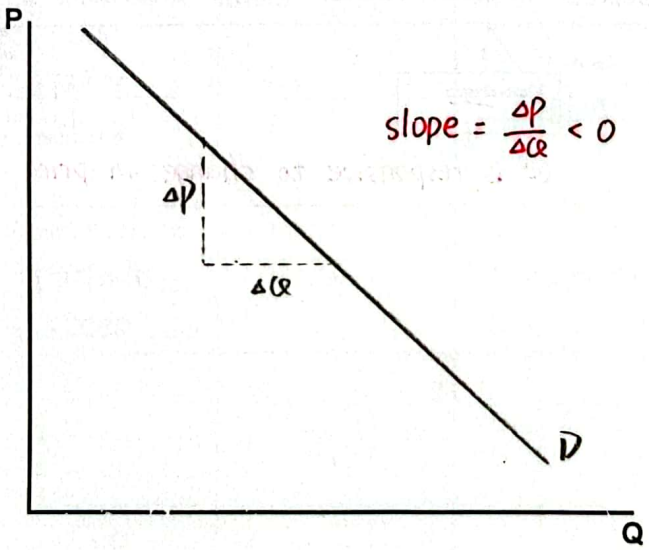
Principles of Economics (Spring 2024)
Lecture 7
Elasticity

Part I

Price Elasticity of Demand – A measure of the sensitivity of changes in the quantity demanded of a product to changes in its price, ceteris paribus.

$$PED = \frac{\text{Percent change in Quantity Demanded}}{\text{Percent change in Price}}$$

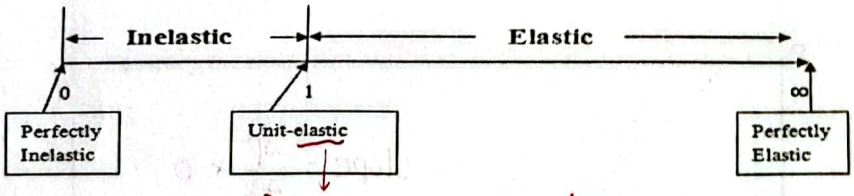
$$= \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{P}{Q} \cdot \frac{\Delta Q}{\Delta P} = \frac{P/Q}{\Delta P/\Delta Q} = \frac{P/Q}{\text{slope}} < 0$$



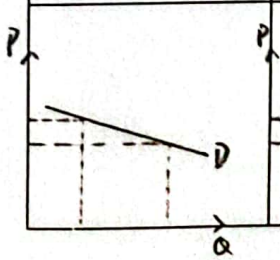
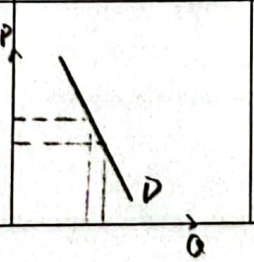
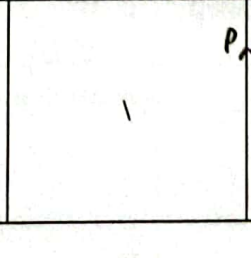
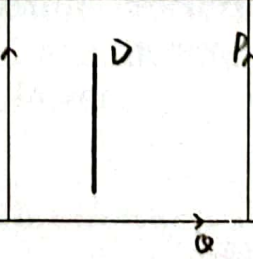
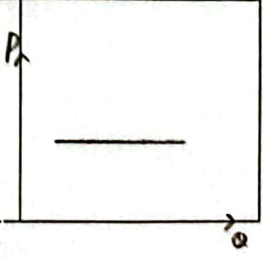
- **Key Points**
  - Price elasticity of demand is negative due to the low of Demand. Also, it is shown from the fact that the slope of the demand curve is negative.
  - When comparing, the price elasticity of demand between two goods, we are usually interested in their absolute value, which means that an item with price elasticity of demand equal to −2 is more elastic than an item with price elasticity of demand equal to −1, although −2 is actually a smaller number than −1.

when calculate the PED, we still use negative value

  - Interpretation: a 1% change in the price of a product will lead to a PED% change in its quantity demanded, e.g., PED = −2 means that if the price of the product increases by 1%, there will be a 2% decrease in its quantity demanded.
  - You should be able to calculate the third variable given the other two variables in the definition of the price elasticity of demand.
  - Comparison between Elastic and Inelastic



Q^D is responsive to change in price

Elastic	Inelastic	Unit-Elastic	Perfectly Inelastic	Perfectly Elastic
$\|PED\| > 1$	$\|PED\| < 1$	$\|PED\| = 1$	$\|PED\| = 0$	$\|PED\| = +\infty$
Quantity demanded is responsive to price change	Quantity demanded is not so responsive to price change	Q^D is unit responsive to price change	Q^D is completely unresponsive to price change	Q^D is infinitely responsive to price change
$\%\Delta Q > \%\Delta P$	$\%\Delta Q < \%\Delta P$	$\%\Delta Q = \%\Delta P$	$\%\Delta Q = 0$: Q^D never changes no matter how P changes	if P changes a little bit : $P\uparrow \Rightarrow Q^D\downarrow$, $P\downarrow \Rightarrow Q^D\uparrow$ } law of demand → For any prices higher than P_0 Q^D drops to 0; for any prices lower than P_0 Q^D increases without limit
Example: stuff with higher prices, but can be used for a long time, such as cars, computers.	Example: daily necessities, such as water, bread.	\	Example: stuff used for the dead, such as coffin.	use 1 dollar to buy 1 dollar
Demand curve is relatively flat.	Demand curve is relatively steep.	\	Demand curve is a vertical line.	Demand curve is a horizontal line.
				

Exercise 1

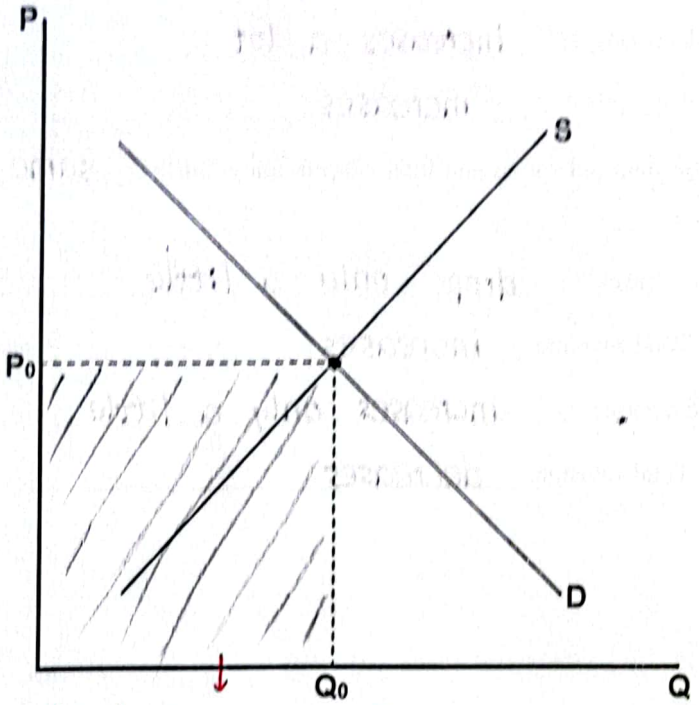
The price of oysters increases by 14%. As a result, its quantity demanded decreases by 27%. What is the price elasticity of demand for oysters?

$$PED = -\frac{\Delta Q/Q}{\Delta P/P} = -\frac{27\%}{14\%} = -1.93$$

Exercise 2

The price elasticity of demand for iPods is −4. Therefore, a 20% decrease in the price of iPods would cause its quantity demanded to ___increase___ by ___80___%.

- **Relationship between Price Elasticity of Demand and Total Revenue**
  - Total Revenue = P · Q = Total Expenditure



  - Price elasticity of demand could be used to predict how the total revenue would change if the price of the product changes.
    - An increase in the price contributes to a higher total revenue. However, when the price goes up, the quantity demanded of the product falls. A decrease in the quantity sold contributes to a lower total revenue.

- **Elastic demand**: price and total revenue move in the opposite direction.
  - ❖ P increases, Q drops a lot
    - ⇒ Total revenue decreases
  - ❖ P decreases, Q increases a lot
    - ⇒ Total revenue increases
- **Inelastic demand**: price and total revenue move in the same direction.
  - ❖ P increases, Q drops only a little
    - ⇒ Total revenue increases
  - ❖ P decreases, Q increases only a little
    - ⇒ Total revenue decreases

Part II

Price Elasticity of Supply – A measure of the sensitivity of changes in the quantity supplied of a product to changes in its price, ceteris paribus.

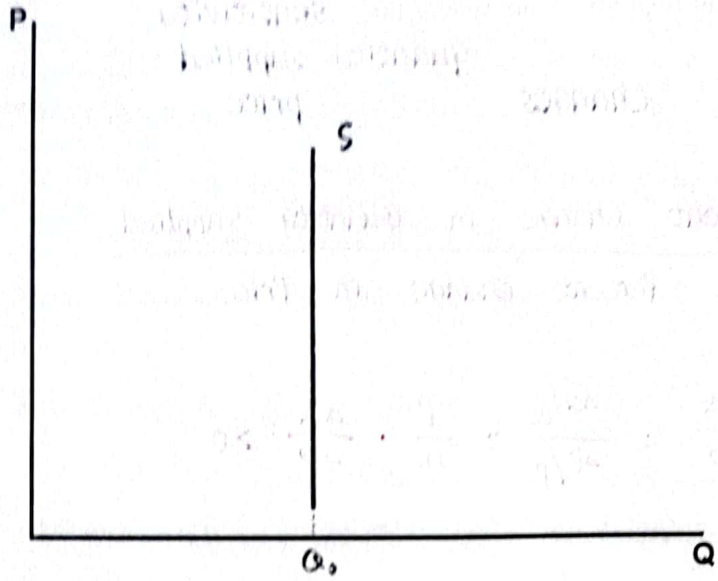
$$PES = \frac{\text{Percent Change in Quantity Supplied}}{\text{Percent change in Price}}$$

$$= \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q/Q}{\Delta P/P} = \frac{P}{Q} \cdot \frac{\Delta Q}{\Delta P} > 0$$

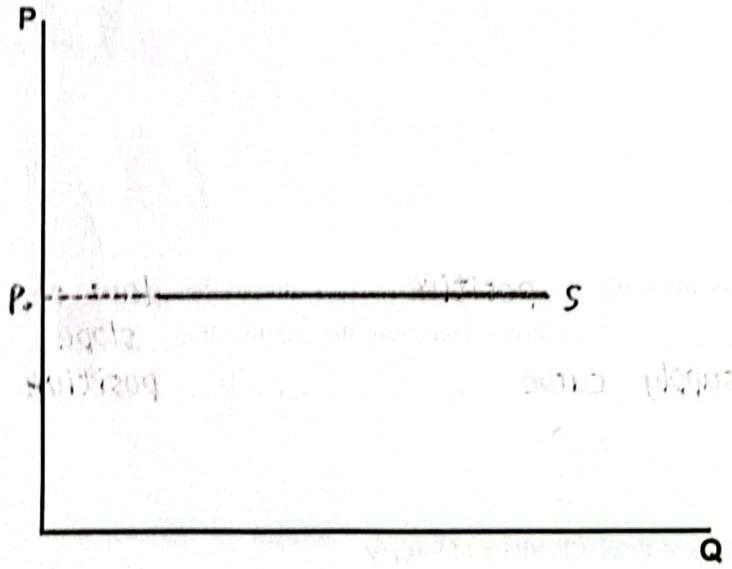
- Price elasticity of supply is positive due to the law of supply. Also, it is shown from the fact that the slope of the supply curve is positive.

- **Different Types of Price Elasticity of Supply**
  - Elastic Supply: $PES > 1$
  - Inelastic Supply: $0 < PES < 1$
  - Unit-Elastic Supply: $PES = 1$

- Perfectly Inelastic Supply: PES = 0



- Perfectly Elastic Supply: PES = +∞



Exercise 3

If the supply of a good is unit-elastic and the price of that good increases by 10%, then its quantity supplied will increase by 10 %.