Elasticity
Responsiveness of Demand and Supply to Price and Other Influences

Q: What do the shapes of the demand/supply curves tell us?
A: How responsive quantity demanded and quantity supplied are to changes in price.
This is called ELASTICITY
Elasticity is important to ask these questions:
What happens if a firm wishes to lower/raise quantity?
What is the effect on the firm's revenue?

Total Revenue Test
Total Revenue Test used to determine the effects of price changes on revenue
Total revenue = (price of the good)(quantity sold)
TR= (P)(Q)
= buyer’s expenditures

Determine TR both before and after price change to determine effect on revenue
TR test and Elasticity

Do TR test both before and after price change to determine effect on revenue

However, waiting to determine Q change as a result of P change may find your firm with negative profits.

How can one determine the result of a TR test without having to wait for the results?

PRICE ELASTICITY OF DEMAND

• The responsiveness of quantity demanded to a change in its own price, ceteris paribus.

\[ E_d = \frac{\text{Percent change in quantity demanded}}{\text{Percent change in price}} \]

\[ |E_d| = \frac{\% \Delta Q_d}{\% \Delta P} \]

Since \( E_d \) is negative, by convention we take the absolute value

Calculating Elasticities

How do we calculate the elasticities?

**MIDPOINT FORMULA**

\[ E_d = \frac{(\Delta Q)/Q_{avg.}}{(\Delta P)/P_{avg.}} \]
Elasticity

We can classify elasticities into 5 categories:

1. **$E_d = 0$** $\implies$ Perfectly Inelastic
2. **$0 < E_d < 1$** $\implies$ Inelastic
3. **$E_d = 1$** $\implies$ Unit elastic
4. **$1 < E_d < \infty$** $\implies$ Elastic
5. **$E_d = \infty$** $\implies$ Perfectly Elastic

More on Demand Elasticity

- Why are some goods elastic/inelastic in demand?

**ANSWER:**
1) Substitutes
2) Time
3) Definition of the good
4) Proportion of income spent on the good

Other Elasticities of Demand

We know that there are influences on demand other than the "own" price

1) Suppose the price of an alternative good (substitute, complement) changes
2) Income also affects demand
Cross-Price Elasticity

CROSS PRICE ELASTICITY (goods X and Y)

\[ E_{xy} = \frac{\% \Delta Q_{dx}}{\% \Delta P_y} \]

- If \( E_{xy} = 0 \) \( \Rightarrow \) no relation between goods
- If \( E_{xy} < 0 \) \( \Rightarrow \) complementary goods
- If \( 0 < E_{xy} < \infty \) \( \Rightarrow \) substitute goods
- If \( E_{xy} = \infty \) \( \Rightarrow \) perfect substitutes

Income Elasticity of Demand

Income Elasticity of Demand

\[ E_i = \frac{\% \Delta Q_d}{\% \Delta I} \]

where \( I = \) Income

- If \( E_i > 1 \) \( \Rightarrow \) Normal, elastic good
- If \( 0 < E_i < 1 \) \( \Rightarrow \) Normal, inelastic good
- If \( E_i < 0 \) \( \Rightarrow \) Inferior good

Price Elasticity of Supply

We should also be concerned with how responsive quantity supplied is to a change in price

PRICE ELASTICITY OF SUPPLY

\[ E_S = \frac{\% \Delta Q_S}{\% \Delta P} \]
More on Elasticity of Supply

NOTE: since the supply curve is upward sloping, $E_s$ is always positive
NOTE: same terminology applies as far as elastic, inelastic, and unit elastic

What determines supply elasticities???
1) Factor substitutability
2) Time dimension - Short-run vs long-run
   a. Momentary
   b. Short-run
   c. Long-run