Economics 101 – Section 5

Lecture 9
February 12

Price Elasticity of demand
Income Elasticity of demand
Cross price elasticity of demand

Figure 6 Elasticity and Straight-Line Demand Curves

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

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

... demand becomes more and more elastic as we move leftward and upward along a straight line demand curve.
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.
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

<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 3 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
Determination 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

Figure 8 Elasticity and Total Expenditure
Determinants of Elasticity

- 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.

\[ E_I = \frac{\% \Delta Q^{\text{Demanded}}}{\% \Delta \text{Income}} \]

- 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

\[ E_I < 0 \] 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_1<1
      - i.e. electricity
  - 2) Luxury goods – a good with an income elasticity of demand greater than 1
    - E_2>1
      - 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

\[
E_{x,y} = \frac{\%\Delta Q_x^{Demanded}}{\%\Delta P_y}
\]
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