Economics 101 – Section 5

Lecture 9
February 12
Price Elasticity of demand
Income Elasticity of demand
Cross price elasticity of demand

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Figure 6 Elasticity and Straight-Line Demand Curves

Since equal dollar increases (vertical arrows) are smaller and smaller percentage increases . . .

Since equal quantity decreases (horizontal arrows) are larger and larger percentage decreases . . .

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Figure 7 Extreme Cases of Demand

(a) Perfectly Inelastic Demand

(b) Perfectly Elastic Demand

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Elasticity

- When demand is price inelastic, total expenditure moves in the same direction as price.
- When demand is price elastic, total spending moves in the opposite direction as price.
- When demand is unitary elastic, total expenditure remains the same as price changes.

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Elasticity and Expenditure

- When the price of a good increases then we will demand less of it
  - This is the law of demand
  - This does not mean the total amount spent on the good (i.e. total expenditure - TE) will decrease
  
  \[ TE = P \times Q \]

- Fewer goods are purchased but the price is higher
  - Whether expenditure increases or decreases will depend on the price elasticity of demand for the good

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Table 1 Effects of Price Changes on Expenditure

<table>
<thead>
<tr>
<th>Where demand is:</th>
<th>A price increase will:</th>
<th>A price decrease will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inelastic ((</td>
<td>E_D</td>
<td>&lt; 1))</td>
</tr>
<tr>
<td>Unitary elastic ((</td>
<td>E_D</td>
<td>= 1))</td>
</tr>
<tr>
<td>Elastic ((</td>
<td>E_D</td>
<td>&gt; 1))</td>
</tr>
</tbody>
</table>
Table 2  Effects of Price Changes for Laptop Computers

<table>
<thead>
<tr>
<th>Price per Laptop (P)</th>
<th>Quantity Demanded (per Month) (Q)</th>
<th>Total Monthly Expenditure (P \times Q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>600,000</td>
<td>$600 million</td>
</tr>
<tr>
<td>$1,500</td>
<td>500,000</td>
<td>$750 million</td>
</tr>
<tr>
<td>$3,000</td>
<td>200,000</td>
<td>$600 million</td>
</tr>
<tr>
<td>$3,500</td>
<td>100,000</td>
<td>$350 million</td>
</tr>
</tbody>
</table>

Elasticity and Expenditure

At any point on the demand curve the area bounded by the price and quantity lines is equal to total expenditure.

Determinants of Elasticity

- **Availability of substitutes**
  - When price of a good rises we look for substitutes, the easier it is to find a substitute the easier it is to adjust our purchases (less of the given good and more of the substitute).
  - Generally,
    - The more narrowly the good is defined, the easier it is to find substitutes, and the more elastic is demand for the good.
    - The broader the good is defined, the harder it is find substitutes, and the less elastic is demand.

- **The more necessary a good is, the harder it is to find substitutes and the demand tends to be less elastic**
  - Examples
    - Insulin
    - Heroin for an addict
    - Gas for our vehicles
    - Short run vs. long run

Determinants of Elasticity

- **Short-run elasticity**
  - The quantity response is measured after only a short period of time (i.e. a few months).
  - Not much time to find substitutes
  - Price elasticity of gasoline in short-run \(-0.2\)

- **Long-run elasticity**
  - The quantity response is measured after a longer period of time (i.e. a year +)
  - More time to find substitutes
  - Price elasticity of gasoline in long-run \(>0.6\)
Income Elasticity of Demand

- The **income elasticity of demand** is the percentage change in quantity demanded divided by the percentage change in income holding all other variables constant:
  
  \[ E_I = \frac{\% \Delta Q^{\text{Demand}}}{\% \Delta \text{Income}} \]

- Note – Price elasticity of demand is always negative (satisfies the law of demand)
- However, income elasticity of demand could be negative or positive
- Recall our discussion about normal and inferior goods

Income Elasticity of Demand

- Inferior goods – demand decreases when income rises
  - Examples –
    - ramen noodles
    - Ground beef
  - Inferior goods have a negative income elasticity
    \[ E_I < 0 \text{ for inferior goods} \]

Income Elasticity of Demand

- Normal goods
  - As your income rises so does your demand for the good
  - Positive income elasticity
    \[ E_I > 0 \]

Income Elasticity of Demand

- Normal goods can be broken into two categories
  1. Necessities – a good with an income elasticity of demand between 0 and 1
     - \( 0 < E_I < 1 \)
     - Examples:
       - Electricity
  2. Luxury goods – a good with an income elasticity of demand greater than 1
     - \( E_I > 1 \)
     - Examples:
       - Diamond jewelry
       - Ivory back scratchers

Cross-Price Elasticity of Demand

- Cross price elasticity of demand is the percentage change in the quantity demanded for a percentage change in the price of some other good while holding all other factors constant:
  
  \[ E_{x,y} = \frac{\% \Delta Q_x^{\text{Demand}}}{\% \Delta P_y} \]
Cross-Price Elasticity of Demand

- Recall our discussion on substitutes and complements.
- If two goods are substitutes then the cross-price elasticity of demand is positive:
  - $E_{x,y} > 0$
  - Examples:
    - Tea and coffee
    - Geo metros and Ford escorts

Cross-Price Elasticity of Demand

- If two goods are complements the cross-price elasticity of demand is negative:
  - $E_{x,y} < 0$
  - Examples:
    - Demand for SUVs and the price of gas
    - Shoes and the price of shoe laces
    - Televisions and the price of cable