

ECONOMICS 201: WEEK 3

ELASTICITY

- **Price Elasticity of Demand**
- **Price Elasticity & Total Revenue**
- **Income Elasticity of Demand**
- **Cross Price Elasticity of Demand**
- **Elasticity of Supply**

ELASTICITY

... is a measure of how much buyers and sellers respond to changes in market conditions

Elasticity = *Responsiveness*

PRICE ELASTICITY OF DEMAND

The response of consumers to a change in price is measured by the *price elasticity of demand*.

PRICE ELASTICITY OF DEMAND

Examples

- If the price of gasoline doubled, how much would quantity demanded fall?
- If the price of movie tickets doubled, how much would quantity demanded fall?
- If the price of Ford trucks fell 10%, would quantity demanded increase by 10%?
- If the price of Economics textbooks fell 20%, how much would quantity demanded increase?

PRICE ELASTICITY OF DEMAND

The price elasticity of demand (E_d) is the percentage change in quantity demanded divided by the percentage change in price.

$$E_d = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

PRICE ELASTICITY OF DEMAND

Example

If the price of chocolate ice cream increases by 10%, the quantity demanded of chocolate ice cream will decrease by 20%.

$$E_d = \frac{\% \Delta \text{ in Quantity demanded}}{\% \Delta \text{ in Price}}$$

$$E_d = - 20\%/10\% = - 2$$

$$E_d = 2$$

It is customary to drop the minus sign on Elasticity of Demand.

PRICE ELASTICITY OF DEMAND

Elastic vs. Inelastic Demand

- Demand can be
 - Elastic
 - Inelastic
 - Unitary elastic.

PRICE ELASTICITY OF DEMAND

Elastic Demand

- Demand is elastic if E_d is greater than 1.
- Consumers are very responsive to a change in price.

Example:

- The price of turnips increases by 20%, the quantity demanded falls by 60%.
- $E_d = - 60\%/20\% = - 3$
- $E_d = 3$

PRICE ELASTICITY OF DEMAND

Inelastic Demand

- Demand is inelastic if the absolute value of E_d is less than 1.
- Consumers are not very responsive to price changes.

Example:

- The price of cigarettes increases by 20%, the quantity demanded falls by 10%.
- $E_d = - 10\%/20\% = - 0.5$
- $E_d = 0.5$

PRICE ELASTICITY OF DEMAND

Unitary Elastic

- Demand is unitary elastic if the absolute value of E_d equals 1.
- The percentage change in quantity demanded is exactly equal to the percentage change in price.

Example:

- The price of balloons increases by 20%, consumers respond by decreasing their quantity demanded by 20%.
 - $E_d = - 20\%/20\% = - 1.0$
 - $E_d = 1$

COMPUTING THE PRICE ELASTICITY OF DEMAND: PROBLEMS OF DETERMINING THE BASE

$$E_d = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Example: If the price of gasoline *increases* from \$2.70 to \$3.00 and the amount you buy *falls* from 10 to 8 gallons then your elasticity of demand would be calculated as:

$$\frac{\frac{(10 - 8)}{10} \times 100}{\frac{(3.00 - 2.70)}{2.70} \times 100} = \frac{-20 \text{ percent}}{+11.1 \text{ percent}} = -1.8$$

COMPUTING THE PRICE ELASTICITY OF DEMAND: PROBLEMS OF DETERMINING THE BASE

$$E_d = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Example: If the price of gasoline **decreases** from \$3.00 to \$2.70 and the amount you buy **rises** from 8 to 10 gallons then your elasticity of demand would be calculated as:

$$\frac{\frac{(10 - 8)}{8} \times 100}{\frac{(3.00 - 2.70)}{3.00} \times 100} = \frac{+25 \text{ percent}}{-10 \text{ percent}} = -2.5$$

THE MIDPOINT FORMULA

Our calculation gave us an answer that doesn't make sense.

- E_d was 1.8 in response to a **rising** price, but 2.5 in response to a **falling** price.

This problem resulted from using different bases in the formula.

To avoid this problem, use an average for the base.

THE MIDPOINT FORMULA

$$\frac{\frac{(10-8)}{(10+8)/2}}{(2.70-3.00)/(3.00+2.70)/2} = \frac{\frac{(10-8)}{9}}{(2.70-3.00)/2.85} =$$

$$= \frac{22.2 \text{ percent}}{10.5 \text{ percent}} = 2.11$$

PRICE ELASTICITY AND TOTAL REVENUE

Total revenue

The price of a product multiplied by the quantity sold in a given time period.

$$\text{Total Revenue} = \text{Price} \times \text{Quantity Sold}$$

PRICE ELASTICITY AND TOTAL REVENUE

You own a movie theatre and notice that attendance has fallen over the past year.

- Should you cut the price of your tickets?
- Would the quantity demanded rise with a fall in price?
- Would your revenues increase or decrease?
- i.e. would the increased Quantity sold compensate for the lower price per ticket?

PRICE ELASTICITY AND TOTAL REVENUE

Reducing the price will increase total revenues until price = \$2.00

Price	Quantity Demanded	Total Revenue
\$5.00	1	\$5.00
4.50	2	9.00
4.00	4	16.00
3.50	6	21.00
3.00	8	24.00

Price	Quantity Demanded	Total Revenue
\$2.50	12	\$30.00
2.00	16	32.00
1.50	20	30.00
1.00	25	25.00
0.50	30	15.00

Reducing the price below \$2.00 will decrease total revenues.

PRICE ELASTICITY AND TOTAL REVENUE

Summary

- Price cuts **reduce** total revenue if demand is price **inelastic**
- Price cuts **increase** total revenue if demand is price **elastic**
- Price cuts **do not change** total revenue if demand is **unitary elastic**

INCOME ELASTICITY OF DEMAND

measures how much the quantity demanded of a good responds to a change in consumers' income.

$$E_{\text{Income}} = \frac{\text{Percentage change in demand}}{\text{Percentage change in income}}$$

INCOME ELASTICITY OF DEMAND

An increase in income increases one's consumption of *almost all* goods.

- **Normal goods** are those whose consumption **increases** with an **increase** in income.
 - Income elasticity of demand will be a *positive* number
- **Inferior goods** are those whose consumption **decreases** when income **increases**.
 - Income elasticity of demand will be a *negative* number

NORMAL VS. INFERIOR GOODS: EXAMPLES

Normal goods are those whose consumption **increases** with an **increase** in income. Income elasticity of demand will be a ***positive*** number

- **Example:** Joe's income increased by 20%, and his consumption of Starbucks' coffee increased 40%. His income elasticity of demand for Starbucks' coffee is: $\% \text{ change in quantity} / \% \text{ change in income} = 40\% / 20\% = 2$

Inferior goods are those whose consumption **decreases** when income **increases**. Income elasticity of demand will be a ***negative*** number

- **Example:** Joe's income increased by 20%, and his consumption of clothes from Goodwill decreased by 40%. His income elasticity of demand for Goodwill clothing is: $+40\% / -20\% = -2$.

INCOME ELASTICITY – NORMAL GOODS

Goods consumers regard as *luxuries* tend to be **income elastic**.

- The percentage increase in demand is greater than the percentage increase in income.
- Examples: sports cars, jewelry, and expensive foods.

INCOME ELASTICITY – NORMAL GOODS

Goods consumers regard as **necessities** tend to be *income inelastic*

- Their percentage increase in demand is less than the percentage increase in income.
- Examples: food, fuel, clothing, utilities, and medical services.

CROSS-PRICE ELASTICITY OF DEMAND

measures how much the quantity demanded of **one** good responds to a change in the price of a **related good** income.

$$E_{\text{Cross - Price}} = \frac{\text{Percentage change in demand}}{\text{Percentage change in price of a related good}}$$

COMPLEMENTS AND SUBSTITUTES

Substitutes are goods that can be used in place of another.

- Substitutes have **positive** cross-price elasticities.

Complements are goods that are used in conjunction with other goods.

- Complements have negative cross-price elasticities.

CROSS-PRICE ELASTICITY OF DEMAND:

Substitutes (Positive Elasticity)

- 10% drop in price of orange juice causes 5% drop in quantity of grapefruit juice
 - Cross-price elasticity = $-10\% / -5\% = 2$

Complements (Negative Elasticity)

- 10% drop in price of peanut butter causes 8% rise in quantity of jelly
 - Cross-price elasticity = $8\% / -10\% = -0.80$

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.
- Refers to the behavior of suppliers (rather than consumers).
 - Example: If the price of wheat rises, how much will quantity supplied increase?
 - Example: If the price of cars with hybrid engines rises, how much will the quantity supplied increase?