

**Elasticity**  
Responsiveness of Demand and  
Supply to Price and Other Influences

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**Elasticity**

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?

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**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

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## 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?

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## PRICE ELASTICITY OF DEMAND

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

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

$$|E_d| = |\% \Delta Q_d / \% \Delta P|$$

Since  $E_d$  is negative, by convention we take the absolute value

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## Calculating Elasticities

How do we calculate the elasticities?

### MIDPOINT FORMULA

$$E_d = \left\{ \frac{\Delta Q}{Q_{\text{avg}}} \right\} / \left\{ \frac{\Delta P}{P_{\text{avg}}} \right\}$$

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## 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

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## 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

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## 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

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## Cross-Price Elasticity

CROSS PRICE ELASTICITY (goods X and Y)

$$E_{xy} = (\% \Delta Q_{dx}) / (\% \Delta P_y)$$

- If  $E_{xy} = 0$        $\implies$  no relation between goods
- If  $E_{xy} < 0$        $\implies$  complementary goods
- If  $0 < E_{xy} < \infty$        $\implies$  substitute goods
- If  $E_{xy} = \infty$        $\implies$  perfect substitutes

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## Income Elasticity of Demand

Income Elasticity of Demand

$$E_I = (\% \Delta Q_d) / (\% \Delta I)$$

where I = Income

- If  $E_I > 1$        $\implies$  Normal, elastic good
- If  $0 < E_I < 1$        $\implies$  Normal, inelastic good
- If  $E_I < 0$        $\implies$  Inferior good

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## Price Elasticity of Supply

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

PRICE ELASTICITY OF SUPPLY

$$E_S = (\% \Delta Q_S) / (\% \Delta P)$$

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### 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

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