Economics 001  
Principles of Microeconomics  
Professor Arik Levinson

Lecture 6
- Elasticity
- Price elasticity of Demand
- Income elasticity
- Cross-price elasticity

If you are a farmer, do you support BGH or not?
A. support BGH  
B. oppose BGH

Bovine Growth Hormone (BGH)
- increases milk production
- safe and indistinguishable from other milk

Elasticity example
- Bovine Growth Hormone (BGH)
  - increases milk production
  - safe and indistinguishable from other milk
- Why are dairy farmers opposed?

DN: Revenue = Price x Quantity
Revenue change depends on "steepness" of demand curve

Demand curve shallow

Demand curve steep
DN: Price elasticity of demand

$$\eta_D = \frac{\% \Delta Q_D}{\% \Delta P_D}$$

Arc Elasticity of Demand

$$\eta_D = -\frac{\frac{Q_2 - Q_1}{1/2(Q_1 + Q_2)}}{\frac{P_2 - P_1}{1/2(P_1 + P_2)}} = -\frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

DN: Demand is **price elastic** if \( \eta_D > 1 \)

DN: Demand is **price inelastic** if \( \eta_D < 1 \)

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**Figure 5-2** A Straight-Line Demand Curve

**Figure 5-3** Three Demand Curves with Constant Elasticity

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Total revenue and \( \eta_D \)

- If demand is elastic, a 1 percent price cut increases the quantity sold by more than 1 percent, and total revenue increases.
- If demand is inelastic, a 1 percent price cut increases the quantity sold by less than 1 percent, and total revenue decreases.
- If demand is unitary elastic, a 1 percent price cut increases the quantity sold by 1 percent, and total revenue remains unchanged.
Long run v. short run $\eta_D$

Examples of demand elasticity

- public transport: 0.4
- food: 0.4
- gas: 0.5
- clothing: 0.6
- beef: 1.0
- automobiles: 2.1
- hats: 3.0

Elasticity of Demand Across Countries

- The elasticity of demand for food is estimated to be 0.8 in India, Nigeria, and Tanzania—much higher than in the U.S.
- In those three countries, a 10% increase in the price of food will lead to an 8% drop in quantity.
- The amount spent on food will rise by 2%.

DN: Price elasticity of supply

$$\eta_S = \frac{\%\Delta Q_S}{\%\Delta P}$$

DN: Income elasticity of demand

$$\eta_Y = \frac{\%\Delta Q_D}{\%\Delta Y}$$

Income elasticity can be positive or negative

Suppose income increases

a "normal" good

an "inferior" good
Income Elasticity of Demand

Positive income elasticity
\[ \eta_y > 1 \]

Normal income elasticity
\[ 0 < \eta_y < 1 \]

Necessity
\[ \eta_y < 0 \]

Examples of income elasticity
- whole milk: -0.5
- potatoes: -0.2
- wine in France: 0.1
- food: 0.2
- poultry: 0.3
- gas: 1.1
- wine in U.S.: 1.4
- restaurant meals: 2.4

DN: Cross-price elasticity

\[ \eta_{AB} = \frac{\%\Delta Q_A}{\%\Delta P_B} \]

DN: Goods are substitutes if \( \eta_{AB} > 0 \)

DN: Goods are complements if \( \eta_{AB} < 0 \)