NYJC

TUTORIAL QUESTIONS

Resource Allocation in Competitive Markets:
Elasticity of Demand & Supply

Elasticity of Demand & Supply
Essential Question: **How do the various elasticity concepts differ from one another?**
Key Questions: **1. How do consumers adjust their quantity demanded of a good in response to changes in the price of a particular good or service?** **2. What determines the responsiveness of quantity demanded of a good or service to a change in its own price?**

Review on: Elasticity of Demand & Supply

Below are general issues you need to know before attempting the tutorial questions. Please put a tick in the column, to indicate that you are aware of the issue and understand it clearly. Else do revise the issues before attempting the essay and case study questions.

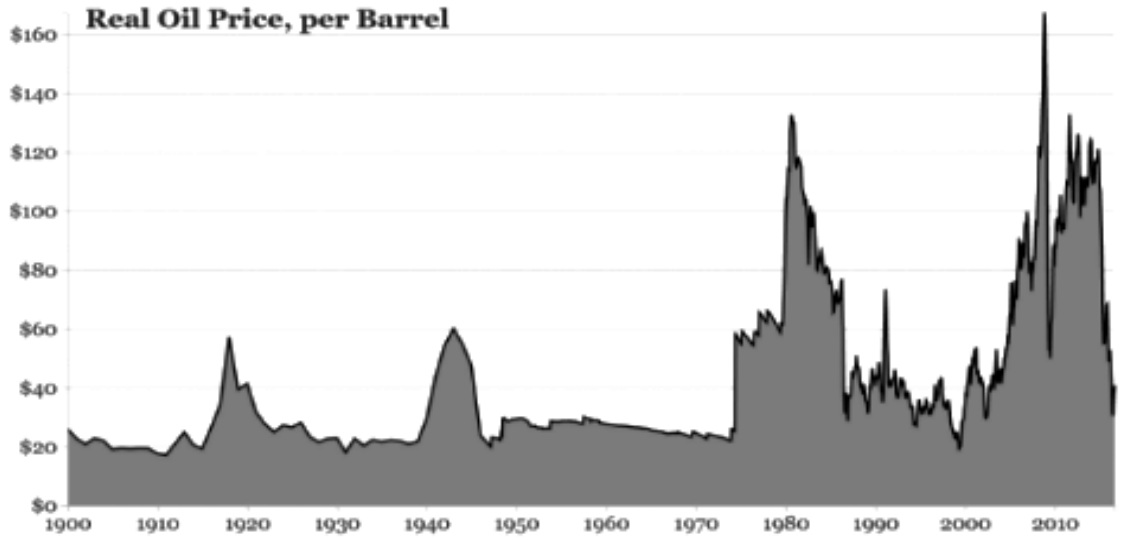
Elasticity of Demand & Supply	Tick
1. What is price elasticity of demand, price elasticity of supply, income elasticity of demand and cross elasticity of demand?	
2. How do you interpret the signs and magnitudes of the different elasticity concepts?	
3. What are the factors influencing the PED, YED & XED of a product?	

SECTION 1 – Economics ALIVE!

Article #1: The evolution of oil prices over the last 50 years feels like a roller-coaster ride

Frank Elavsky, Northwestern IT (2017), Source: https://insight.kellogg.northwestern (Adapted)

Take 1973, when oil prices skyrocketed unexpectedly. Within two years, US unemployment had doubled, leaving the nation deep in the throes of a recession. (The rest of the world soon followed.) Similar tailspins occurred in 1979 and 1991, both caused by sharp increases in oil prices.



Traditional economic theory utilises elasticity concepts to explain the volatility in oil prices. Since both demand and supply for oil are relatively price inelastic, any change in demand and/or supply conditions will lead to a large change in the price.

Sergio Rebelo (Kellog School) together with fellow economists Gideon Bornstein, a PhD student at Northwestern, and Per Kersell of Stockholm University, set out to examine oil price volatility more closely. The researchers had one critical advantage: a massive oil industry dataset containing historical information on every oil field in the world

When they charted year-to-year changes, these economists found that the amount of resources energy companies invest in oil exploration and extraction was more volatile than oil prices. And when oil prices increased, investment in the oil industry increased along with them, as energy companies sought to capitalize on the higher profit margins. Curiously, though, those investments did not seem to immediately affect the amount of oil extracted.

Suppliers can boost oil production in one of two ways: by extracting more quickly from existing oil fields, or by finding and drilling new fields. But there are upper limits to how fast oil can be extracted — and developing new wells takes time. The upshot: companies cannot boost production quickly in response to high oil prices.

What they found is that abrupt changes in supply explain only about half of the jumps in prices

Rebelo notes that turning oil production on or off is a serious decision that costs millions of dollars. “It’s not like you have a tap, like you’re in the bathtub and you can put in more warm water or less,” he says.

The difficulty in adjusting supply in the short run explains why a full half of oil-price fluctuations were due to changes in consumer demand, which moved up and down according to the changing needs of the world economy.

What is the role of Fracking in the volatility of oil prices?

Fracking started at a time when there was a lot of volatility in oil prices. So fracking and volatility tend to be linked,” Rebelo says. His new findings defy the consensus that fracking exacerbated volatility. Instead, the study suggests that fracking could eventually help stabilize oil markets.

It takes on average about one year between investment and production in a fracking field,” says Rebelo. However, in the short term, the researchers found that fracking firms can produce oil much more nimbly than traditional firms.

As such, when oil prices rise, fracking firms will be able to take advantage of many booms before they end. And by producing more oil, they will put downward pressure on oil prices. Conversely, when oil prices are low, they are able to more easily halt production, driving prices upward.

Rebelo warns that we are still in the midst of the fracking transition, so it might be a while before the full effect can be seen. “We don’t have a situation where the fracking industry is yet mature” Rebelo says.

Discussion:

1. Explain why the demand for oil is price inelastic.

- Oil is a major energy source to generate electricity which is required for modern living.
- Increased economic production generally requires more electricity (thus more oil) the proportion of energy costs to the total costs is generally very small. Thus is a small part of a producer’s total expenditure.

2. Using a demand and supply diagram, explain how ‘traditional economic theory’ explains the volatility of oil prices.

- Inelastic demand and inelastic supply.
- Small shifts in demand will cause large changes in price.

3. “The supply of oil is elastic for a price fall but inelastic for a price rise.”

   a) Using evidence from the article, support the claim above.

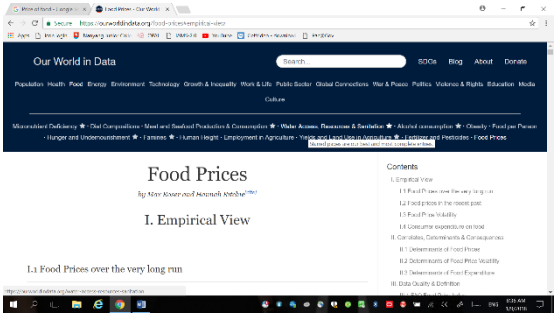
- “But there are upper limits to how fast oil can be extracted — and developing new wells takes time.” Difficult to increase qty ss in response to price increases.
- However, cutting back on supply due to falling prices is much easier to do.

b) Do you agree that "fracking could eventually help stabilize oil markets"?

- **Agree:** Fracking producers can respond more nimbly (more price elastic). This will help reduce the surpluses and shortages created thus reducing the pressures of price to change, stabilising the market.
- **Disagree:** Oil production though fracking comprises only a small proportion of the market. Thus, the impact on the total market may not be significant.
- **Judgement:** There are many other factors that cause price volatility e.g the magnitude of the changes in demand and supply (rather than the elasticity). Thus, ability for fracking producers to influence the volatility of the oil market is limited.

Part 2

Food Prices



Use the following website again to help you answer the following questions:
https://ourworldindata.org/food-prices
Note: This is the same website used in Chp 2

Why is the price of food so volatile?

https://www.economicshelp.org/blog/2601/economics/what-explains-volatility-of-oil-and-food-prices/

Part 2 (based on Chp 3 & 4)

1. Explain the possible reasons for the historical volatility in food prices.

- Price inelastic Dd and SS would result in unstable prices.

2. Explain why the introduction of mobile phones has helped reduce this volatility.

- Improves information transfers. This reduces volatility as resources are able to move from where prices are relatively low to where prices are relatively high. Conversely consumers are better informed to buy where prices are lower. Thus in markets where prices are low DD increases whilst SS falls, thus increasing price.
- Simultaneously, in markets where prices are high, DD falls and SS increases, thus decreasing price. This serves to stabilise prices. (Law of one price)

3. Explain the consequences of volatile food prices.

- Volatile prices of necessities will result is large changes in expenditures especially for the low income.
- Difficult for suppliers to respond to unstable prices and thus supply also becomes unstable.

4. Explain the reasoning behind Engel's Law.

Food is a necessity of life and a minimum amount must be consumed. However, there is a limit to how much food can be comfortably consumed in a day. Thus, these physiological limits make food consumption less dependent on price and income (PED<; YED<1). Thus the portion of income spent on food will fall as income increases.

5. The demand for food in general is very price inelastic but the demand for specific kinds of food may be very price elastic" Explain this statement.

The narrower the definition just means that there are more substitutes. With more substitutes, consumers can afford to be more sensitive (responsive) to price changes.

Why is the price of food so volatile?

https://www.economicshelp.org/blog/2601/economics/what-explains-volatility-of-oil-and-food-prices/

Compare the price volatility of oil and food prices.

Similarities:
- The demand for both food and oil is price inelastic.
- The supply for both food and oil is price inelastic.
- Both prices fluctuate widely.
- Both show a long term increasing trend.

Differences:
- The price changes for oil are largely due to changes in demand.
- The price changes for food are largely due to changes in supply.

Article #2: Do Oil Prices Affect The Auto Industry?
By Matthew Johnston (Adapted), Source: https://www.investopedia.com

Within the auto industry, vehicles and petroleum are considered complimentary goods whereas gas-guzzling trucks and SUVs are similar enough to their smaller more fuel-efficient counterparts to be considered reasonable substitutes. Understanding these two distinct categories of goods is helpful in thinking about how price changes affect the demand for different types of goods. With the significant decline in the price of oil over the past year, this distinction is essential in understanding how the auto industry has and will be affected.

Lower Oil Prices Fueling Demand for Automobiles

As gasoline is a petroleum-based product, price changes in crude oil directly affect its price. A decrease in the price of gasoline means automobile owners have more disposable income to use for other purchases. For those who were unable to afford the expenses of vehicle ownership, depressed fuel prices makes driving a lot cheaper and consequently, vehicle ownership becomes much more attractive

Automobile Substitutes

While overall automobile sales in the US have increased due to the lower fuel prices, it has been the gas-guzzlers that have been growing more rapidly than their more fuel-efficient substitutes, as one would expect. Lower fuel prices make the difference in the cost of driving a low fuel-economy vehicle versus a high fuel-economy vehicle less significant and thus consumers opt for the advantages – extra space and greater feeling of safety –that come with owning the bigger, less fuel-efficient vehicles.

American automobile manufacturers are not indifferent to the types of vehicles consumers purchase, and the trend towards SUVs, trucks and bigger cars are a real boon for the industry for a couple reasons. Firstly, US automakers have generally offered vehicles with lower fuel economy than their foreign counterparts and are thus going to benefit more from the trend towards these vehicle types. The other reason is that profit margins on smaller vehicles are generally less than those on larger ones, while losses are generally suffered on electric vehicle sales.

While American automakers are soaking up the higher profits now, there is some worry that they could face penalties from regulators in the future. New fuel economy standards are to take effect in 2016. Future regulations and/or subsidies that incentivize the purchase and manufacture of greener vehicles could be a potential limiting factor in the substitution effects of lower fuel prices.

Article #3: Electric vehicles - The little industry that could take a bite out of oil demand
Patti Domm (Adapted), 2 March 2018 CNBC.com

The electric vehicle market is tiny, but it's created some very big questions about the future of gasoline demand.

Morgan Stanley analysts Wednesday issued a forecast for global miles driven rising to 32 trillion by 2030, up from 11 trillion currently, with emerging markets a big driver of the growth. They say that forecast is not only bullish for electric cars and light trucks, but also for gains by gasoline-fueled vehicles.

For example, they expect China, the largest and fastest adapter of electric vehicles, to increase miles travelled to nearly 9 trillion by 2040, up from 1.5 trillion currently.

"Even allowing for an aggressive penetration of EVs, we forecast gasoline demand for light vehicle transport to roughly triple by the mid-2030s before beginning a slow decline," the Morgan Stanley analysts wrote. "It's little wonder why the Chinese government is so focused on encouraging the development of a sustainable electric transport ecosystem on the grounds of energy security and environmental sustainability."

Electric cars and light trucks, including hybrids, in the last year displaced only about 50,000 barrels a day of oil in a world that is using 100 million barrels a day for the first time this year, according to IHS Markit. That's small, but energy experts say when combined with other trends, like fuel economy standards, the reduction in oil demand will start to add up.

"We have [electric vehicles] going up to be 30 percent of new car sales by 2040 from 1 percent now," said Jim Burkhard, who heads oil research and energy and mobility research at IHS Markit. Last year, he said there were 2.8 million electric cars on the road compared to 1.5 billion oil fueled vehicles, and the electric vehicles could reach 36 million by 2025.

"Each year it will impact more and more…There's no doubt about that but the bigger demand story is fuel economy. EVs on their own are not disruptive," he said. He said the fuel efficiency efforts around the world alone should result in savings of 18 million barrels a day of fossil fuels by 2040.

Discussion (read Articles #2 and #3):

1. Examine the degree of complementarity between petrol and …
    a. Low-fuel economy cars “gas-guzzlers”
    b. High-fuel economy cars “fuel efficient cars”
    c. ‘Hybrid’ cars
    d. Fully electric cars

Rank from high levels of XED to low or unrelated goods.

2. Discuss the degree of substitutability between ‘fully electric cars’ and ‘low-economy “gas-guzzlers”.

- Electric vehicles are not very good substitutes for large pickup trucks and SUVs.
    - Pickup Trucks & SUV have off-road capabilities that most electric vehicles do not.
    - Battery powered vehicles still do not match the performance capabilities of petrol powered vehicles.
    - It is much faster to fill a tank of petrol than to fully charge a battery.

However,

- Electric vehicles are becoming better substitutes for pickups and SUVs.
    - Battery technology and EV designs are improving, reducing the performance gap between EVs and petrol powered vehicles.
    - Charging time is getting shorter and battery life is getting longer.

3. Using demand and supply diagrams, explain how improvements in battery technology used the manufacture of electric vehicles would affect the demand for oil.

Two diagrams are expected:
- 1st diag showing the demand and supply of electric vehicles. Show how supply increases (shifts rightward). The resultant change in Price and Qty should be highlighted.
- 2nd diag showing the demand for oil shifting leftward. (demand for oil)

4. Both articles #2 and #3 point toward an eventual fall in the demand for oil due to the developments in electric vehicles. To what extent do you agree that this will lead to continually falling oil prices?

Students are expected to use all that they have learnt thus far to address this question. The extent to which developments in electric EVs will lead to an eventual fall in oil prices would depend on:

i) the degree to which EVs can replace petrol powered vehicles.
ii) the proportion of total oil demand that is required for powering vehicles. (as opposed to powering electricity etc)
iii) whether supply conditions for oil are also changing.

Considerations:
- The development of a new product is only one factor that affects the demand for oil.
- Oil is also demanded for heating homes, powering electric generators and other uses.
- Price is also determined by supply conditions, the supply of oil may also fall thus keeping oil prices high.

SECTION 3 – Essays

1. Prices of agricultural products increased by 14% in recent years, compared with only 3% for manufactured goods.

   (a) Using economic analysis, account for the differences in prices of agricultural and manufactured products. [10] **[Suggested Answer on Page 3-10T]**

2. (a) Distinguish between price elasticity of demand, income elasticity of demand and cross elasticity of demand. [10] **[Suggested Answer on Page 3-12T]**

3. Governments frequently impose indirect taxes in order to influence the pattern of consumers' expenditure. The effectiveness of such policy measures, however, depends crucially on how consumers respond.

   (a) Explain with the help of examples the concepts of price elasticity of demand and price elasticity of supply. [10] **[Suggested Answer on Page 3-13T]**

Chapter 3: Elasticity of Demand & Supply Suggested Answers

SECTION 3 – Essays

1. Prices of agricultural products increased by 14% in recent years, compared with only 3% for manufactured goods.

(a) Using economic analysis, account for the differences in prices of agricultural and manufactured products. [10]

Suggested Answer

Approach:
There are two main factors that determine the magnitude of the price changes;

- **The magnitude of the change the demand and/or supply conditions**
- **The inelasticity of demand and supply.**

For manufactured goods it can be easily argued that both the demand and supply are price elastic. It can also be argued that changes of any significant magnitude generally occur on the demand side.

Conversely, for agricultural goods it can be easily argued that both the demand and supply are price inelastic. It also can be argued that changes of any significant magnitude generally occur on the supply side.

Sample Essay

Manufactured goods are produced by firms using physical capital or machinery as the main input. They are typically produced in factories, turning basic raw materials into finished products. Good examples of manufactured goods are consumer durables including TVs, refrigerators and washing machines. On the other hand, agricultural products are that use land as the main input. Examples of agricultural products include food related products such as wheat, rice and potatoes.

The primary reason for the difference in the magnitude of the price changes between these two types of goods lies in the differences in the price elasticities of demand and supply for these goods, as well as the magnitude of changes in the demand and supply conditions.

There is greater price stability for manufactured products due to the fact that supply of such products tends to be price elastic. Supply is elastic because products such as TVs and washing machines can be mass produced & stored (not perishable & hence have longer shelf-life). Its production is seldom affected by weather or seasons. Production is round the clock or can be increased at short notice. Next, since such products are durables, they can be stockpiled, thus supply can be released or withheld easily in response to price changes. Given the elastic supply, any change in demand will cause a less than proportionate change in price.

The demand for manufactured products is also price elastic, as they are durables and tend to be luxury goods such washing machines, TVs etc – consumers can choose not to buy when price rises and buy when price falls. Also, the markets for manufactured goods tends to be very competitive with many firms producing alternative products. There are many firms producing TVs, e.g. Sony, LG, Samsung, etc. Thus consumers have many substitutes available making the demand price elastic.

The demand for manufactured goods is subject to factors other than price. The demand for washing machines and TVs is very much determined by the general level of income in the economy, higher levels of income would significantly increase the demand for such manufactured goods. Thus changes in the price of manufactured good generally originate from the demand side. Despite these changes the eventual price change is relatively small, see Fig 1. {Fig 1 [diag showing gentle dd & ss and shifts in demand]}

Thus, the relatively small change of 3% in the price of manufactured goods can be attributed to the high price elasticity of demand and supply.

In the case of agricultural products, the price fluctuates more because of its inelastic supply and demand. The supply of agricultural products – agriculture for example, is either perfectly price inelastic or inelastic. Production is seasonal and crop takes a few months to grow (long gestation period). Once harvested, the quantity cannot be changed. Hence, the supply of rice, wheat and potatoes, which are staples, is perfectly price inelastic. Also, they cannot be stored for long as they are perishables. Any changes in demand will bring about a more than proportionate change in prices.

Likewise, the demand for agricultural products is also price inelastic. As food is necessity, we need food for basic survival. Although, the demand for a specific kind of food can be very price elastic, the demand for food in general. Thus the demand for basic foods like rice, wheat and potatoes are relatively inelastic. Further, food generally occupies a small proportion of the consumer's total income and thus change in price of food will not comprise a significant proportion of a consumer's income. Any change in supply will lead to a more than proportionate change in price

The supply of agricultural product, although price inelastic, depends greatly on other factors such as weather and natural disasters. A prolonged drought can wipe out the harvests affecting supply drastically. Good harvests on the other hand will increase supply independently of price. Thus changes in the price of agricultural products originate generally from the supply side. {Fig 2 [diag showing steep dd & ss and shifts in supply]}

Thus, the relatively large change in price of 14% for agricultural products can be attributed to the price inelasticity of demand and supply, coupled with the changes in supply conditions.

In conclusion, due to the supply for agricultural products are relatively more price inelastic and demand are highly price inelastic, changes in its price is more 'significant' compared to manufactured products, despite changes in the demand and supply conditions.

Knowledge, Application, Understanding and Analysis		
L3	A clear and developed economic analysis of how demand and supply factors together with elasticities concepts are used to explain and justify the price volatility of agricultural products compared to manufactured products.	8 – 10
L2	Relevant but explanation can be further elaborated as to why prices of agricultural products tend to be more price inelastic compared to manufactured products. OR Only Demand and Supply factors that are well elaborated but without discussions on elasticities	5 – 7
L1	Smattering of points of why prices of agricultural products tend to be more volatile compared to manufactured products with no/minimal reference to concept of elasticities.	1 – 4

2. (a) Distinguish between price elasticity of demand, income elasticity of demand and cross elasticity of demand. [10]

Suggested Answer

	PED	YED	XED
Definition	Measures the responsiveness of quantity demanded to a change in price of good itself, cp	Measures the responsiveness of demand to a change in income, cp	Measures the responsiveness of demand to a change in price of another good, cp
Formula	$\frac{\%\text{ Change in QD}}{\%\text{ Change in Price}}$	$\frac{\%\text{ Change in Demand}}{\%\text{ Change in Income}}$	$\frac{\%\text{ Change in Demand}_a}{\%\text{ Change in Price}_b}$
Cause of change in quantity	Change in price of good itself	Change in income	Change in price of related good
Effect on demand curve	Represented by movement along original demand curve	Represented by shifts of original dd curve	Represented by shifts of original demand curve
Significance of sign	Negative as long as law of demand holds (P & QD change in opposite directions)	Can be +ve or -ve depending on type of good (i.e. normal or inferior good) YED +ve: normal gd YED –ve: inferior gd	Can be +ve, -ve or 0, depending on relationship between the 2 goods. Substitutes: +ve XED Complements:-ve XED Unrelated: XED=0
Significance of size	Vary from 0 to 1 to ∞ PED>1: price elastic demand where %Δ Qd>% Δ P PED<1: price inelastic demand where %Δ Qd<% Δ P	Vary from 0 to 1 to ∞ YED>1: income elastic demand where %Δ dd>% Δ Y YED<1: income inelastic demand where %Δ dd<% Δ Y	Vary from 0 to 1 to ∞ XED>1: high XED where %Δ Qx>% Δ Py (good substitutes or complements) XED<1: low XED where %Δ Qx<% Δ Py (poor substitutes or complements)

Knowledge, Understanding, Application & Analysis		
L3	Clear detailed explanation of the differences across three elasticity concepts and ability to use examples and/or diagrams.	8-10
L2	Mere listing of characteristics of the different elasticities, without demonstrating the differences across all three concepts.	5-7
L1	Recognise the various elasticity concepts (definition, formula)	1-4

3. Governments frequently impose indirect taxes in order to influence the pattern of consumers' expenditure. The effectiveness of such policy measures, however, depends crucially on how consumers respond.

(a) Explain with the help of examples the concepts of price elasticity of demand and price elasticity of supply. [10]

Suggested Answer

Introduction:

- Define PED and briefly mention about negative sign & magnitude.

Main Body:

A) PED

(i) When demand is price elastic (1 < PED < infinity (∞)

If a price change causes a *more than proportionate change* in quantity demanded, quantity demanded is *very responsive* to price changes. Demand is said to be price elastic.

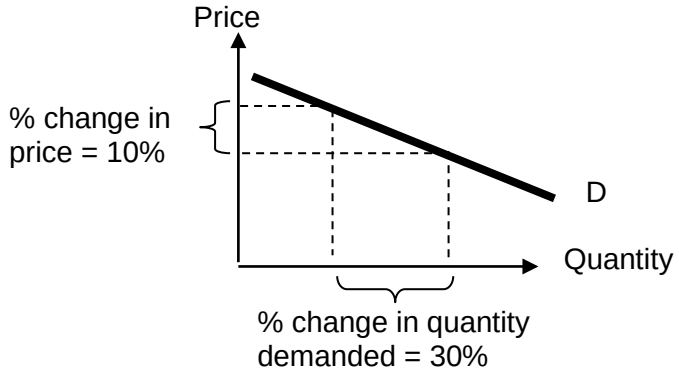


Figure 1: Price Elastic Demand

For example, if price decreases by 10%, and quantity demanded increases by 30%, the PED coefficient will be 3. Therefore, the demand for this good is price elastic.

The good is price elastic if:

a) Large number and presence of closeness of substitutes in the same price range

The more closely related the goods are, the higher the price elasticity of demand. Goods in a particular class (satisfy same want) are more easily substituted for one another. In addition, the larger the number of substitutes, the greater is the price elasticity of demand.
E.g. : Different kinds of meat. Consumers will easily be able to switch to consuming pork when the price of chicken increases as both kinds of meat satisfy the same want of consuming proteins; different brands of toothpaste; carbonated drinks, etc.

b) Relatively longer time period

The **longer the time period, the more price elastic the demand** is likely to be. In the long run, consumers are more receptive to price changes. A slight change in price would result in a greater likelihood of them changing their consumption habits or switching to other substitutes. It is also possible that given a longer time period, there is more scope for substitutes to be found or developed.

c) High proportion of income consumers spend on the good

E.g. cars, housing, an increase in price will provide an incentive to search for cheaper substitutes, and thus PED > 1. This is because a large proportion of our income is spent on cars and housing. When the price of cars increases, more consumers will cut back on their consumption of cars. Hence, quantity demanded will decrease more than proportionately, resulting in a price elastic demand for cars.

d) Low degree of necessity of the good to the consumers

For example, car, travelling, etc. If the price of cars increases, the quantity demanded for cars will decrease more than proportionately. The lower the degree of necessity, the higher is the price elasticity of demand. However whether a good is a necessity or luxury is subject to the income levels of consumers. Demand for luxury goods may be price inelastic for the rich but price elastic for the poor.

(ii) When demand is price inelastic (0 < PED < 1)

If a price change results in a *less than proportionate change* in quantity demanded, quantity demanded is *not very responsive* to price changes. Demand is said to be price inelastic.

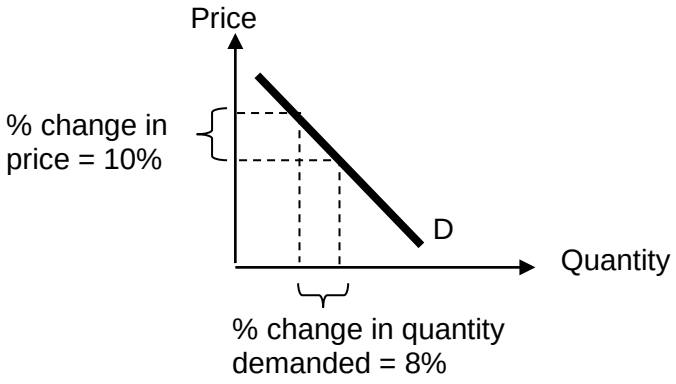


Figure 2: Price Inelastic Demand

For example, if price decreases by 10%, and quantity demanded increases by 8%, the PED coefficient will be 0.8. Therefore, the demand for this good is price inelastic.
The good is price inelastic if:

a) Low number and few close Substitutes in the Same Price Range

Consumers cannot easily switch from one product to another due to low number and/or close substitutes. E.g.: Electricity, oil etc.

b) Small proportion of income consumers spend on the good

The **smaller the proportion of income spent on the good, the lower the price elasticity of demand**. E.g. salt, pepper, sugar, etc

c) High degree of necessity of the good to the consumers

E.g, as rice is a staple food, it is regarded as a necessity. If the price of rice increases, the quantity demanded for rice will decrease less than proportionately.

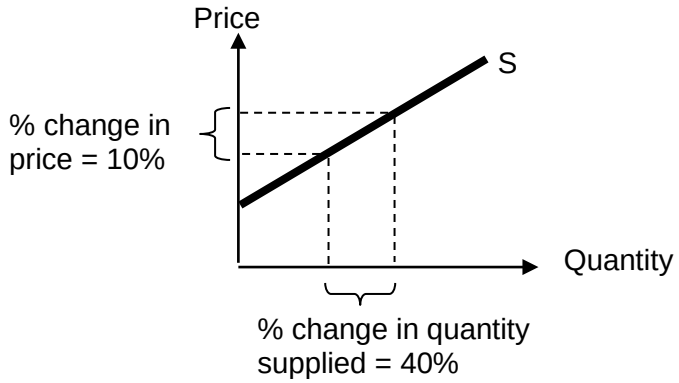
d) Habit of the consumers

People may consume a certain good out of sheer habit E.g. cigarettes and alcohol. Thus even if the price of cigarettes and alcohol increase, the quantity demanded of these goods will only decrease less than proportionately i.e. not very responsive to the price change.

B) PES

(i) When supply is price elastic (PES > 1)

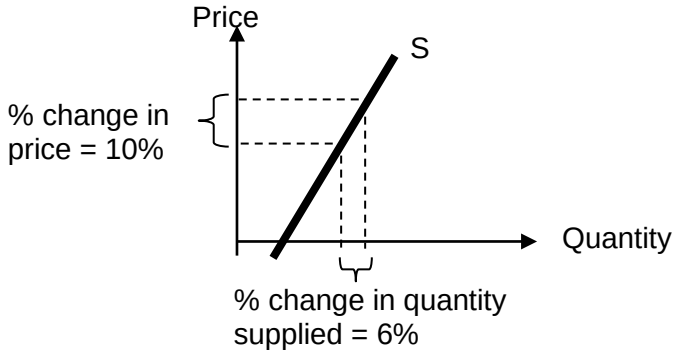
If a price change causes a *more than proportionate change* in quantity supplied, quantity supplied is *very responsive* to price changes. Supply is said to be price elastic.



For example, if price increases by 10%, and quantity supplied increases by 40%, the PES coefficient will be 4. Therefore, the supply for this good is price elastic.

(ii) When supply is price inelastic (PES < 1)

If a price change results in a *less than proportionate change* in quantity supplied, quantity supplied is *not very responsive* to price changes. Supply is said to be price inelastic.



For example, if price increases by 10%, and quantity supplied increases by 6%, the PES coefficient will be 0.6. Therefore, the supply for this good is price inelastic.

Factors Affecting the Price Elasticity of Supply of a Good

a) Time Period

In the ***very short run***, the producer is unable to respond to a price change because it is very difficult to increase the quantity of any product on the market due to the fact that all factors of production are fixed. Supply is restricted to the quantities actually available in the market at that point in time. For example, if there is an unexpected increase in demand for apples, the apple seller is unable to increase the supply of apples available for sale on that particular day. Therefore, supply is almost perfectly price inelastic.

In the ***short run***, supply is price inelastic as the firm may be able to adjust some but not all of its factors of production. The firm can increase output by increasing its variable factor inputs (labour and raw materials) but not the fixed inputs (factory space and equipment). For example, if there is an increase in demand for a good, the producer can hire more labour and order more raw materials (variable factors). But the increase in supply is limited as he cannot increase the number of machines or the size of factory space at that point in time (fixed factors). In this case, supply is still price inelastic but not as perfectly price inelastic as compared to the very short run time period.

In the ***long run***, supply is price elastic since all the factor inputs (fixed and variable) can be adjusted in response to changes in prices. There is sufficient time for all inputs and the productive capacity of the firm to be increased to expand production easily.

b) Mobility of factors of production

Mobility of factors of production refers to the ease and speed with which firms can shift resources and production between different products or uses.

The greater the ease and speed that resources can be shifted out of one line of production into another (where price is increasing), the greater will be its responsiveness of quantity supplied to changes in price.

For example, if the firm is able to substitute labour with capital easily, there could be a significant increase in quantity supplied of the good in response to the rise in its price. Hence, the supply for a good will be price elastic.

c) Spare capacity of firms

Spare Capacity measures the extent to which an industry, or economy is operating below the maximum sustainable level of production - there are spare factor resources of land, labour and capital.

Sometimes, firms may have excess capacity that is not being used (for example, factories or equipment may have been idle for some hours each day). If this occurs, it is relatively easy for a firm to respond with an increased output to a price rise. Thus, the supply will be price elastic in response to a rise in demand. For example, the supply of goods and services are often most price elastic during a recession, when there are plenty of spare labour and capital available to increase output as the economy recovers. But if the firm's capacity is fully utilised, it will be more difficult to respond to a price rise.

d) Level of Stocks or Inventories

Most firms will hold stocks of output they produce but do not sell right away in anticipation of possible increases in demand.

Firms that have a high level of stocks of output, have the ability to respond to a rise in price by supplying these stocks onto the market at a faster rate. Hence, supply for the good will be price elastic.

However, this is something that can affect PES over relatively short periods of time, because once the stocks are released in the market and sold, other factors determining PES may come into play.

Knowledge, Understanding, Application & Analysis		
L3	Thorough analysis and examples to explain the concepts of price elasticity of demand and supply.	8 – 10
L2	Shows descriptive understanding of the concepts of price elasticity of demand and supply.	5 – 7
L1	Recognise the concept of price elasticity of demand and supply.	1 – 4