

Categories of Income Elasticity

- Superior goods
- Normal goods
- Inferior goods





Other Elasticity Measures

Elasticity is encountered every time a change in some variable affects quantities.

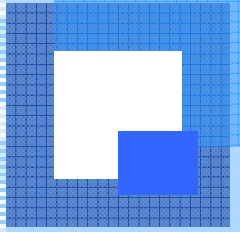
- Advertising expenditure
- Interest rates
- Population size



Elasticity of Supply

Price Elasticity of Supply: The percentage change in quantity supplied as a result of a 1 percent change in price

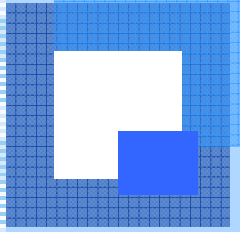
$$E_s = \frac{\% \Delta \text{ Quantity supplied}}{\% \Delta \text{ Price}}$$



Elasticity of Supply

Arc elasticity

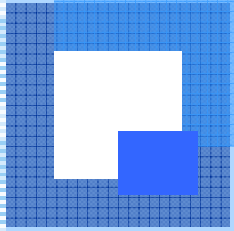
$$E_s = \frac{Q_2 - Q_1}{(Q_1 + Q_2) / 2} \div \frac{P_2 - P_1}{(P_1 + P_2) / 2}$$



Elasticity of Supply

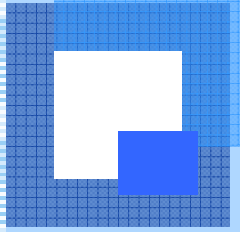
Point elasticity

$$\epsilon_S = \frac{dQ}{dP} \times \frac{P_1}{Q_1}$$



Elasticity of Supply

If the supply curve slopes upward and to the right, the coefficient of supply elasticity is a positive number.



Elasticity of Supply

When the supply curve is more elastic, the effect of a change in demand will be greater on quantity than on the price of the product.

With a supply curve of low elasticity, a change in demand will have a greater effect on price than on quantity.