# ELASTICITY

LECTURE 4

# LEARNING OUTCOMES

- LO1 Discuss price elasticity of demand and how it can be applied.
- LO2 Explain the usefulness of the total revenue test for price elasticity of demand.
- LO 3 Describe price elasticity of supply and how it can be applied.
- LO 4 Apply cross elasticity of demand and income elasticity of demand.

# THE CONCEPT OF ELASTICITY

- Elasticity is a measure of the responsiveness of one variable to another.
- The greater the elasticity, the greater the responsiveness.
- is a measure of how much buyers and sellers respond to changes in market conditions
- … allows us to analyze supply and demand with greater precision.

# THE ELASTICITY OF DEMAND

- **Price elasticity of demand** is a measure of how much the quantity demanded of a good responds to a change in the price of that good.

- Price elasticity of demand is the percentage change in quantity demanded given a percent change in the price.

# PRICE ELASTICITY

- The ***price elasticity of demand*** is the percentage change in quantity demanded divided by the percentage change in price.

$$\text{Price elasticity of demand} = \frac{\text{Percent change in quantity demanded}}{\text{Percent change in price}}$$

# SIGN OF PRICE ELASTICITY

- According to the law of demand, whenever the price rises, the quantity demanded falls. **Thus the price elasticity of demand is always negative.**

- Because it is always negative, economists usually state the value without the sign.

# CLASSIFYING DEMAND AND SUPPLY AS ELASTIC OR INELASTIC

- Demand is ***elastic*** if the percentage change in quantity is greater than the percentage change in price.

$$E > I$$

- Demand is ***inelastic*** if the percentage change in quantity is less than the percentage change in price.

$$E < I$$

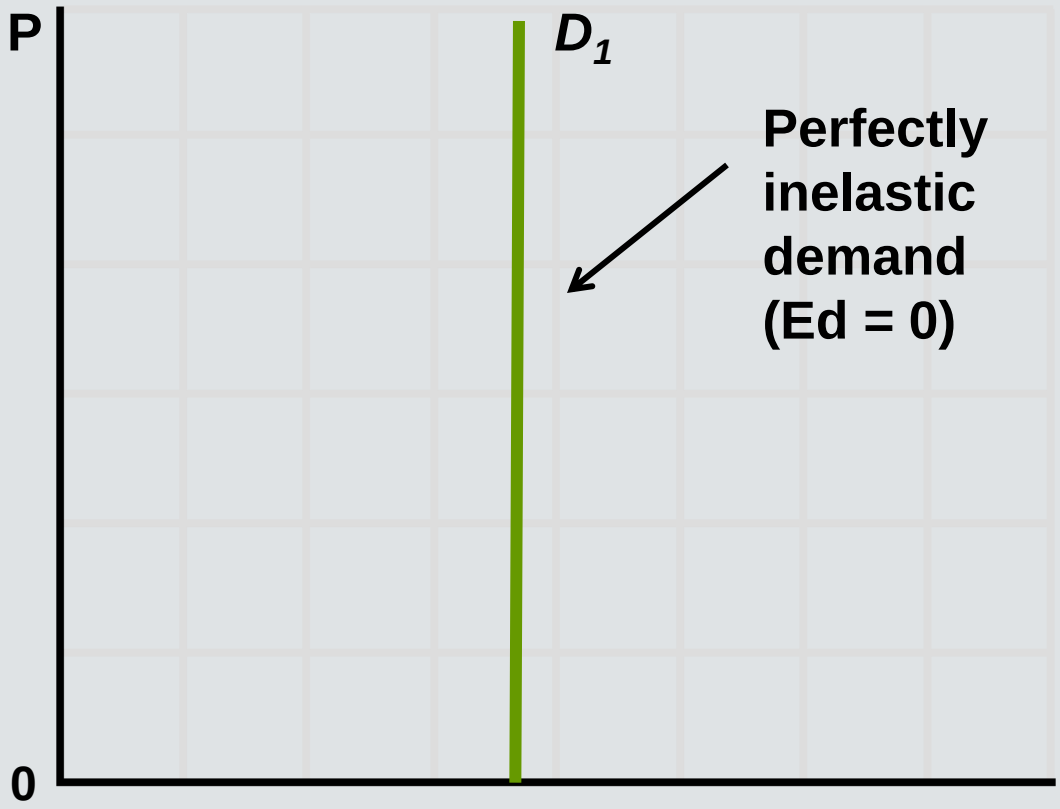
# INTERPRETATION OF ELASTICITY OF DEMAND

- $E_d > 1$ demand is elastic
- $E_d = 1$ demand is unit elastic
- $E_d < 1$ demand is inelastic
- Extreme cases
  - Perfectly inelastic
  - Perfectly elastic

# INTERPRETATION OF ELASTICITY OF DEMAND

- **EXTREME CASES - PERFECTLY INELASTIC DEMAND**
- When we say demand is "inelastic," we do not mean that consumers are completely unresponsive to a price change.
- In that extreme situation, where a price change results in no change whatsoever in the quantity demanded, economists say that demand is perfectly inelastic.
- $E_d = 0$ demand
- Example: An acute diabetic's demand for insulin.

# PERFECTLY INELASTIC DEMAND



# INTERPRETATION OF ELASTICITY OF DEMAND

- **Extreme Cases - Perfectly elastic demand**
- Conversely, when we say demand is “elastic,” we do not mean that consumers are completely responsive to a price change.
- In that extreme situation, where a small price reduction causes buyers to increase their purchases from zero to all they can obtain, the elasticity coefficient is infinite (∞) and economists say demand is perfectly elastic.
- $E_d = \infty$ demand
- Example: A mining firm—that is selling its output in a purely competitive market.

# PERFECTLY ELASTIC DEMAND

# ELASTIC DEMAND

- Elastic Demand means that quantity changes by a greater percentage than the percentage change in price.
  - Quantity demanded responds strongly to changes in price.
  - Price elasticity of demand is greater than one.

- Demand tends to be more elastic :
  - the larger the number of close substitutes.
  - if the good is a luxury.
  - the more narrowly defined the market.
  - the longer the time period.

# SUMMARY

| Price Elasticity of Demand: A Summary | | | | |
|---|---|---|---|---|
| **Absolute Value of Elasticity Coefficient** | **Demand Is** | **Description** | **Impact on Total Revenue of a:** | |
| | | | **Price Increase** | **Price Decrease** |
| Greater than 1 ($E_d > 1$) | Elastic or relatively elastic | $Q_d$ changes by a larger percentage than does price | Total revenue decreases | Total revenue increases |
| Equal to 1 ($E_d = 1$) | Unit or unitary elastic | $Q_d$ changes by the same percentage as does price | Total revenue is unchanged | Total revenue is unchanged |
| Less than 1 ($E_d < 1$) | Inelastic or relatively inelastic | $Q_d$ changes by a smaller percentage than does price | Total revenue increases | Total revenue decreases |

# DETERMINANTS OF ELASTICITY OF DEMAND

- **SUBSTITUTE**
  - More substitutes, demand is more elastic
  - For Example:  candy bars, highly *elastic*
  - However, the demand for tooth repair (or tooth pulling) is quite *inelastic* because there simply are no close substitutes when those procedures are required.

# DETERMINANTS OF ELASTICITY OF DEMAND

- **PROPORTION OF INCOME**
  - Higher proportion of income, demand is more elastic
  - For example: A 10 percent increase in the price of low-priced pencils or chewing gum, quantity demanded will probably decline only slightly and price elasticity tends to be low.
  - But a 10 percent increase in the price of relatively high priced automobiles or housing, quantities demanded will likely diminish significantly. and the price elasticity tend to be high.

# DETERMINANTS OF ELASTICITY OF DEMAND

- **LUXURIES VS. NECESSITIES**
  - Luxury goods, demand is more elastic
  - Example: Electricity is a necessity. A price increase will not significantly reduce the amount of lighting and power used in a household.
  - Vacation travel and jewelry are luxuries, can easily be forgone.
  - Salt, highly inelastic and necessity

# INCOME ELASTICITY OF DEMAND

- **INCOME ELASTICITY OF DEMAND** measures how much the quantity demanded of a good responds to a change in consumers' income.
- It is computed as the percentage change in the quantity demanded divided by the percentage change in income.

# INCOME ELASTICITY OF DEMAND

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

**Positive income elasticity ⇒ *normal* good**

**Negative income elasticity ⇒ *inferior* good**

# INCOME ELASTICITY

- Types of Goods
  - Normal Goods
  - Inferior Goods
- Higher income raises the quantity demanded for normal goods but lowers the quantity demanded for inferior goods.

# INCOME ELASTICITY

- Goods consumers regard as necessities tend to be income inelastic
  - Examples include food, fuel, clothing, utilities, and medical services.
- Goods consumers regard as luxuries tend to be income elastic.
  - Examples include sports cars, furs, and expensive foods.

# INCOME ELASTICITY OF DEMAND

- **NORMAL GOODS**
- For most goods, the income-elasticity coefficient Ei is positive, meaning that more of them are demanded as incomes rise.
- Such goods are called normal or superior goods.

- But the value of Ei varies greatly among normal goods.
- For example, income elasticity of demand for automobiles is about +3, while income elasticity for most farm products is only about +.20

# INCOME ELASTICITY OF DEMAND

- **INFERIOR GOODS**
- A negative income-elasticity coefficient designates an inferior good.
- Retread tires, cabbage, long distance bus tickets and used clothing are likely candidates.
- Consumers decrease their purchases of inferior goods as incomes rise.

# CROSS PRICE ELASTICITY OF DEMAND

- The ratio of the percent change in quantity demanded of a good to the percent change in the price of a substitute or a complement.

$$\text{Cross elasticity of demand} = \frac{\text{Percent change in quantity demanded of a good}}{\text{Percent change in the price of one of its substitutes or complements}}$$

# CROSS ELASTICITY OF DEMAND

- **SUBSTITUTE GOODS**
- 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 substitute goods.
- The larger the positive cross elasticity coefficient, the greater is the substitutability between the two products.

# CROSS ELASTICITY OF DEMAND

- **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.
- So the two are complementary goods.
- For example, a decrease in the price of digital cameras will increase the number of memory sticks purchased.
- The larger the negative cross-elasticity coefficient, the greater is the complementarity between the two goods.

# CROSS ELASTICITY OF DEMAND

- **INDEPENDENT GOODS**
- A zero or near-zero cross elasticity suggests that the two products being considered are unrelated or independent goods.
- An example is walnuts and plums: We would not expect a change in the price of walnuts to have any effect on purchases of plums, and vice versa.

# CROSS PRICE ELASTICITY OF DEMAND

- **SUBSTITUTES**
- The cross price elasticity of demand between substitutes is positive.
- E.g.: Coke vs. Pepsi

- **COMPLEMENTS**
- The cross price elasticity of demand between complements is negative.
- E.g.: Tire and Tube

# THE ELASTICITY OF SUPPLY

- **PRICE ELASTICITY OF SUPPLY** is a measure of how much the quantity supplied of a good responds to a change in the price of that good.
- Price elasticity of supply is the percentage change in quantity supplied resulting from a percent change in price.

$$\text{Price elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

# PRICE ELASTICITY: SUPPLY

- Supply is **ELASTIC** if the percentage change in quantity is *greater than* the percentage change in price

Elastic supply is when $E_s > 1$

- Supply is **INELASTIC** if the percentage change in quantity is *less than* the percentage change in price

Inelastic supply is when $E_s < 1$