

The Elasticity of Demand

Chapter 7

The Concept of Elasticity

- **Elasticity** is a measure of the responsiveness of one variable to another.
- The greater the elasticity, the greater the responsiveness.

Laughter Curve

- Q. What's the difference between an economist and a befuddled old man with Alzheimer's?
- A. The economist is the one with a calculator.

The Concept of Elasticity

- **Elasticity** is a measure of the responsiveness of one variable to another.
- The greater the elasticity, the greater the responsiveness.

Price Elasticity

- The **price elasticity of demand** is the percentage change in quantity demanded divided by the percentage change in price.

$$E_D = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Sign of Price Elasticity

- According to the law of demand, whenever the price rises, the quantity demanded falls. **Thus the price elasticity of demand is always negative.**
- Because it is always negative, economists usually state the value without the sign.

What Information Price Elasticity Provides

- Price elasticity of demand and supply gives the exact quantity response to a change in price.

Classifying Demand and Supply as Elastic or Inelastic

- Demand is **elastic** if the percentage change in quantity is greater than the percentage change in price.

$$E > 1$$

Classifying Demand and Supply as Elastic or Inelastic

- Demand is **inelastic** if the percentage change in quantity is less than the percentage change in price.

$$E < 1$$

Elastic Demand

- Elastic Demand means that quantity changes by a greater percentage than the percentage change in price.

Inelastic Demand

- Inelastic Demand means that quantity doesn't change much with a change in price.

Defining elasticities

- When price elasticity is between zero and -1 we say demand is **inelastic**.
- When price elasticity is between -1 and -infinity, we say demand is **elastic**.
- When price elasticity is -1, we say demand is **unit elastic**.

Elasticity Is Independent of Units

- Percentages allow us to have a measure of responsiveness that is independent of units.
- This makes comparisons of responsiveness of different goods easier.

Calculating Elasticities

- To determine elasticity divide the percentage change in quantity by the percentage change in price.

The End-Point Problem

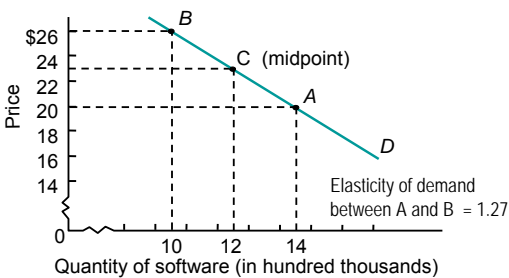
- The **end-point problem** – the percentage change differs depending on whether you view the change as a rise or a decline in price.

The End-Point Problem

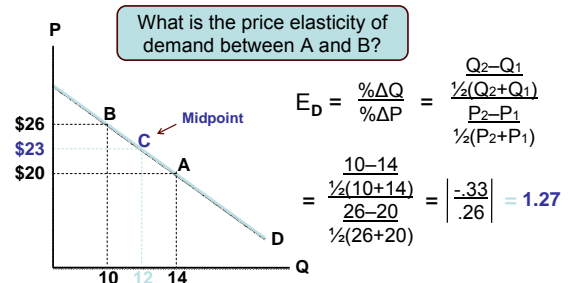
- Economists use the average of the end points to calculate the percentage change.

$$Elasticity = \frac{(Q_2 - Q_1) / \frac{1}{2}(Q_2 + Q_1)}{(P_2 - P_1) / \frac{1}{2}(P_1 + P_2)}$$

Graphs of Elasticities



Calculating Elasticities: Price elasticity of Demand



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Price Elasticity: Supply

- **Price elasticity of supply** is the percentage change in quantity supplied divided by the percentage change in price

$$E_s = \frac{\% \text{ change in Quantity Supplied}}{\% \text{ change in Price}}$$

- This tells us exactly how quantity supplied responds to a change in price
- Elasticity is independent of units

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Price Elasticity: Supply

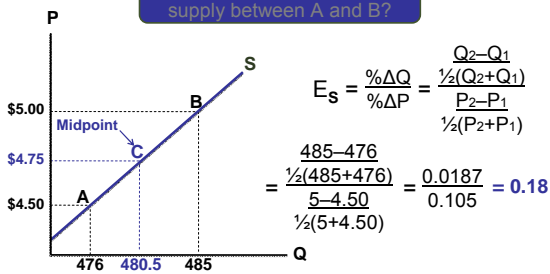
- Supply is **elastic** if the percentage change in quantity is *greater than* the percentage change in price
- Supply is **inelastic** if the percentage change in quantity is *less than* the percentage change in price

Inelastic supply is when $E_s < 1$

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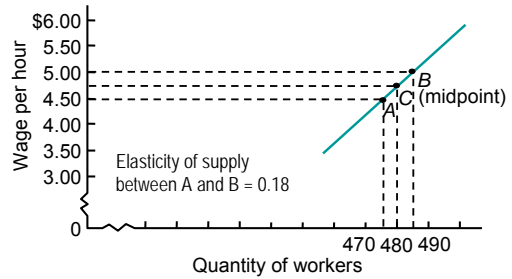
Calculating Elasticities: Price

elasticity of Supply
What is the price elasticity of supply between A and B?



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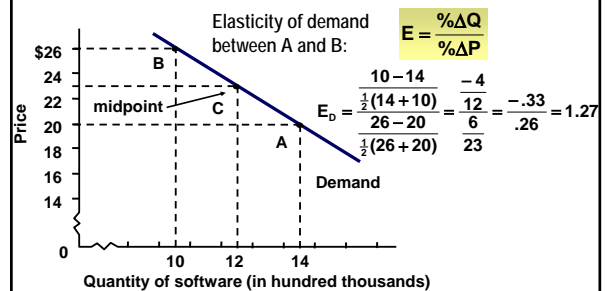
Graphs of Elasticities



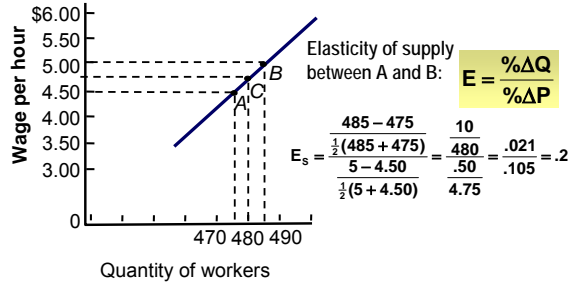
Calculating Elasticity

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{Q_2 - Q_1}{\frac{1}{2}(Q_1 + Q_2)}}{\frac{P_2 - P_1}{\frac{1}{2}(P_1 + P_2)}}$$

Calculating Elasticity of Demand Between Two Points



Calculating Elasticity of Supply Between Two Points



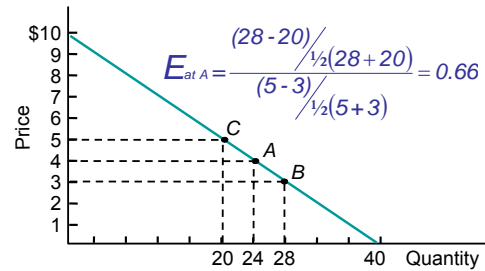
Calculating Elasticity at a Point

- Let us now turn to a method of calculating the elasticity at a specific point, rather than over a range or an arc.

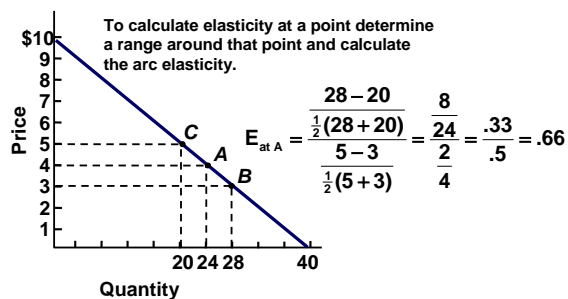
Calculating Elasticity at a Point

- To calculate elasticity at a point, determine a range around that point and calculate the arc elasticity.

Calculating Elasticity at a Point



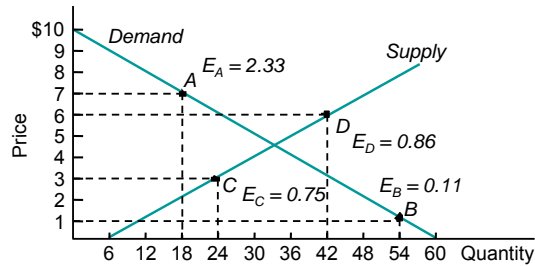
Calculating Elasticity at a Point



Elasticity and Demand Curves

- Two important points to consider:
 - Elasticity is related (but is not the same as) slope.
 - Elasticity changes along straight-line demand and supply curves.

Calculating Elasticity at a Point



Elasticity and Demand Curves

- Two important points to consider:
 - Elasticity is related (but is not the same as) slope.
 - Elasticity changes along straight-line demand and supply curves.

Elasticity Is Not the Same as Slope

- The steeper the curve at a given point, the less elastic is supply or demand.
- There are two limiting examples of this.

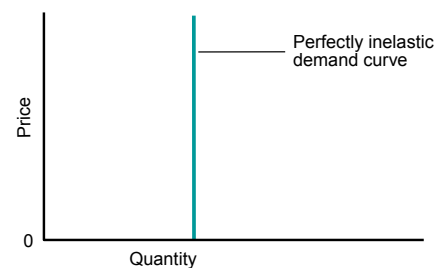
Elasticity Is Not the Same as Slope

- When the curves are flat, we call the curves perfectly elastic.
- The quantity changes enormously in response to a proportional change in price ($E = \infty$).

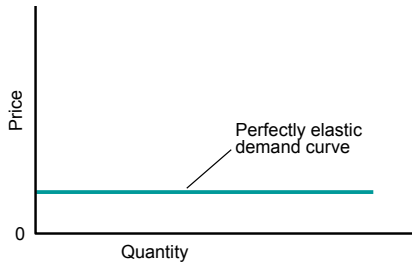
Elasticity Is Not the Same as Slope

- When the curves are vertical, we call the curves perfectly inelastic.
- The quantity does not change at all in response to an enormous proportional change in price ($E = 0$).

Perfectly Inelastic Demand Curve



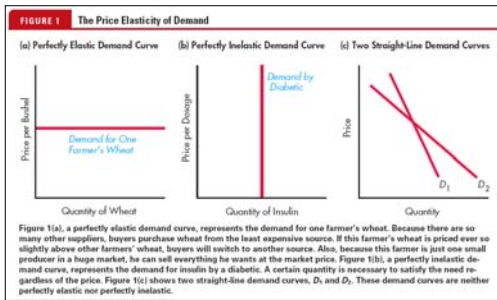
Perfectly Elastic Demand Curve



Demand Curve Shapes and Elasticity

- **Perfectly Elastic Demand Curve**
 - The demand curve is horizontal, any change in price can and will cause consumers to change their consumption.
- **Perfectly Inelastic Demand Curve**
 - The demand curve is vertical, the quantity demanded is totally unresponsive to the price. Changes in price have no effect on consumer demand.
- In between the two extreme shapes of demand curves are the demand curves for most products.

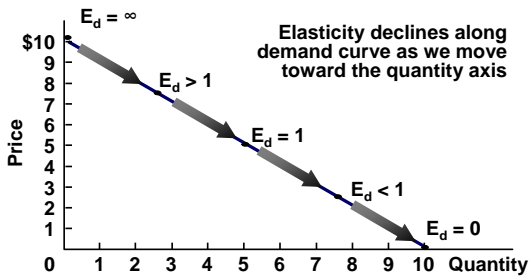
Demand Curve Shapes and Elasticity



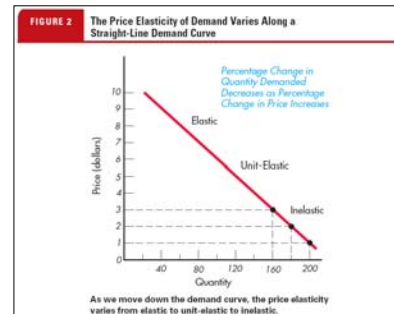
Elasticity Changes Along Straight-Line Curves

- Elasticity is not the same as slope.
- Elasticity changes along straight line supply and demand curves—slope does not.

Elasticity Along a Demand Curve



The Price Elasticity of Demand Along a Straight-line Demand Curve



Substitution and Elasticity

- As a general rule, the more substitutes a good has, the more elastic is its supply and demand.

Substitution and Demand

- The less a good is a necessity, the more elastic its demand curve.
- Necessities tend to have fewer substitutes than do luxuries.

Substitution and Demand

- Demand for goods that represent a large proportion of one's budget are more elastic than demand for goods that represent a small proportion of one's budget.

Substitution and Demand

- Goods that cost very little relative to your total expenditures are not worth spending a lot of time figuring out if there is a good substitute.
- It is worth spending a lot of time looking for substitutes for goods that take a large portion of one's income.

Substitution and Demand

- The larger the time interval considered, or the longer the run, the more elastic is the good's demand curve.
 - There are more substitutes in the long run than in the short run.
 - The long run provides more options for change.

Determinants of the Price Elasticity of Demand

- The degree to which the price elasticity of demand is inelastic or elastic depends on:
 - How many substitutes there are
 - How well a substitute can replace the good or service under consideration
 - The importance of the product in the consumer's total budget
 - The time period under consideration