



Module:
Microeconomics

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Microeconomics

Lecture - 7

Elasticity

Elasticity

Price Elasticity of Demand
Cross Price Elasticity of Demand
Income Elasticity of Demand
Price Elasticity of Supply

Price Elasticity of Demand

- What is the change in quantity demanded of a particular good when its price changes ?
- For two different goods the same percentage change in price may lead to very different percentage changes in quantity demanded

Price Elasticity of Demand

- The responsiveness of the percentage change in quantity demanded to a percentage change in price is called the Price Elasticity of Demand (PED)
- This concept helps us understand economic problems such as, how do firms set prices, at what rate do governments set taxes and how do farmers react to changes in weather conditions

Price Elasticity of Demand

Price Elasticity of Demand =

$$\frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

**PED is nearly always negative because usually when price increases quantity falls and vice versa
(Demand curve normally downward sloping)**

Calculating Percentage Changes

Standard method
of computing the
percentage (%) change:

$$\frac{\text{end value} - \text{start value}}{\text{start value}} \times 100\%$$



Going from A to B,
the % change in P equals
 $(\$250 - \$200)/\$200 = 25\%$

Calculating Percentage Changes

Problem:

The standard method gives different answers depending on where you start.

From A to B,

P rises 25%, Q falls 33%,
elasticity = $33/25 = 1.33$

From B to A,

P falls 20%, Q rises 50%,
elasticity = $50/20 = 2.50$



Calculating Percentage Changes

- So, we instead use the **midpoint method**:

$$\frac{\text{end value} - \text{start value}}{\text{midpoint}} \times 100\%$$

- The midpoint is the number halfway between the start and end values, the average of those values.
- It doesn't matter which value you use as the start and which as the end—you get the same answer either way!

Calculating Percentage Changes

- Using the midpoint method, the % change in **P** equals

$$\frac{\$250 - \$200}{\$225} \times 100\% = 22.2\%$$

- The % change in **Q** equals

$$\frac{12 - 8}{10} \times 100\% = 40.0\%$$

- The price elasticity of demand equals

$$40/22.2 = 1.8$$

Determinants of PED

1. The number & closeness of substitutes

The more substitutes of a good & the closer they are the greater the PED

2. The proportion of Income spent on the good

The higher the proportion of income spent on the good the more the consumer will be forced to cut consumption when the price rises

3. Time Horizon

When price increases, people may take time to adjust their consumption and find alternatives

4. Necessities v. Luxuries

People are less able to reduce their consumption of necessities (There's clue in the name), consequently they are inelastic (and vice versa for luxuries)

Price Elasticity of Demand

The elasticity of a good can be divided into 3 broad categories

1. Elastic Demand

Where PED is more negative than -1 or PED is greater than $| -1 |$

This occurs when the percentage change in quantity exceeds the percentage change in price

i.e. Numerator > Denominator

Price Elasticity of Demand

2. Inelastic Demand

Where the PED lies between –1 and 0

This occurs when the percentage change in quantity is less than the percentage change in price

i.e. Numerator < Denominator

Price Elasticity of Demand

3. Unit Elasticity

Where PED equals 1

This occurs where the percentage change in quantity
equals the percentage change in price

i.e. Numerator = Denominator

Price Elasticity of Demand

- **Summary**
- Elastic Demand – Price changes have a big affect on quantity demanded.
Demand curve is relatively flat*
- Inelastic Demand – Price changes have a small affect on quantity demanded
Demand curve is relatively steep*
- *Warning: There are “issues” with this interpretation !!

Price, Quantity & Total Revenue

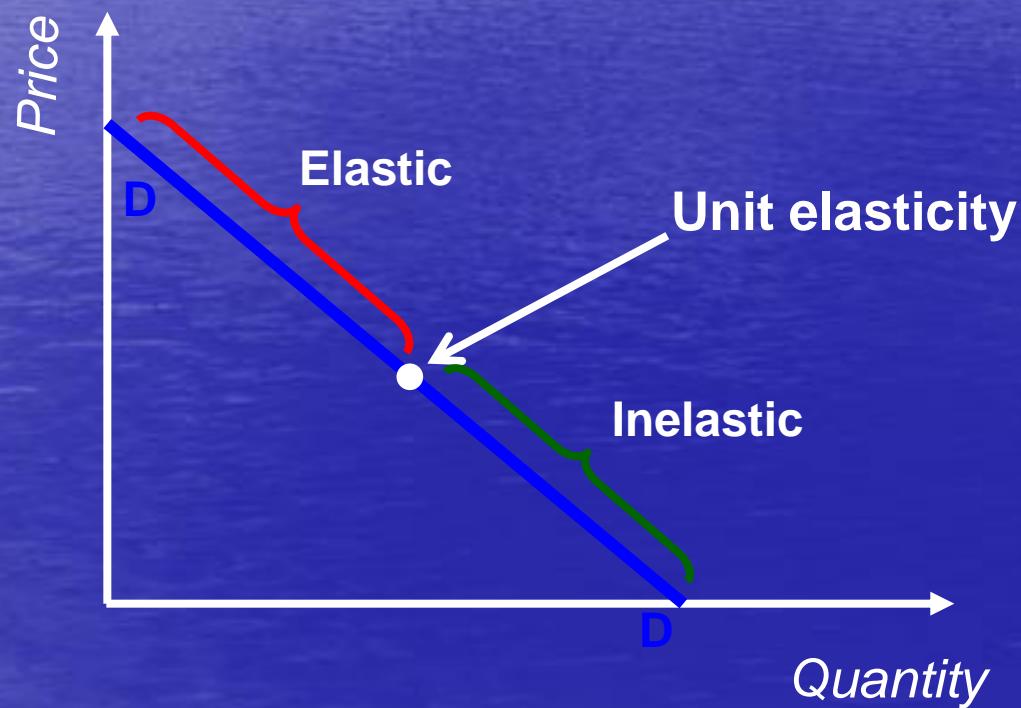
- Total revenue is equal to price multiplied by quantity
- When demand is elastic, quantity demanded changes proportionately more than price
 - i.e. ΔQ has a bigger effect on TR than ΔP
 - $P \downarrow, Q \uparrow$ proportionately more $\Rightarrow TR \uparrow$
 - $P \uparrow, Q \downarrow$ proportionately more $\Rightarrow TR \downarrow$

Price, Quantity & Total Revenue

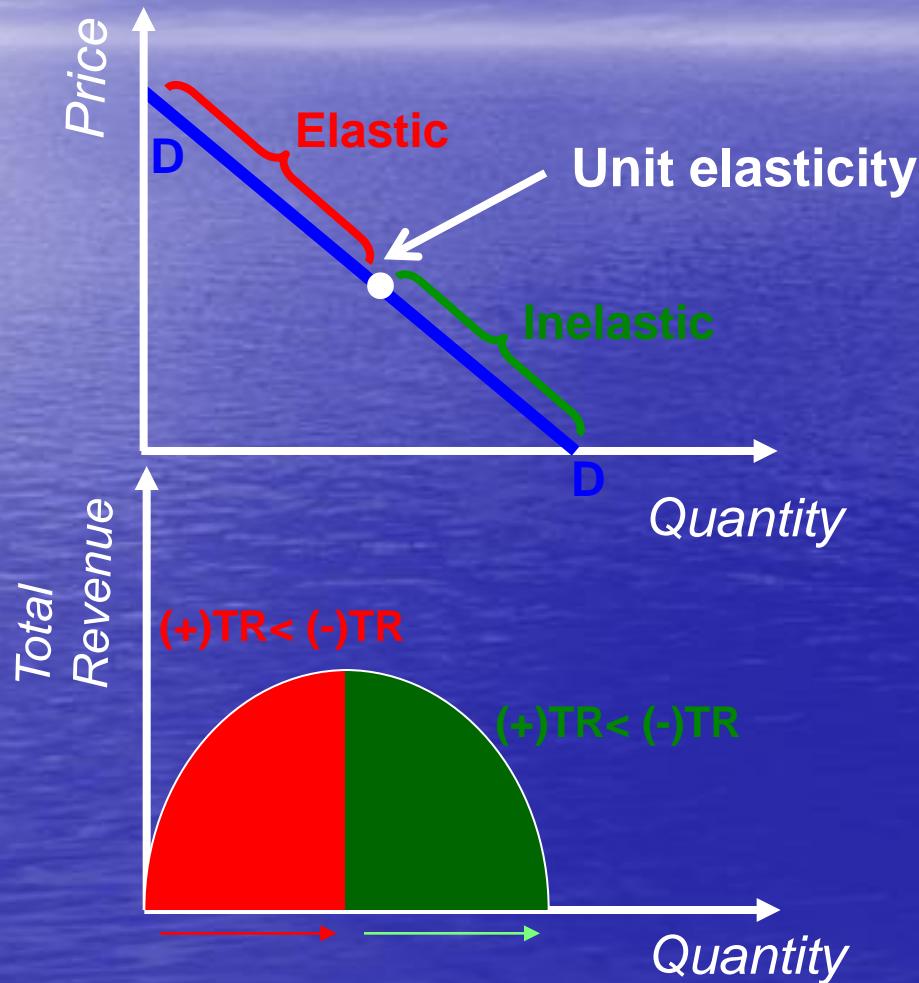
- When demand is inelastic, price changes proportionately more than quantity demanded
- i.e. ΔP has a bigger effect on TR than ΔQ
- $P \downarrow, Q \uparrow$ proportionately less $\Rightarrow TR \downarrow$
- $P \uparrow, Q \downarrow$ proportionately more $\Rightarrow TR \uparrow$

Price elasticity for a linear demand curve

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



Elasticity and price reductions



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

Cross Price Elasticity

- Cross Price Elasticity measures the responsiveness of demand for one product to a change in the price of another
- The cross price elasticity of good A with respect to good B is the percentage change in Q_A divided by the percentage change in P_B

Cross Price Elasticity

- $CPE_{AB} =$

$$\frac{\% \text{ change in quantity of good A demanded}}{\% \text{ change in price of good B}}$$

- CPE + for substitutes
- CPE - for complements

A low absolute CPE means a weak substitute/complement & vice versa

Cross Price Elasticity

- The major determinant of CPE is the closeness of the substitute or complement
- The closer the good is the bigger will be the effect of the change in price of the other good
- Important for firms to know CPE of rival good (substitute) or CPE of good used in conjunction with their own e.g. car makers and the price of oil

Income Elasticity of Demand

- YED measures the responsiveness of demand to a change in consumer income
- It enables us to predict how much the demand curve will shift for a given change in income

Income Elasticity of Demand

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

$$\frac{\% \text{ change in quantity demanded of a good}}{\% \text{ change in consumer income}}$$

- income elasticity may be positive or negative.

Income Elasticity of Demand

- A NORMAL GOOD has a positive income elasticity of demand
 - an increase in income leads to an increase in the quantity demanded
 - e.g. shoes
- 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 NECESSITY GOOD has an income elasticity of demand between 0 & 1
 - e.g. beer
- A LUXURY GOOD has an income elasticity of demand greater than 1
 - e.g. craft beer

Price Elasticity of Supply

Price Elasticity of Supply =

$$\frac{\% \text{ change in quantity supplied}}{\% \text{ change in price}}$$

- **Price elasticity of supply** measures how much the quantity supplied responds to a change in P .

Determinants of PES

1. Flexibility of Production

The more easily sellers can change the quantity they produce, the greater the price elasticity of supply.

2. Time Horizon

For many goods, PES is more elastic in the long run than in the short run, due to the fact that firms can acquire new factories, or new firms may be able to enter the market.

APPLICATION: Does Drug Prohibition Increase or Decrease Drug-Related Crime?

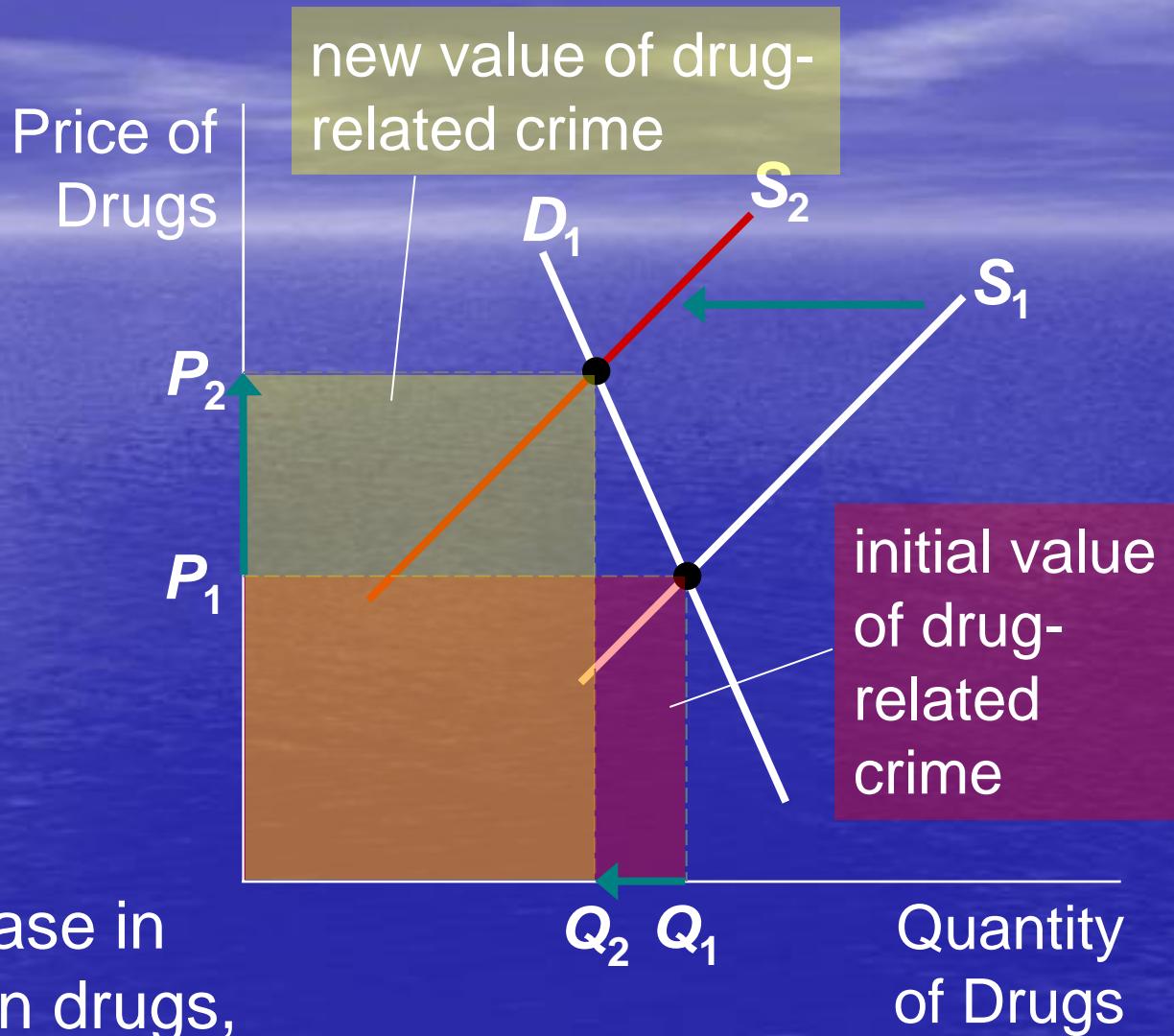
- One side effect of illegal drug use is crime: Users often turn to crime to finance their habit.
- We examine two policies designed to reduce illegal drug use and see what effects they have on drug-related crime.
- For simplicity, we assume the total dollar value of drug-related crime equals total expenditure on drugs.
- Demand for illegal drugs is inelastic, due to addiction issues.

Policy 1: Prohibition

Prohibition reduces the supply of drugs.

Since demand for drugs is inelastic, P rises proportionally more than Q falls.

Result: an increase in total spending on drugs, and in drug-related crime



Policy 2: Health/Education Policy

Health/Education policy reduces the demand for drugs.

P and Q fall.

Result:
A decrease in total spending on drugs, and in drug-related crime.

