Chapter 4
Elasticities of demand and supply

The price elasticity of demand

...measures the sensitivity of the quantity demanded of a good to a change in its price

It is defined as:

\[
\frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}
\]
Elastic demand

• Demand is ELASTIC
  – when the price elasticity (ignoring the negative sign) is greater than -1
  – i.e. when the % change in quantity demanded exceeds the change in price
    • e.g. if quantity demanded falls by 7% in response to a 5% increase in price
    • elasticity is $-7 \div 5 = -1.4$

Inelastic demand

• Demand is INELASTIC
  – when the price elasticity lies between -1 and 0
  – i.e. when the % change in quantity demanded is smaller than the change in price
    • e.g. if quantity demanded falls by 3.5% in response to a 5% increase in price
    • elasticity is $-3.5 \div 5 = -0.7$
Unit elastic demand

- Demand is UNIT ELASTIC
  - when the price elasticity is exactly -1
  - i.e. when the % change in quantity demanded is equal to the change in price
    - e.g. if quantity demanded falls by 5% in response to a 5% increase in price
    - elasticity is \(-5 \div 5 = -1\)

Price elasticity for a linear demand curve

The price elasticity varies along the length of a straight-line demand curve.
What determines the price elasticity?

• The ease with which consumers can substitute another good.

• EXAMPLE:
  – consumers can readily substitute one brand of detergent for another if the price rises
  – so we expect demand to be elastic
  – but if all detergent prices rise, the consumer cannot switch
  – so we expect demand to be inelastic

Elasticity is higher in the long run

• In the short run, consumers may not be able (or ready) to adjust their pattern of expenditure.

• If price changes persist, consumers are more likely to adjust.

• Demand thus tends to be
  – more elastic in the long run
  – but relatively inelastic in the short run.
Elasticity and revenue

When price is changed, the impact on a firm's total revenue (TR) will depend upon the price elasticity of demand.

<table>
<thead>
<tr>
<th></th>
<th>For a price increase</th>
<th>For a price decrease</th>
</tr>
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<tbody>
<tr>
<td>Demand is elastic</td>
<td>TR decreases</td>
<td>TR increases</td>
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<tr>
<td>Demand is unit elastic</td>
<td>TR does not change</td>
<td>TR does not change</td>
</tr>
<tr>
<td>Demand is inelastic</td>
<td>TR increases</td>
<td>TR decreases</td>
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</tbody>
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For a price fall: if demand is elastic, revenue from new sales will exceed the fall in revenue from existing sales - total revenue will rise; if demand is inelastic, revenue from new sales will be less than the fall in revenue from existing sales - total revenue will fall.
Elasticity and tube fares

How should tube fares be changed to increase revenues?

- Passengers can use buses, taxis, cars etc
  - so demand may be elastic (e.g. -1.4)
  - and an increase in fares will reduce the number of journeys demanded and total spending
- If passengers do not have travel options
  - demand may be inelastic (e.g. -0.7)
  - so raising fares will have less effect on journeys demanded
  - and revenue will improve

The cross price elasticity of demand

The cross price elasticity of demand for good i with respect to the price of good j is:

\[
\frac{\text{% change in quantity demanded of good i}}{\text{% change in the price of good j}}
\]

This may be positive or negative

The cross price elasticity tends to be negative
- if two goods are substitutes: e.g. tea and coffee

The cross price elasticity tends to be positive
- if two goods are complements e.g. tea and milk.
Price elasticities in the UK

<table>
<thead>
<tr>
<th>Percentage change in the quantity demanded of</th>
<th>Food</th>
<th>Clothing</th>
<th>Transport</th>
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<tbody>
<tr>
<td>Food</td>
<td>−0.4</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Clothing and footwear</td>
<td>0.1</td>
<td>−0.5</td>
<td>−0.1</td>
</tr>
<tr>
<td>Travel and communications</td>
<td>0.3</td>
<td>−0.1</td>
<td>−0.5</td>
</tr>
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The income elasticity of demand

The income elasticity of demand measures the sensitivity of quantity demanded to a change in income:

\[
\text{% change in quantity demanded of a good} = \frac{\text{% change in consumer income}}{\text{% change in quantity demanded of a good}}
\]

The income elasticity may be positive or negative.
Normal and inferior goods

- A NORMAL GOOD has a positive income elasticity of demand
  - an increase in income leads to an increase in the quantity demanded
    - e.g. dairy produce
- An INFERIOR GOOD has a negative income elasticity of demand
  - an increase in income leads to a fall in quantity demanded
    - e.g. coal
- A LUXURY GOOD has an income elasticity of demand greater than 1
  - e.g. wine

Income and the demand curve

For an increase in income:

NORMAL GOOD
- Demand curve moves to the right

INFERIOR GOOD
- Demand curve moves to the left