MFP SET

Lecture 3
Surplus: Consumer & producer
Elasticity & its applications
Consumer surplus

- **Willingness to pay**: the maximum amount that a consumer will pay for a good
- **Consumer surplus**: the difference between a consumer’s willingness to pay and the amount the consumer actually pays
Consumer surplus

Price

Quantity

Consumer surplus

Amount paid
Producer surplus

- **Cost**: the value of everything a seller must give up (use) to produce a good
  - Remember opportunity cost
- **Producer surplus**: the amount seller is paid for a good minus the cost of the good
Consumer surplus

Price

Quantity

Producer surplus

Cost

2000

MFP SET 2000
Elasticity . . .

. . . is a measure of how much buyers and sellers respond to changes in market conditions. . .

. . . allows us to analyse supply and demand with greater precision
Three Types of Elasticities

- Price elasticity of demand
- Income elasticity of demand
- Price elasticity of supply
Price Elasticity of Demand

- Price elasticity of demand is the percentage change in quantity demanded given a one percent change in the price
Ranges of Elasticity

- **Inelastic Demand**
  - Quantity demanded does not respond strongly to price changes

- **Elastic Demand**
  - Quantity demanded responds strongly to changes in price.
Ranges of Elasticity

- **Perfectly Inelastic**
  - Quantity demanded does not respond to price changes

- **Perfectly Elastic**
  - Quantity demanded changes infinitely with any change in price

- **Unit Elastic**
  - Quantity demanded changes by the same percentage as the price
The Price Elasticity of Demand: Perfectly Inelastic

Demand

Price

Quantity

$5

4

0

100

2000 MFP SET 2000
The Price Elasticity of Demand: Perfectly Elastic

1. At any price above $4, quantity demanded is zero.

2. At exactly $4, consumers will buy any quantity.

3. At a price below $4, quantity demanded is infinite.
The Price Elasticity of Demand: Unit Elastic

1. A 22% increase in price...

2. ...leads to a 22% decrease in quantity demanded.
The Price Elasticity of Demand: Elastic Demand

1. A 22% increase in price...
2. ...leads to a 67% decrease in quantity demanded.
The Price Elasticity of Demand: Inelastic Demand

1. A 22% increase in price...

2. ...leads to an 11% decrease in quantity demanded.
Determinants of Price Elasticity of Demand

- Demand tends to be more *elastic*...
  - if the good is a luxury
  - the longer the time period
  - the larger the number of close substitutes
  - the more narrowly defined the market
Determinants of Price Elasticity of Demand

- Demand tends to be more elastic . . .
  ➢ if the good is a necessity
  ➢ the shorter the time period
  ➢ the fewer the number of close substitutes
  ➢ the more broadly defined the market
Computing the Price Elasticity of Demand

The price elasticity of demand is computed as the percentage change in the quantity demanded divided by the percentage change in price.
The price elasticity of demand is computed as the percentage change in the quantity demanded divided by the percentage change in price.

\[
\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}
\]
Computing the Price Elasticity of Demand

Demand is price elastic

\[ E_D = \frac{(100 - 50)}{(5.00 - 4.00)} = \frac{50}{1} = 50 \text{ percent} \]

\[ = \frac{50}{4} = 12.5 \text{ percent} \]

\[ = \frac{-25}{-1} = 25 \text{ percent} \]
Elasticity is larger than 1.

Elasticity is smaller than 1.
Elasticity and Total Revenue

- **Total revenue** is the amount paid by buyers and received by sellers of a good.
- Computed as the price of the good times the quantity sold.

\[ TR = P \times Q \]
Elasticity and Total Revenue

\[ P \times Q = \$400 \] (total revenue)
Elasticity and Total Revenue

- With an elastic demand curve, an increase in the price leads to a decrease in quantity demanded that is proportionately larger.
- So total revenue decreases.
Elasticity and Total Revenue: Elastic Demand

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4</td>
<td>50</td>
<td>$200</td>
</tr>
<tr>
<td>$5</td>
<td>20</td>
<td>$100</td>
</tr>
</tbody>
</table>

Demand
Revenue = $200

Demand
Revenue = $100
Elasticity and Total Revenue

- With an inelastic demand curve, an increase in price leads to a decrease in quantity that is proportionately smaller.
- So total revenue increases.
Elasticity and Total Revenue: Inelastic Demand

Inelastic Demand

- Demand 1: $1 Demand
  - Revenue = $100
  - Quantity 0
- Demand 2: $3 Demand
  - Revenue = $240
  - Quantity 80

Revenue equations:

- Revenue = price * quantity
  - Revenue 1: $1 * 100 = $100
  - Revenue 2: $3 * 80 = $240
Income Elasticity of Demand

- Income elasticity of demand measures how much the quantity demanded of a good responds to a change in consumers’ income.
- It is computed as the percentage change in the quantity demanded divided by the percentage change in income.
Computing Income Elasticity

Income Elasticity of Demand = \frac{Percentage Change in Quantity Demanded}{Percentage Change in Income}
Income Elasticity... Types

- Higher income *raises* the quantity demanded for normal goods but *lowers* the quantity demanded for inferior goods.

- Goods regarded as necessities tend to be income inelastic
  - food, fuel, clothing, utilities, & medical services

- Goods regarded as luxuries tend to be income elastic
  - sports cars, expensive foods
Price Elasticity of Supply

Price elasticity of supply is the percentage change in quantity supplied resulting from a one percent change in price.
### Ranges of Elasticity

<table>
<thead>
<tr>
<th>Type</th>
<th>Elasticity</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectly Elastic</td>
<td>$E_S = \infty$</td>
<td></td>
</tr>
<tr>
<td>Relatively Elastic</td>
<td>$E_S &gt; 1$</td>
<td></td>
</tr>
<tr>
<td>Unit Elastic</td>
<td>$E_S = 1$</td>
<td></td>
</tr>
<tr>
<td>Relatively Inelastic</td>
<td>$E_S &lt; 1$</td>
<td></td>
</tr>
<tr>
<td>Perfectly Inelastic</td>
<td>$E_S = 0$</td>
<td></td>
</tr>
</tbody>
</table>
Price Elasticity of Supply: Perfectly Inelastic Supply

1. An increase in price...
2. ...leaves the quantity supplied unchanged.
Price Elasticity of Supply: Inelastic Supply

1. A 22% increase in price...

2. ...leads to a 10% increase in quantity supplied.
Price Elasticity of Supply: Unit Elastic Supply

Quantity

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>125</td>
</tr>
</tbody>
</table>

1. A 22% increase in price...

2. ...leads to a 22% increase in quantity supplied.
Price Elasticity of Supply: Elastic Supply

1. A 22% increase in price...

2. ...leads to a 67% increase in quantity supplied.
1. A 22% increase in price...

2. At exactly $4, producers will supply any quantity.

3. At a price below $4, quantity supplied is zero.
Determinants of Elasticity of Supply

- Ability of sellers to change the amount of the good they produce
  - Beach-front land is inelastic
  - Books, cars, or manufactured goods are elastic

- Time period
  - Supply is more elastic in the long run
Computing the Price Elasticity of Supply

The price elasticity of supply is computed as the percentage change in the quantity supplied divided by the percentage change in price.

\[
\text{Elasticity of Supply} = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}}
\]
Application of Elasticity

Can good news for farming be bad news for farmers?

➢ What happens to wheat farmers and the market for wheat when university agronomists discover a new wheat hybrid that is more productive than existing varieties?
Application of Elasticity

- Examine whether the supply or demand curve shifts
- Determine the direction of the shift of the curve
- Use the supply-and-demand diagram to see how the market equilibrium changes
An Increase in Supply in the Market for Wheat

<table>
<thead>
<tr>
<th>Quantity of Wheat</th>
<th>Price of Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>$3</td>
</tr>
</tbody>
</table>
An Increase in Supply in the Market for Wheat

1. When demand is inelastic, an increase in supply...
An Increase in Supply in the Market for Wheat

1. When demand is inelastic, an increase in supply...
An Increase in Supply in the Market for Wheat

1. When demand is inelastic, an increase in supply...

2. ...leads to a large fall in price...

Price of Wheat

$3

$3

2

2

Quantity of Wheat

0

100

110

Demand

S1

S2
An Increase in Supply in the Market for Wheat

1. When demand is inelastic, an increase in supply...

2. ...leads to a large fall in price...

3. ...and a proportionately smaller increase in quantity sold. As a result, revenue falls from $300 to $220.
Computing Elasticity

Demand is inelastic
Application: Oil price shocks

(a) The Oil Market in the Short Run
1. In the short run, when supply and demand are inelastic, a shift in supply...
2. ...leads to a large increase in price.

(b) The Oil Market in the Long Run
1. In the long run, when supply and demand are elastic, a shift in supply...
2. ...leads to a small increase in price.

Application: Oil price shocks
Application: drug policy

(a) Drug Interdiction

1. Drug interdiction reduces the supply of drugs...
2. Which raises the price...
3. ...and reduces the quantity sold.

(b) Drug Education

1. Drug education reduces the demand for drugs...
2. ...which reduces the price...
3. ...and reduces the quantity of drugs
Conclusion

- Price elasticity of demand measures how much the quantity demanded responds to changes in the price.
- If a demand curve is elastic, total revenue falls when the price rises.
- If it is inelastic, total revenue rises as the price rises.
- The price elasticity of supply measures how much the quantity supplied responds to changes in the price.
- In most markets, supply is more elastic in the long run than in the short run.