

Introduction to Economics

Lecture 5

MGM112
Elasticity

Prepared by
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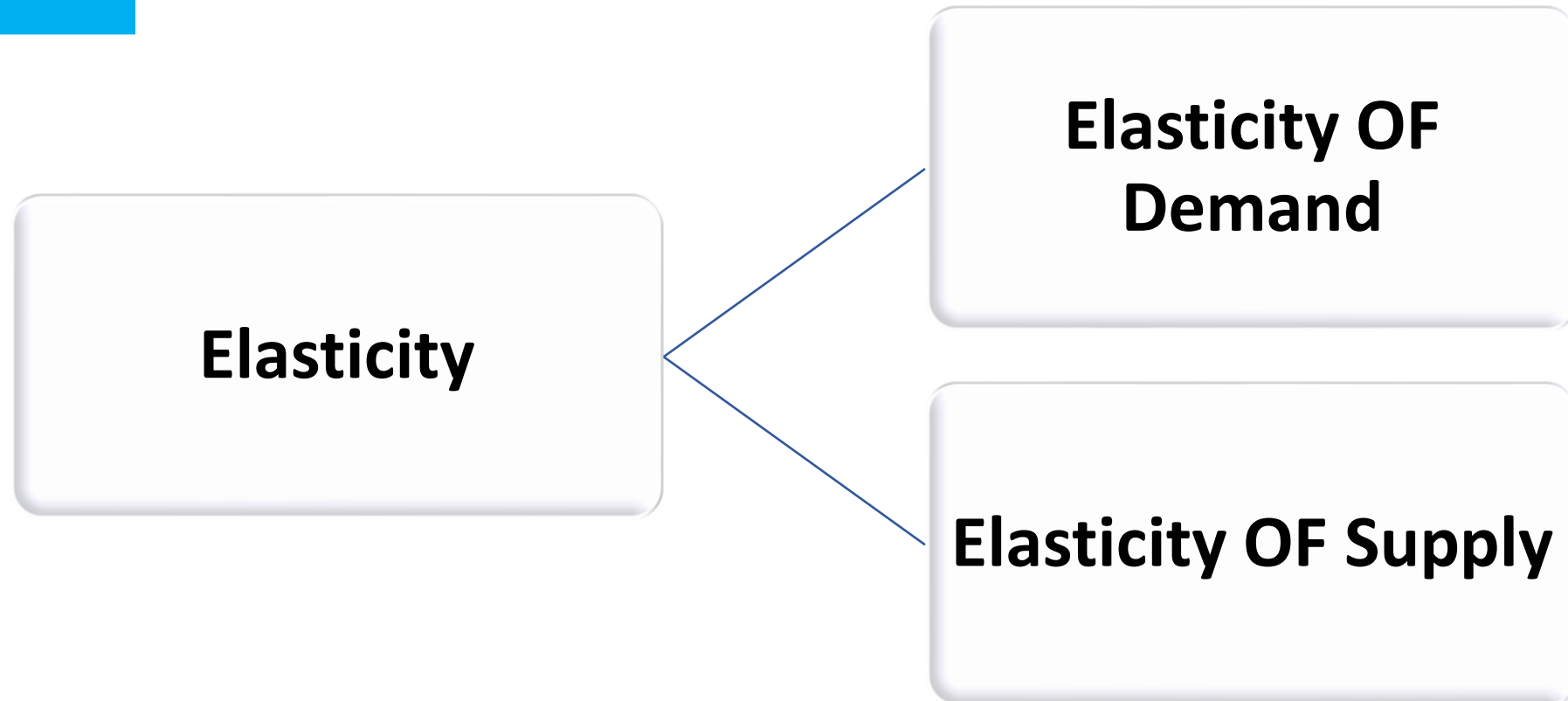
Chapter
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Elasticity

Elasticity: the responsiveness of quantity to a change in another variable (i.e., price, income, price of other goods)

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Types of Elasticity

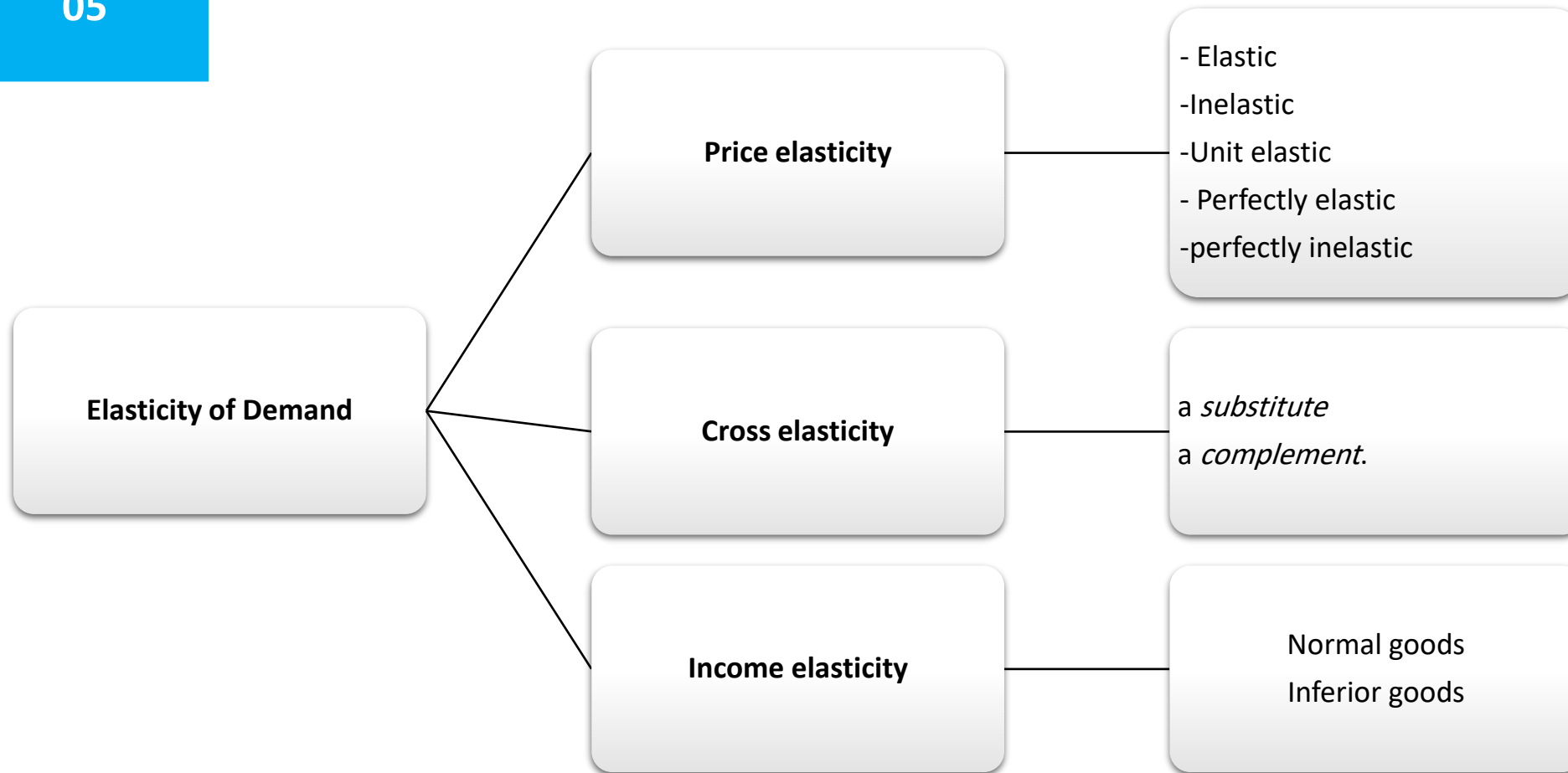


Types of Elasticity

1) Elasticity OF Demand

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Types of Elasticity

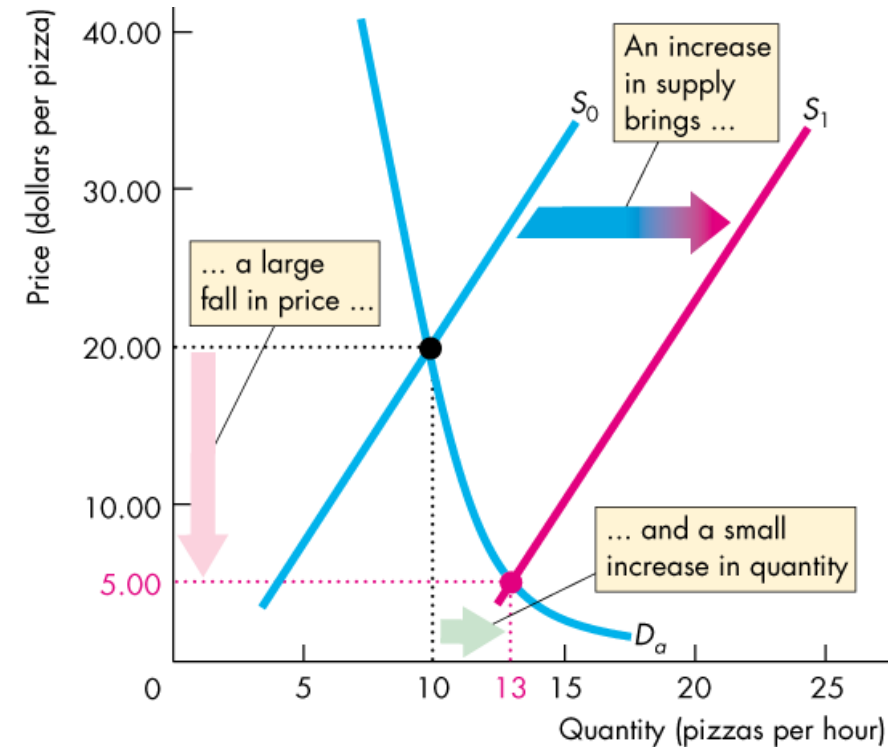


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2) Price Elasticity of Demand

In the Figure, an increase in supply brings

- A large fall in price
- A small increase in the quantity demanded



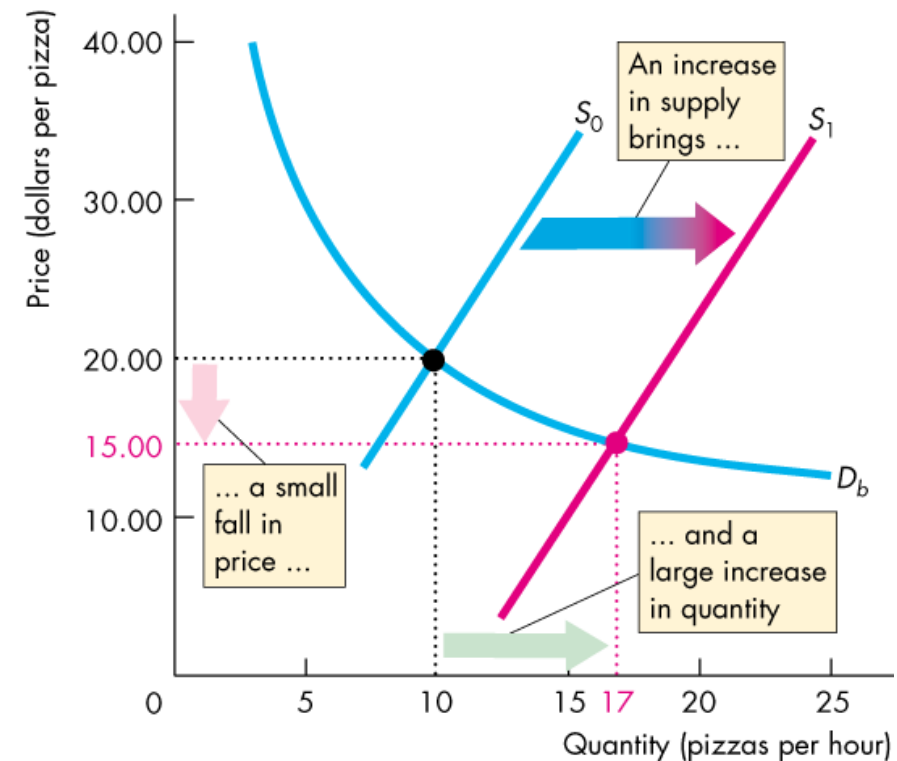
(a) Large price change and small quantity change

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2) Price Elasticity of Demand

In The Figure, an increase in supply brings

- A small fall in price
- A large increase in the quantity demanded



(b) Small price change and large quantity change

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2) Price Elasticity of Demand

The contrast between the two outcomes highlights the need for:

A measure of the responsiveness of the quantity demanded to a price change.

The **price elasticity of demand** is a measure of the responsiveness of the quantity demanded of a good to a change in its price when all other influences on buying plans remain the same.

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2) Price Elasticity of Demand

Calculating Price Elasticity of Demand

The price elasticity of demand is calculated by using the formula:

$$Ed = \frac{\text{Percentage change in quantity demanded } (\% \Delta Q_d)}{\text{Percentage change in price } (\% \Delta P)}$$

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2) Price Elasticity of Demand

Calculating Price Elasticity of Demand

$$\% \Delta Q_d = \frac{\Delta Q_d}{Q_d.\text{average}}$$

$$\% \Delta P = \frac{\Delta P}{P.\text{average}}$$

$$Q_d.\text{average} = \frac{\text{Sum } Q_d}{n}$$

$$P.\text{average} = \frac{\text{Sum } P}{n}$$

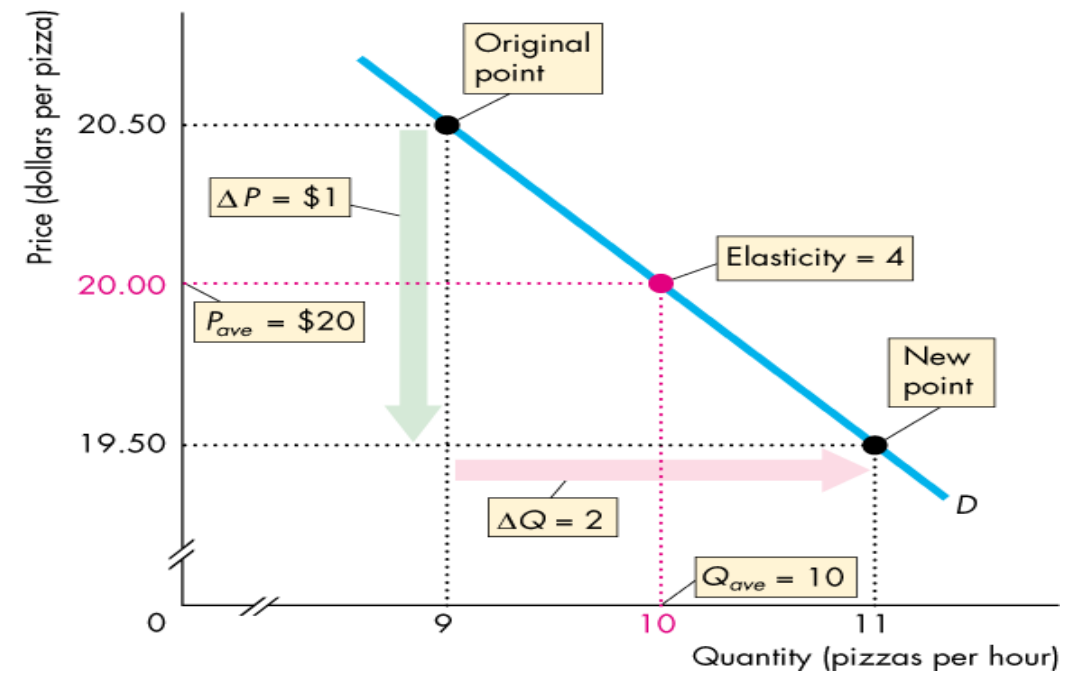
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2) Price Elasticity of Demand

Numerical Example:

Using the following data Using the mid -point formula to get elasticities

Price	Qd
20.5	9
19.5	11



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2) Price Elasticity of Demand

Numerical Example:

The Answer:

ΔQ_d	$Q_d\text{-average}$	$\% \Delta Q_d$
2	$(9+11)/2 = 10$	$\Delta Q_d / Q_d\text{-average} * 100$ $= 20\%$

ΔP	$P\text{-average}$	$\% \Delta P$
1	$(20.5+19.5)/2 = 20$	$\Delta P / P\text{-average} * 100$ $= 5\%$

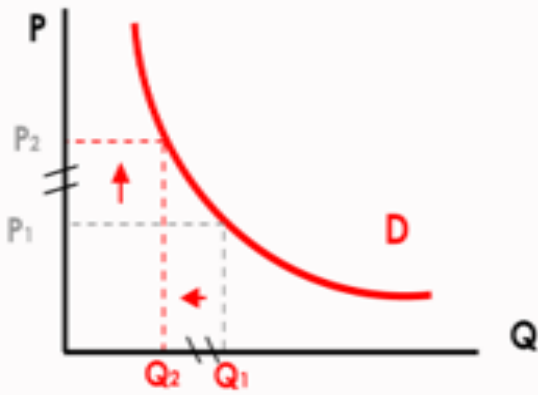
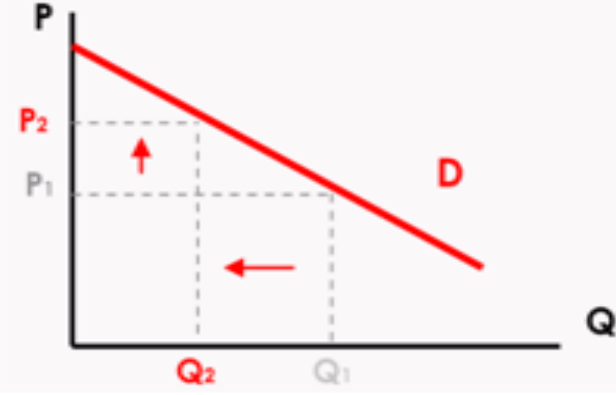
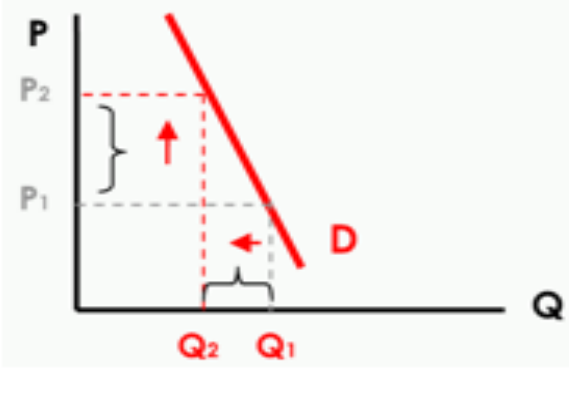
$$E_d = \frac{\% \Delta Q_d}{\% \Delta P} = |20\% / 5\%| = 4$$

This value means:

A 10 percent increase in the price will decrease the quantity demanded by 40 percent

A 1 percent increase in the price will decrease the quantity demanded by 4 percent

a) Types of Price Elasticity of Demand

1) Unit Elastic	2) Elastic demand	3) Inelastic demand
If the price changes by 1%, quantity demanded will change by 1% at opposite direction $\% \Delta Q_d = \% \Delta P$	If the price changes by 1%, quantity demanded will change by More than 1% at opposite direction $\% \Delta Q_d > \% \Delta P$	If the price changes by 1%, quantity demanded will change by Less than 1% at opposite direction $\% \Delta Q_d < \% \Delta P$
the price elasticity of demand is constant = 1 $E_d = 1$	$E_d > 1$	$0 < E_d < 1$
		
	Luxury goods	Necessary Goods → Bread The quantity demanded is not greatly affected by the change in price level

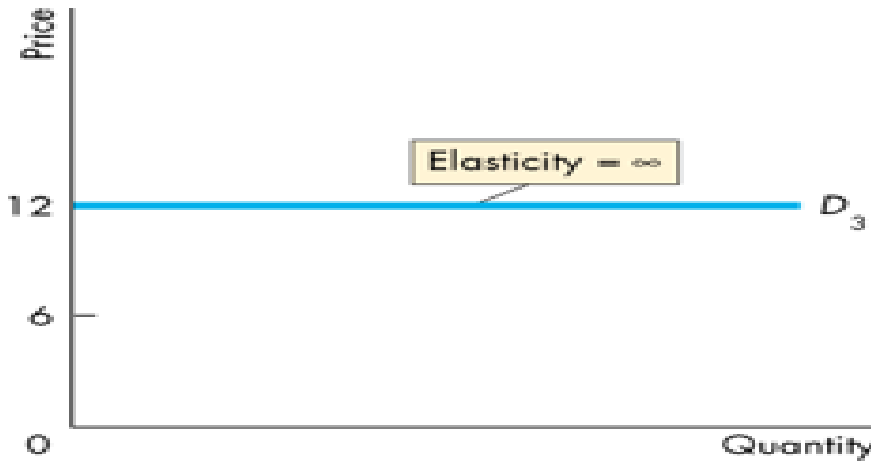
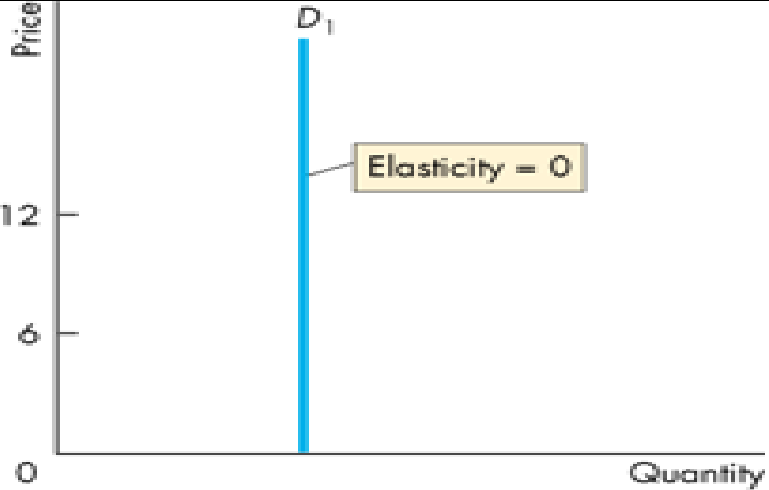
5 Types

Demand is price **inelastic** if a relatively large price increase leads to a relatively small decrease in the quantity demanded.

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5 Types

a) Types of Price Elasticity of Demand

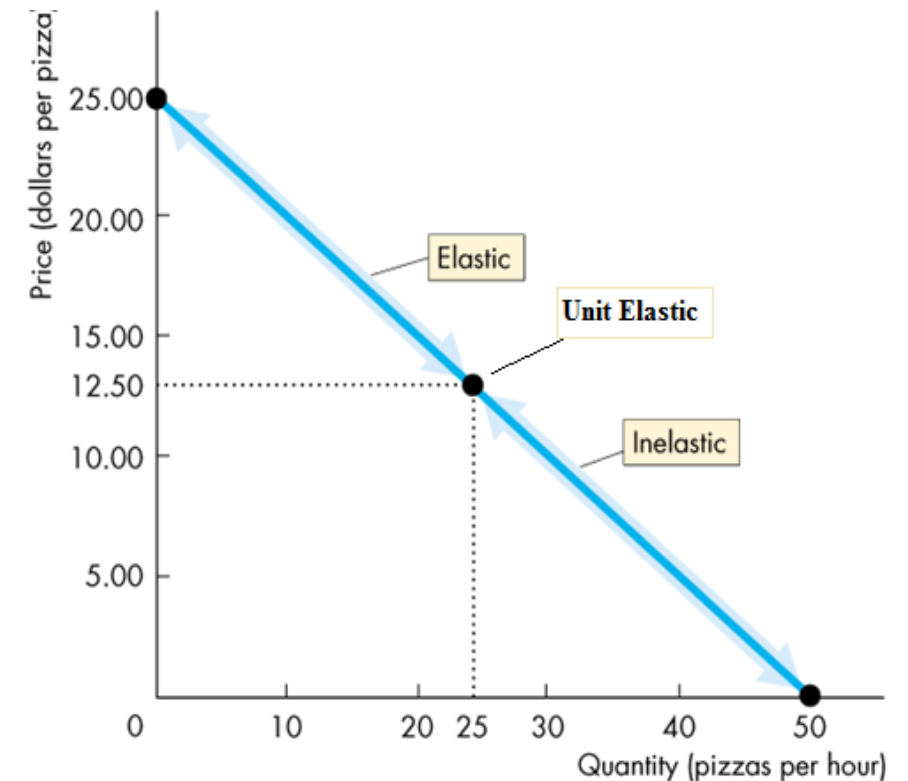
4) Perfectly Elastic demand	5) Perfectly inelastic demand
If the price changes by 1%, quantity demanded will change <u>infinitely large</u> at opposite direction	If the price changes by 1%, quantity demanded will <u>not change</u>
the price elasticity of demand is constant = ∞ $E_d = \infty$	$E_d = 0$
	
(c) Perfectly elastic demand	(a) Perfectly inelastic demand
Any homogenous products with many substitutes as: Potatoes, vegetables Any increase in the price will cause $\Delta Q_d = \text{zero}$	Lifesaving drug Any increase in the price will not affect Q_d of drugs

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a) Types of Price Elasticity of Demand

Price elasticity varies along a linear demand curve

- At prices above the mid-point of the demand curve, demand is elastic.
- At the mid-point of the demand curve, demand is Unit elastic.
- At prices below the mid-point of the demand curve, demand is inelastic



a) Factors That Influence the Price Elasticity of Demand

1) The closeness of substitutes (+VE)

- **The closer / many the substitutes** for a good or service → the more elastic are the demand for the good or service → **Luxuries**, such as exotic vacations
- **The Fewer the substitutes** for a good or service → Inelastic demand for the good or service → Luxuries, such as exotic vacations → **Necessities**, such as food or housing

2) Proportion of Income Spent on the Good (+VE)

- The greater the proportion of income consumers spend on a good, the larger is the elasticity of demand for that good.

3) Time Elapsed Since Price Change (+VE)

- The more time consumers have to adjust to a price change, or the longer that a good can be stored without losing its value, the more elastic is the demand for that good

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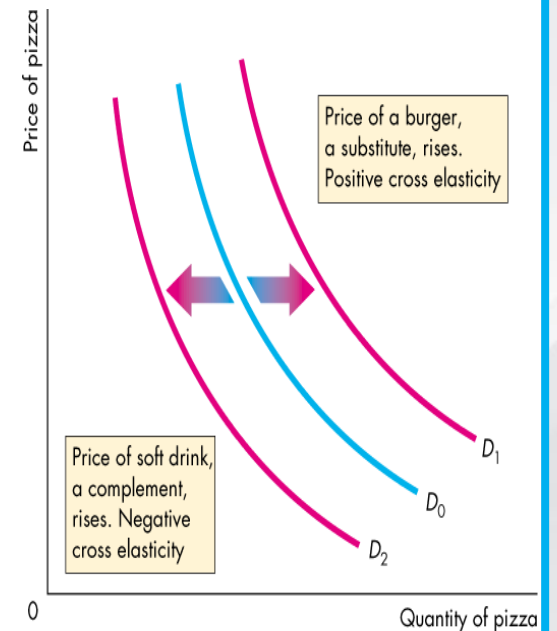
b) The Cross Elasticity of Demand

- The cross elasticity of demand:

It is a measure of the responsiveness of demand for a good to a change in the price of a substitute or a complement, other things remaining the same.

The cross elasticity of demand is calculated by using the formula:

$$E_{cd} = \frac{\text{Percentage change in quantity demanded } (\% \Delta Q_d)}{\text{Percentage change in price of substitute or complement } (\% \Delta P_s)}$$



a substitute good	a complement good
Price of a substitute good $\uparrow$ $E_{cd} > 0$ (positive)	Price of a complement $\uparrow$ $E_{cd} < 0$ (negative)

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c) The Income Elasticity of Demand

- The Income elasticity of demand:**

the degree of responsiveness of a change in demand for a product due to the change in the income.

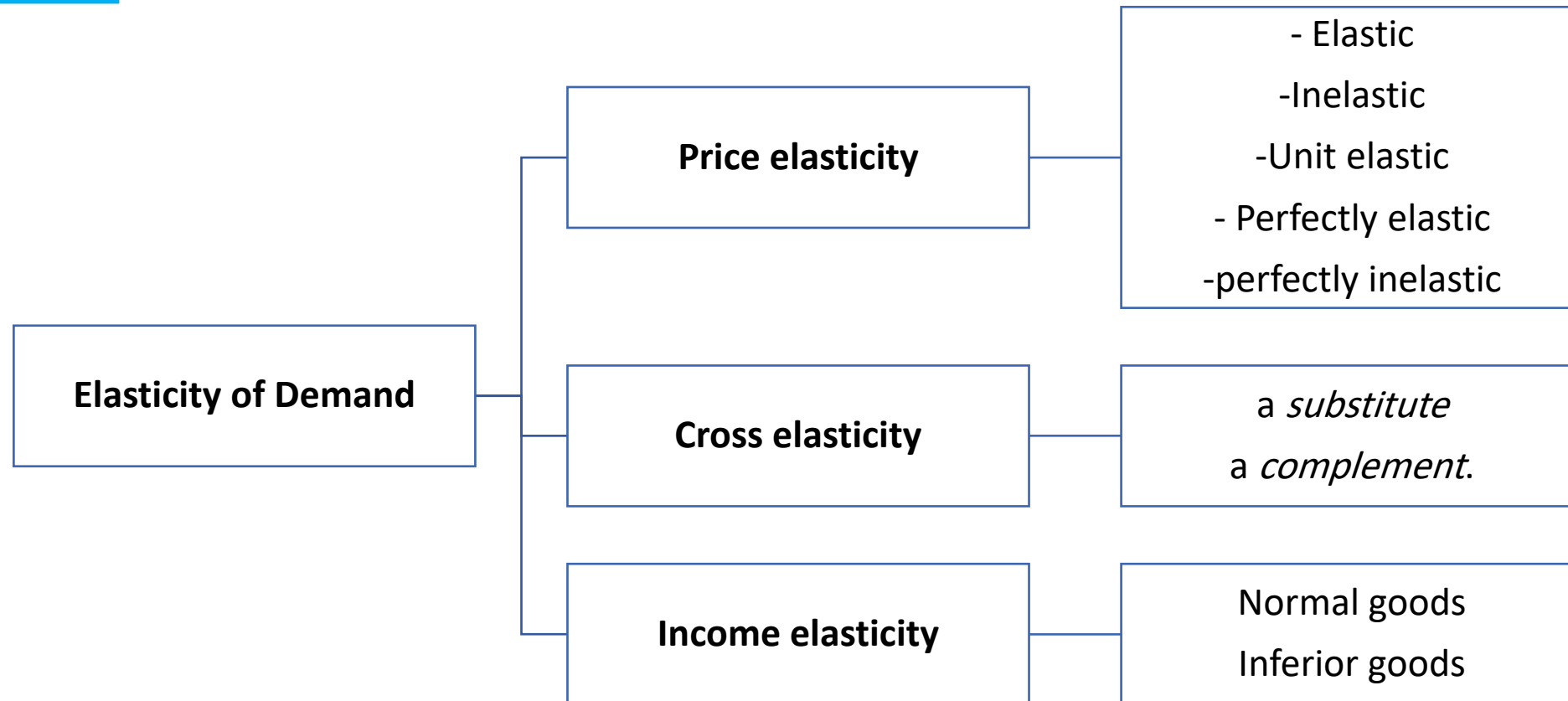
The income elasticity of demand is calculated by using the formula:

$$E_{id} = \frac{\text{Percentage change in quantity demanded } (\% \Delta Q_d)}{\text{Percentage change in income } (\% \Delta I)}$$

a normal good	An inferior good
$E_{id} > 1 \rightarrow$ demand is <u>income elastic</u> and the good is a normal good. $0 < E_{id} < 1 \rightarrow$ demand is <u>income inelastic</u> and the good is a normal good. + E_{id}	$E_{id} < 0$ (negative) $\rightarrow$ the good is an inferior good. -E_{id}

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Types of Elasticity of Demand



Think

Suppose the price of burgers increases from \$2 to \$3 each. The degree to which quantity demanded responds to this price increase depends on the

- A) price elasticity of demand.**
- B) the price elasticity of supply.
- C) income elasticity of demand.
- D) cross elasticity of demand.

The price elasticity of demand is equal to the _____ in the _____ divided by the _____ in the _____.

- A) percentage change; price; percentage change; quantity demanded
- B) change; price; change; quantity demanded
- C) percentage change; quantity demanded; percentage change; price**
- D) change; quantity demanded; change; price



Think

If a 6 percent decrease in the price leads to a 5 percent increase in the quantity demanded, the price elasticity of demand is

- A) 0.30.
- B) 0.60.
- C) 0.83.** ($0.05 / 0.06$)
- D) 1.20.

Taco Bell's economists determine that the price elasticity of demand for their tacos is 2.0. So, if Taco Bell raises the price of its tacos by 6.0 percent, the quantity demanded will decrease by _____ percent.

- A) 2.0
- B) 3.0
- C) 6.0
- D) 12.0** ($2 * 6\%$)





Think

The price elasticity of demand for DVDs is 2. If the price of a DVD increased by 2 percent, the quantity demanded will _____.

- A) decrease by 2 percent
- B) not change
- C) decrease by 4 percent**
- D) decrease by 1 percent

If the price elasticity of demand for a good is 0.8, then a

- A) 1 percent rise in the price leads to a 0.8 percent decrease in the quantity demanded.**
- B) one dollar rise in the price leads to a 0.8 percent decrease in the quantity demanded.
- C) 1 percent rise in the price leads to an 80 percent decrease in the quantity demanded.
- D) 1 percent rise in the price leads to an 8 percent decrease in the quantity demanded.



Think

Demand is perfectly inelastic when

- A) shifts in the supply curve results in no change in price.
- B) the good in question has perfect substitutes.
- C) shifts of the supply curve results in no change in quantity demanded.**
- D) shifts of the supply curve results in no change in the total revenue from sales.

A good with a vertical demand curve has a demand with

- A) unit elasticity.
- B) infinite elasticity.
- C) zero elasticity.**
- D) varying elasticity.



Think

If the demand for a good is perfectly elastic, the price elasticity of demand is _____ and the demand curve is _____.

- A) infinite; vertical
- B) zero; vertical
- C) zero; horizontal
- D) infinite; horizontal**
- D) 5.00; decrease; 5.00

Price elasticity of demand is not influenced by:

- a. the number of substitutes available.
- b. the proportion of the consumer's budget spent on the good.
- c. the length of the time period under consideration.
- d. the units of measurement used for price or for quantity demanded.**



Types of Elasticity

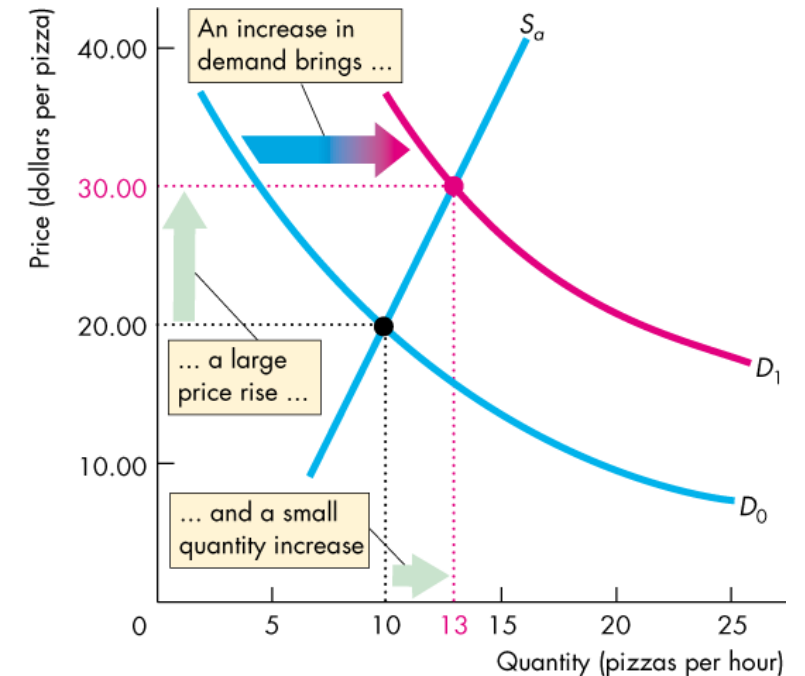
2) Elasticity OF Supply

2) Price Elasticity of Supply

When demand increases, is the change in the quantity supplied small or large?

In the Figure, an increase in demand brings

- A large rise in price
- A small increase in the quantity supplied

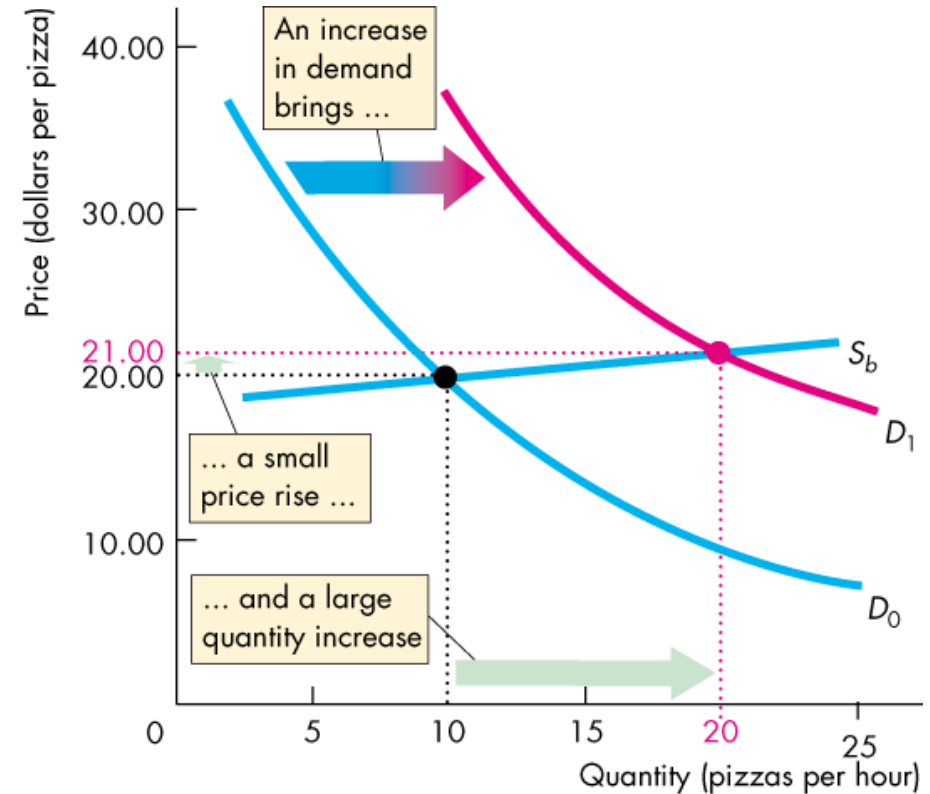


(a) Large price change and small quantity change

2) Price Elasticity of Supply

In the Figure, an increase in demand brings

- A small rise in price
- A large increase in the quantity supplied



(b) Small price change and large quantity change

2) Price Elasticity of Supply

The contrast between the two outcomes highlights the need for:

- A measure of the responsiveness of the quantity supplied to a price change.

The price elasticity of supply is a measure of the responsiveness of the quantity supplied to a change in the price of a good when all other influences on selling plans remain the same.

2) Price Elasticity of Supply

Calculating Price Elasticity of Supply

The price elasticity of supply is calculated by using the formula:

$$Es = \frac{\text{Percentage change in quantity supplied } (\% \Delta Q_s)}{\text{Percentage change in price } (\% \Delta P)}$$

2) Price Elasticity of Supply

Calculating Price Elasticity of Supply

$$\% \Delta Q_s = \frac{\Delta Q_s}{Q_s.\text{average}}$$

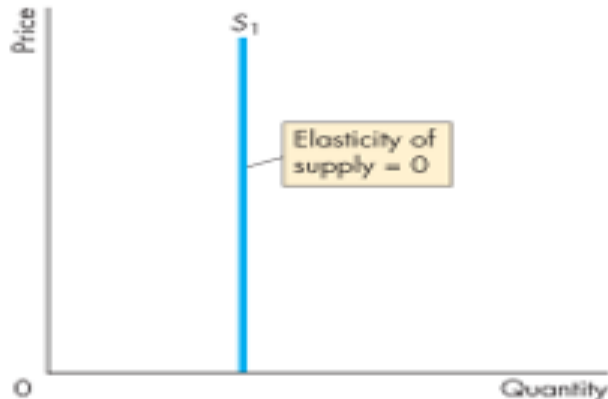
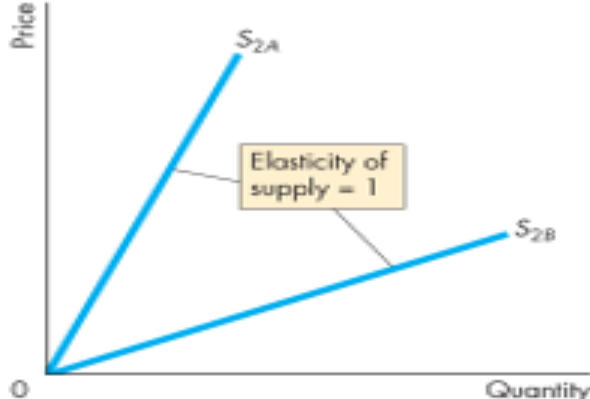
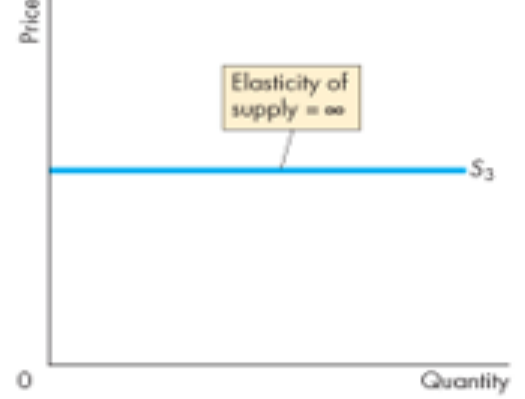
$$\% \Delta P = \frac{\Delta P}{P.\text{average}}$$

$$Q_s.\text{average} = \frac{\text{Sum } Q_s}{n}$$

$$P.\text{average} = \frac{\text{Sum } P}{n}$$

2) Types of Price Elasticity of Supply

3 Types

1) <i>perfectly inelastic</i>	2) <i>unit elastic</i>	3) <i>perfectly elastic</i>
If the price changes by 1%, quantity supplied will <u>not change</u>	If the price changes by 1%, quantity supplied will change <u>by 1%</u> $\% \Delta Q_s = \% \Delta P$	If the price changes by 1%, quantity supplied will change <u>infinitely large</u>
$E_s = 0$	$E_s = 1$	$E_s = \infty$
the supply curve is <u>vertical</u>	the supply curve is linear and passes through the <u>origin</u>	the supply curve is <u>horizontal</u>
 (a) Perfectly inelastic supply	 (b) Unit elastic supply	 (c) Perfectly elastic supply



2) Factors That Influence the Price Elasticity of Supply

1. Resource Substitution Possibilities (+ VE)

The easier it is to substitute among the resources used to produce a good or service, the greater is its elasticity of supply.

2) Time Frame for Supply Decision (+ VE)

The more time that passes after a price change, the greater is the elasticity of supply.

- ***Momentary supply*** is perfectly inelastic:
 - The quantity supplied immediately following a price change is constant.
- ***Short-run supply*** is somewhat elastic.
- ***Long-run supply*** is the most elastic.

Think

The price elasticity of supply tends to be:

- a. Smaller in the long run than in the short run.
- b. Smaller in the short run than in the long run.**
- c. larger in the short run than in the long run.
- d. Unrelated to the length of time.

If the price increased by 5%, given that elasticity is 5, quantity supplied will:

- a. increase by 25%. $(5 * 0.05) * 100 = 25\%$**
- b. decrease by 1%.
- c. decrease by 25%.
- d. None of the above.



Think

If the price elasticity of supply is unit elastic how does quantity supplied change in response to a 25% increase in price?

- a. Quantity supplied increase by 50%.
- b. Quantity supplied decrease by 50%.
- c. Quantity supplied decrease by 25%.
- d. Quantity supplied increase by 25%.**

If the price of a movie ticket increases by 4 percent and the quantity of movies supplied rises by 2 percent, the price elasticity of supply is

- a. 2.0.
- b. 4.0.
- c. 0.5.** ($0.02/0.04 = 0.5$)
- d. Some amount that cannot be determined without more information.



Think

If a 3% increase in price leads to an 10% decrease in quantity demanded, demand is

- a. Perfectly elastic
- b. Elastic**
- c. Unit elastic
- d. Inelastic

8. A perfectly elastic supply curve is

- a. Vertical straight line
- b. Horizontal straight line**
- c. Downward-sloping straight line
- d. An upward-sloping straight



Think

Which of the following effects a product's price elasticity of demand?

- a. Availability of substitution
- b. the time factor
- c. necessity of the product is to consumers
- d. all of the above**

Other things being equal, the price elasticity of demand for a product will be more elastic

- a. if spending on the item is a very large proportion of the household's budget**
- b. if spending on the item is a very small proportion of the household's budget
- c. when the price of the product is very low
- d. for a product with no close substitutes



Summary outlines

1. Elasticity of Demand
 - Price Elasticity of Demand (Definition- Calculate – Types - Factors)
 - Cross Elasticity of Demand (Definition- Calculate – Types)
 - Income Elasticity of Demand (Definition- Calculate – Types)
2. Elasticity of Supply (Definition- Calculate – Types - Factors)



Important Notes

Definition of Elasticity:

- Elasticity measures **the responsiveness of a variable to a change in another variable.**
- Definition of Elasticity of demand:
- The price elasticity of demand measures **the responsiveness of the quantity demanded to change in price.**
- The price elasticity of demand is defined as the magnitude of **the percentage change in quantity demanded divided by the percentage change in price.**
- The price elasticity of demand is estimated at 1.4. This value means a one percent increase in the **price will decrease the quantity demanded by 1.4 percent**

Important Notes

- Measure of Elasticity of demand:

- The price elasticity of demand is estimated at 0.03. This value means a 10 percent increase in the **price of oil will decrease the quantity of oil demanded by 0.3 percent.**
- A 20 percent increase in the quantity demanded results from a 10 percent decline in its price. **The price elasticity is 2.**
- A 5 percent increase in the quantity demanded results from a 10 percent decline in its price. The price elasticity of demand is **0.5.**
- If the price decreases by 3 percent and as a result the quantity demanded increases by 12 percent, the price elasticity of demand equals **4.**
- Using average price and average quantity, calculate the price elasticity of demand if a price rise from \$8 to \$10 and decreases the quantity demanded from 20 units to 15 units. Calculate The price elasticity of demand.

Important Notes:

$\Delta Q_d = 20 - 15 = 5$ $Q_d \text{ average} = \frac{20 + 15}{2} = 17.5$ $\% \Delta Q_d = \frac{5}{17.5} = 0.285$	$\Delta P = 10 - 8 = 2$ $P \text{ average} = \frac{10 + 8}{2} = 9$ $\% \Delta P = \frac{2}{9} = 0.22$
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$$E_d = \frac{0.285}{0.22} = 1.29 \text{ (Elastic)}$$



Important Notes

Types of Price Elasticity of demand:

- Dan sells newspapers. Dan says that a 5 percent increase in the price of a newspaper will decrease the quantity of newspapers demanded by 9 percent. According to Dan, the demand for newspapers is **elastic**.
- If the quantity demanded changes by a relatively small amount for a given change in price, then demand is **inelastic**.
- If the price elasticity is between 0 and 1, demand is **inelastic**.
- Demand is inelastic if **the price elasticity of demand is less than 1**
- If a 20 percent increase in the price results in a 10 percent decrease in the quantity demanded, then the demand for used cars is **inelastic**.
- Demand is price inelastic if a relatively large price increase leads to a relatively small decrease in the quantity demanded.



Important Notes

Types of Price Elasticity of demand:

- If a consumer is relatively insensitive to changes in the price of a good, then the consumer's demand for the good is **inelastic**.
- If the price of a good increases from \$3 to \$4, and the quantity demand remains unchanged, then the demand is **perfectly inelastic**.
- If the demand for a good is **elastic**, when the price increases, the quantity demanded will decrease by a greater percentage than the price increased
- If the demand for a good is **elastic**, the price elasticity of demand is **greater than 1**.
- When the percentage change in quantity demanded **equals** than the percentage change in price, the demand for the good is **unit elastic**.
- When the **price elasticity of demand for a good 0**, the demand curve is **vertical**.



Important Notes

Types of Price Elasticity of supply:

- If the supply curve is **vertical**, then supply is relatively **perfectly inelastic**.
- The elasticity of supply for paintings by Picasso is **perfectly inelastic**.
- The elasticity of supply equals **infinity** if the supply curve is **horizontal**.



Thank You