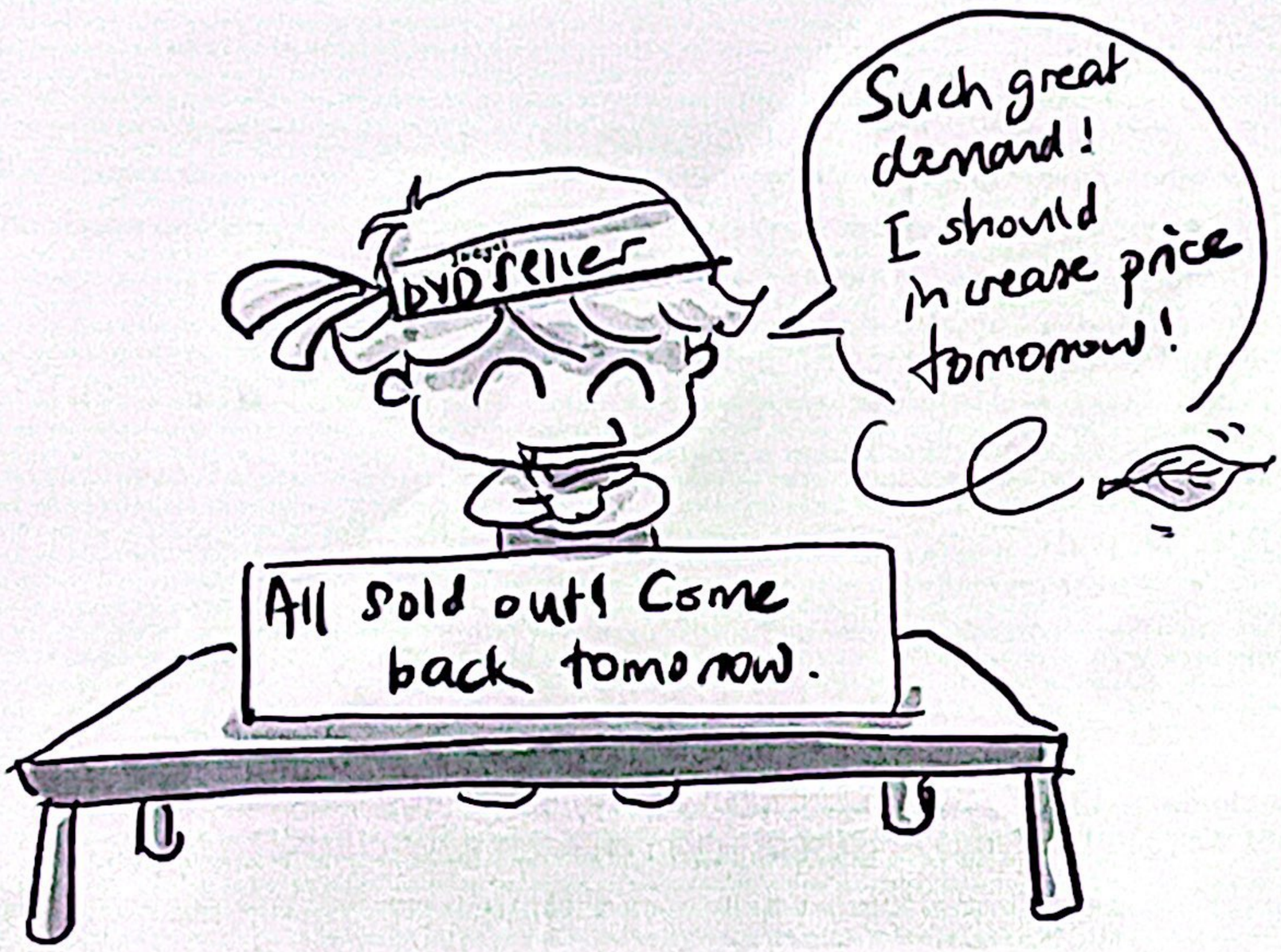
PRICE MECHANISM AND ITS APPLICATION

a.k.a

THEORY AND APPLICATIONS OF DEMAND AND SUPPLY



PART 0	PRICE MECHANISM AND ITS FUNCTIONS
PART 1	THEORY OF DEMAND AND SUPPLY
PART 2	APPLICATIONS OF DEMAND AND SUPPLY ELASTICITIES BY FIRMS & GOVERNMENT INTERVENTION

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Learning Outcomes

Syllabus content

2.1 Price Mechanism and its Applications

2.1.1 Price mechanism and its functions

a. Resource allocation in a free market

2.1.2 Interaction of demand and supply

a. Determinants of demand and supply

b. Equilibrium price and equilibrium quantity

c. Changes in demand and supply leading to changes in market equilibrium

2.1.3 Applications of demand and supply analysis to real-world markets*

a. Responsiveness of consumers and/or producers

- Price, income and cross elasticities of demand – determinants and significance
- Price elasticity of supply – determinants and significance

b. Impact of market outcomes on consumers and producers

- Consumer expenditure and producer revenue
- Consumer and producer surplus

c. Rationale and impact of government intervention on consumers and producers

- Taxes and subsidies
- Price controls – maximum and minimum prices
- Quantity controls – quotas

Note:
***The focus is on the application of demand and supply analysis to any market. For labour markets, Marginal Revenue Product of labour theory is not required.**

Tutorial Guide

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Chapter #2: Microeconomics II – Markets
Price Mechanism and its Applications

H2 A LEVEL QUESTIONS IN RECENT YEARS

ESSAYS

TYS 2021 Q2

In recent years the United States (US) government has increased tariffs (import taxes) on a wide range of imported goods from China.

(a) With the aid of a diagram, explain what is meant by consumer surplus and producer surplus. [10]
(b) Discuss the view that all economic agents in the US economy will lose from the introduction of tariffs on imported goods from China. [15]

TYS 2020 Q2

Concerns about future shortages of water resulted in Singapore's national water agency, PUB, increasing the price of water by 30% from 2017. By 2060, Singapore's total water demand could almost double.

(a) Explain why a shortage of water might still exist after the rise in the price of water. [10]
(b) Discuss whether the government policy of increasing the price of water is the only effective way to overcome future water shortages. [15]

TYS 2019 Q2

A firm in Singapore is facing an increase in demand for its goods which has led to an increased demand for labour. Its demand for labour is also inelastic. In addition, large numbers of its workers born in the 1960s ('baby boomers') have been retiring, reducing the number of workers available to the firm.

(a) With the aid of a diagram, explain how this firm's total expenditure on its workforce will have changed as a result. [10]
(b) Discuss whether making changes to the foreign worker levy is likely to be the most effective way the Singapore government can address the labour shortages experienced by such firms. [15]

TYS 2018 Q1

The average price of tickets for two concerts performed by singer-song writer Ed Sheeran in November 2017 at the Singapore Indoor Stadium was S$180. Tickets went on sale six months earlier and both concerts sold out almost immediately. Some tickets were later being offered for resale at prices well above face value.

(a) Using supply and demand curves, explain why there is an excess demand for tickets and why there is a high resale price. [10]
(b) Discuss possible strategies that concert organisers could use to improve the market outcome for this type of concert for producers and consumers. [15]

TYS 2017 Q2

Falling interest rates, continued income growth and other factors contributed to a period of rapid residential property price inflation in Singapore from the middle of 2009. However, the government has successfully pursued policies to restrict this rise to the extent that residential property prices actually fell in 2014 and 2015.

(a) Use supply and demand analysis to explain why falling interest rates and continued income growth may have led to a rapid rise in residential property prices. [10]
(b) Discuss the policies that might be used by the Singapore government to reduce residential property price inflation. [15]

TYS 2016 Q1

The price of a pair of jeans can be as little as S$20 or as much as S$500.

(a) Explain what might cause price elasticity of demand and cross elasticity of demand to be different for different products. [10]
(b) Assess the likely effects of a rise in price of one brand of jeans on the revenue earned by both retailers of that brand of jeans and those who sell other related goods. [15]

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TYS 2015 Q2
Recent years have seen a dramatic rise in the output of computer-based products such as smartphones, laptops and tablets.
Discuss the demand and supply factors that determine the output of computer-based products and evaluate which is the most important factor. [25]

TYS N2014 Q2
In 2013 the UK had a very poor harvests for grains and potatoes, which are major ingredients of many of the foods of UK consumers and also provide feed for much of Britain's livestock. At the same time there was a decline in the real income of many UK citizens, especially those on low incomes.

Using economic analysis, discuss the impact these events are likely to have had on UK consumers and farmers. [25]

TYS 2013 Q2
The Urban Redevelopment Authority (URA) announced that prices of private residential properties in Singapore rose by 1.3% in the third quarter of 2011, but the rise in the prices has been slowing for eight consecutive quarters. At the same time it reported that the total supply of new private residential properties nearing completion was at a record high.

Source: http://www.ura.gov.sg/pr/text/2011/pr11-135.html, accessed 28 October 2011

Discuss the different supply and demand factors and their likely importance in determining the reported changes in the prices of private residential properties in Singapore. [25]

TYS 2012 Q1
Most brands of car are available in different models. A large rise in the cost of car manufacture and a rise in income are likely to affect the sales of various models of car in different ways.
(a) Explain how elasticities of demand can assist in understanding the effect of each of these changes on the sales volume of different models of car. [12]
(b) Compare and contrast the likely combined impact of both of these changes on the revenue earned from the sales of different models of car. [13]

TYS 2011 Q1
Consumers and producers are generally assumed by economists to be motivated by self-interest.
(a) Explain how, according to economists, the pursuit of self-interest can help to address the problem of limited resources and unlimited wants. [10]
(b) Assess whether the price mechanism will always allocate scarce resources in the most efficient manner for all goods and services in a market economy. [15]

TYS 2011 Q2
Singapore is facing an ageing population issue. By 2030 senior citizens are expected to comprise almost 20% of the population.

Using economic analysis, discuss the likely effects of this demographic change on the product markets in Singapore. [25]

TYS 2010 Q1
The price of sugar, an ingredient in many canned soft drinks, dropped dramatically by 32% between July 2006 and October 2008. Healthy living campaigns meant consumers became more aware of the possible health dangers of consuming too much sugar and they switched to 'diet' drinks that do not contain sugar.

Discuss how the combination of the fall in the price of sugar and the healthy living campaigns might affect expenditure by consumers on non-diet and diet canned soft drinks. [25]

TYS 2009 Q3
There have been large changes in the price of crude oil over the past few years.

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Discuss what determines whether consumers or producers are more likely to bear the cost of these oil price changes. [25]

Case Studies

N2021 Question 1 "Changes in the market for seafood" (a), (b) & (e)
N2020 Question 1 "Anti-competitive behaviour in Singapore" (b) & (c)
N2019 Question 1 "Market Failures in the Vietnamese energy market" (a) – (d)
N2018 Question 1 "Policies for health improvement" (a) & (b)
N2018 Question 2 "Bangladesh's quest for inclusive economic growth" (c)
N2017 Question 2 "Prospects for beef exports to Japan" (c) – (e)
N2016 Question 1 "India's agricultural policy" (b)
N2016 Question 2 "Inflation policies in Brazil and Japan" (b)
N2015 Question 1 "Collapse of potash cartel" (a)
N2015 Question 2 "The growing threat of protectionism" (c) & (d)
N2013 Question 1 "Responses to rising prices in the UK and Kenya" (a), (b) & (f)
N2012 Question 1 "The market for cotton" (b) – (e)
N2011 Question 1 "The UK air travel market" (a) – (e)
N2009 Question 1 "The impending global food crisis" (b), (c), (d) & (f)

INTRODUCTION

- The fundamental economic problem confronting all societies is to decide on the "best" allocation of scarce resources between alternative uses. Thus, the function of an economy is to address this basic economic problem that arises from unlimited human wants and limited resources to produce the goods and services to satisfy such wants. In the context of scarcity, resource allocation boils down to making the following choices: what and how much to produce, how to produce and for whom to produce

- In the free market economy which is also known as laissez faire, individuals are free to make their own economic decisions. Consumers are free to decide what to buy with their income: free to make demand decisions; firms are free to choose what to sell and what production methods to use: free to make supply decisions. The demand and supply decisions of consumers and firms are then transmitted to each other through their effect on prices, also known as the price mechanism. Adam Smith, one of the Founding Fathers of economics observed that "invisible hand of the price mechanism", through pursuit of self-interest by individuals, will allocate resources in society's best interest.

- In Part 1, we examine how demand and supply interact to determine prices in a free-market economy and apply the concepts to different real-life examples. However, in reality, not all prices are determined by the free market as governments do intervene in markets and we will consider the impact of some forms of government intervention in Part 2.

PRICE MECHANISM AND ITS FUNCTIONS

Markets and Resource Allocation

The market is a mechanism for the allocation of resources. In a free market, consumers, producers and owners of factors of production interact, each seeking to maximize their returns. Prices have three main functions in allocating resources. These are the rationing, signalling and incentive functions. There are buyers who demand goods and sellers who supply goods. The interactions of demand and supply fix the price at

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which exchange takes place. The price mechanism allocates scarce resources in the free market through signalling, incentive and rationing functions

Price is the coordinating mechanism for allocating resources and organising production in the free market. It serves the functions of **signaling, incentive and rationing**, thus solving the three basic economic problems of what and how much, how to produce and for whom to produce.

(I) The signalling function of price mechanism helps to solve the problem of "What and how much to produce"

- Consumers will indicate to producers **what and how much they desire** through the price they are **willing and able to pay** for the good or service. It is in the **self-interest** of consumers to pay only according to the satisfaction they derive from each additional unit of the good to **maximise utility**. The more urgent the want or greater the desire to have the good, the higher the price consumers are willing to pay since they place higher value on each additional unit of the good.

- **Higher prices signal higher level of profits** for the producers. Given that it is in the producer's **self-interest** to **maximise profits**, they will have the incentive to produce the goods and services that command high prices. This results in resources being channelled to produce goods and services in accordance to the society's tastes and preferences.

- If a particular product proves to be increasingly popular with consumers, **the demand for it will outstrip supply at the existing price. A shortage** will develop and the **price of that product will increase**. This **rise in price makes production more profitable** and will serve as a **signal** to producers that they need to expand production to meet the higher demand. Similarly, a **fall in demand** will result in a **surplus** which **drives down price** and will signal to the producers to **reduce their production.**

- **Price movements therefore act as a signal** to producers that they need to **allocate more or less resources** for production to meet higher and lower demand from the consumers respectively.

- Decisions about selling by producers and buying by consumers are based on these signals. Consumers consider their budget constraint, weigh the costs and benefits and interpret existing information before deciding on what they would like producers to produce. Producers receive the price signal from the consumers, consider their available resources, costs and benefits and gather data before deciding on allocating resources according to what and how much to produce.

- The above shows that the price of a good is a key piece of information to both buyers and sellers in the market. Prices come about because of the transactions of buyers and sellers. They reflect market conditions and therefore act as a signal to those in the market. Decisions about buying and selling are based on those signals. Changes in prices provide information to producers and consumers about changes in market conditions. For example, if prices are rising due to higher demand, this is a signal to producers to expand production. On the contrary, fall in price would be a signal of lower demand. This would signal to producers to reduce production.

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(II) The incentive function of the price mechanism helps to solve the problem of "How to produce"

Prices act as an incentive for buyers and sellers. Low prices encourage buyers to purchase more goods. For consumers, this is because the amount of satisfaction or utility gained per dollar spent increases relative to other goods. Higher prices discourage buying because consumers get fewer goods per dollar spent. On the supply side, higher prices encourage suppliers to sell more to the market. Firms may have to take on more workers and invest in new capital equipment to achieve this. Changes in prices provide incentives for producers to reallocate their scarce resources. For example, rising prices act as an incentive for producers to allocate more resources to earn more profits.

However, low prices discourage production. A prolonged fall in prices may drive some firms out of the market because it is no longer profitable for them to supply.

In order to increase profits, the producers must not only increase revenue, they have to also minimise costs, i.e. produce at the lowest possible costs for a particular output level. Therefore, producers need to maximise the use of each factor (e.g. labour, land, and capital) so as to achieve the highest return per dollar of expenditure. So producers must produce at the lowest cost if they are to survive in the market place. This then determines how goods are produced.

(III) The rationing function of the price mechanism helps to solve the problem of "For whom to produce"

Consumer wants are infinite, but we live in a world of scarce resources. Somehow, those scarce resources need to be allocated between competing uses. Changes in prices enable scarce resources to be rationed to the parties who are most willing to pay.

One function of price in a market is to **allocate and ration those resources.** If many consumers demand a good, but its supply is relatively scarce, then prices will be high. Limited supply will be rationed to those buyers prepared to pay a high enough price, or have more "dollar votes". For example, when there is a shortage, those with greater willingness and ability to pay will bid up the price of the good, thus enabling the goods to be rationed to these buyers.

In order to get a good from the market, consumers must be able and willing to pay for it. The amount of money they can spend is determined by their income and wealth. The amount of goods produced is usually insufficient to meet the demand of all those who have the ability to buy. Competition among consumers will drive up the price of a good. This will eliminate those who are unable or unwilling to pay the higher price for the good. In this way, prices serve to **ration** (and distribute) the goods to those who can afford to pay the highest possible market price.

On the contrary, if demand is relatively low, but supply is very high, then prices will be low. The low price ensures that high numbers of goods will be bought, reflecting the lack of scarcity of the good.

Thus, the three questions of what (and how much) to produce, how to produce and for whom to produce are addressed through the price mechanism.

Note: *Refer to Page 2.1.5 for application of the price mechanism.*

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Price Mechanism and its Applications

PART 1: THEORY OF DEMAND AND SUPPLY

CHAPTER OUTLINE

2.1 DEMAND AND SUPPLY

2.1.1 DEFINITION OF DEMAND AND SUPPLY

2.1.2 THE DEMAND CURVE AND SUPPLY CURVE
2.1.2.1 THE DEMAND CURVE & THE LAW OF DEMAND
2.1.2.2 THE SUPPLY CURVE & THE LAW OF SUPPLY

2.1.3 EQUILIBRIUM PRICE, QUANTITY, CONSUMER EXPENDITURE/ PRODUCER REVENUE, CONSUMER AND PRODUCER SURPLUS

2.1.4 MOVEMENTS ALONG vs. SHIFTS IN DEMAND AND SUPPLY CURVES

2.1.4.1 SHIFTS IN DEMAND CURVE (MOVEMENTS ALONG SUPPLY CURVE)
Factors that Shift Demand Curve
1. Consumer income & Income Elasticity of Demand
2. Price of related goods & Cross Elasticity of Demand
3. Taste and Preferences
4. Demographics
5. Consumers' expectations

2.1.4.2 SHIFTS IN SUPPLY CURVE (MOVEMENTS ALONG DEMAND CURVE)
Factors that Shift Supply Curve
1. Number of producers
2. Cost of production
3. Prices of related goods
4. Supply shocks
5. Producers' expectations

2.1.4.3 SIMULTANEOUS SHIFTS IN DEMAND AND SUPPLY

2.1.4.4 <u>EXTENT</u> OF IMPACT ON EQUILIBRIUM PRICE, QUANTITY, CONSUMER EXPENDITURE/ PRODUCER REVENUE, CONSUMER SURPLUS & PRODUCER SURPLUS WHEN DEMAND AND/OR SUPPLY CHANGE/S

Elasticity Concepts
Price Elasticity of Demand (PED)
Income Elasticity of Demand (YED)
Cross Elasticity of Demand (CED)
Price Elasticity of Supply (PES)

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2.1 DEMAND AND SUPPLY

You have learned about the role of the price mechanism to allocate resources in a free market. Now, we will introduce the 'Demand and Supply' framework to help support your analysis of the interaction between consumers and producers and its impact on real-world markets.

2.1.1 DEFINITION OF DEMAND AND SUPPLY

Demand refers to the quantities of a good or service that consumers are **willing and able** to buy at various prices over a given period of time, ceteris paribus*.

Supply refers to the various quantities of a good or service producers are **willing and able** to offer for sale at various prices over a period of time, ceteris paribus*.

**Ceteris Paribus means 'other things being equal' in Latin. This assumption is needed because we want to study the relationship between variables, such as prices, tastes and preferences, and income. This assumption is similar to conducting a Science experiment where we will vary one variable when studying another, by holding other variables constant.*

It is useful to note that desirability (i.e. willingness to pay or buy) without affordability (i.e. ability to pay or buy), does not create demand in the market for goods and services. An effective demand for goods and services is determined by consumers' willingness to buy backed by their purchasing power.

For producers, their objective is profit maximization. Therefore producers must not only have the ability to produce the goods but also willingness to sell them. If the price is not right, producers will not provide the good in the market.

1. Jordan, an 18 year-old who has just completed his A level and passed his driving test, has been thinking of getting his dream car. Will Jordan's desire to have his dream car add on to its demand? Yes or No? Why?
Depends on whether Jordan has the ability to pay for the car, ie. whether the demand is effective
2. Pauline has taken over her father's law firm and is thinking of expanding it due to growing clientele but she is faced with difficulties in renting a bigger venue and hiring more people. Will Pauline be able to supply more law services to the growing clientele? Yes or No? Why?
Difficulties in renting a bigger venue & hiring more people limits Pauline's ability to produce more legal services.

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2.1.2 THE DEMAND CURVE AND SUPPLY CURVE

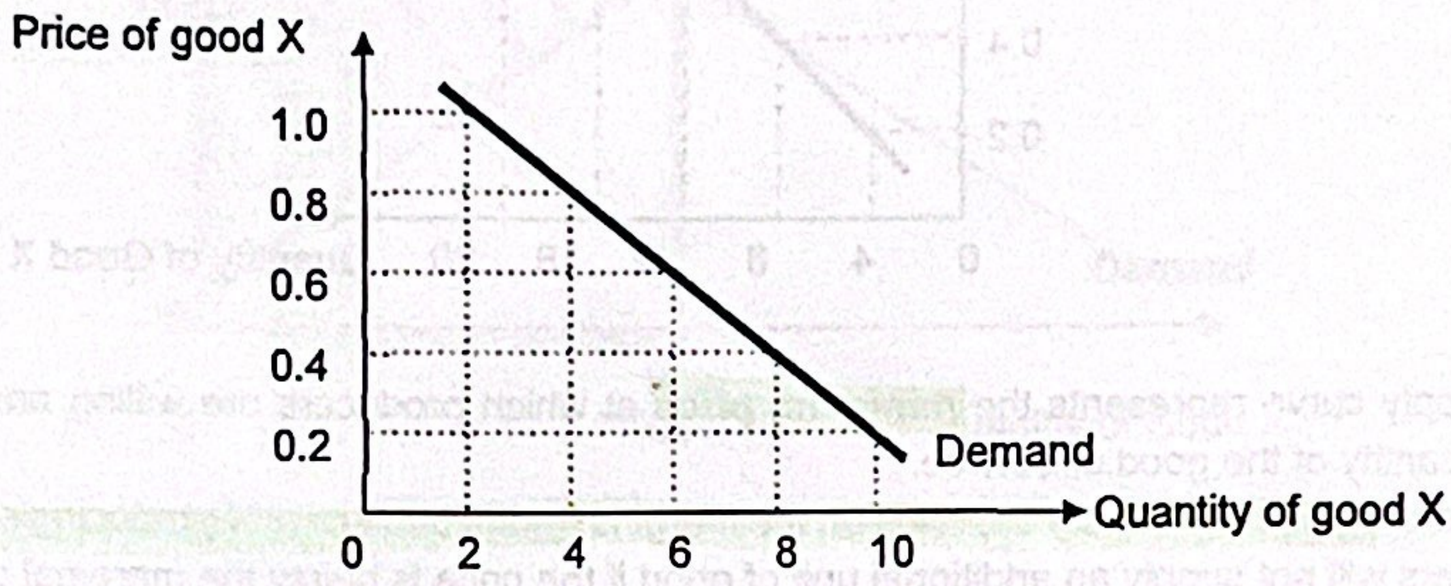
A **market** represents the interaction between buyers and sellers and can be illustrated by a demand curve intersecting a supply curve.

The demand curve and supply curve are the respective graphical representations of demand and supply, with price measured on the vertical axis and quantity on the horizontal axis.

2.1.2.1 THE DEMAND CURVE & THE LAW OF DEMAND

The demand for a particular good refers to the entire relationship between price and quantity demanded. It is indicative of the quantity demanded at each price and is represented by the whole demand curve.

Figure 1: The Demand Curve of Good X



- The demand curve represents the **maximum price** consumers are willing and able to pay for each quantity of the good or service. When making consumption decisions, consumers consider their perceived satisfaction they derive from consuming the good or service, which is referred to as 'utility'. The value of the additional satisfaction that consumers derive from the marginal unit (last unit) also known as marginal utility or marginal benefit is important in determining how much they are willing to pay.
- The **law of diminishing marginal utility (LDMU)** states that as more and more units of a good or service are consumed, the additional utility a consumer derives from successive units eventually decreases. The increase in utility from the consumption of each additional unit of the good or service (marginal utility) is less than the previous units, even though total utility increases. As marginal utility falls, the price that consumers are willing to pay falls. The price of the good or service therefore represents the consumers' marginal willingness to pay.
- Referring to Figure 1, it can be seen that the quantity demanded of good X increases as the price of good X decreases, giving rise to a downward sloping curve with a negative gradient. The downward sloping demand curve reflects the diminishing marginal utility derived from consuming additional units of the good.
- The slope of a demand curve is governed by the

Law of Demand which states that an **inverse** relationship exists between the **price** and the **quantity demanded** of the good, ceteris paribus.

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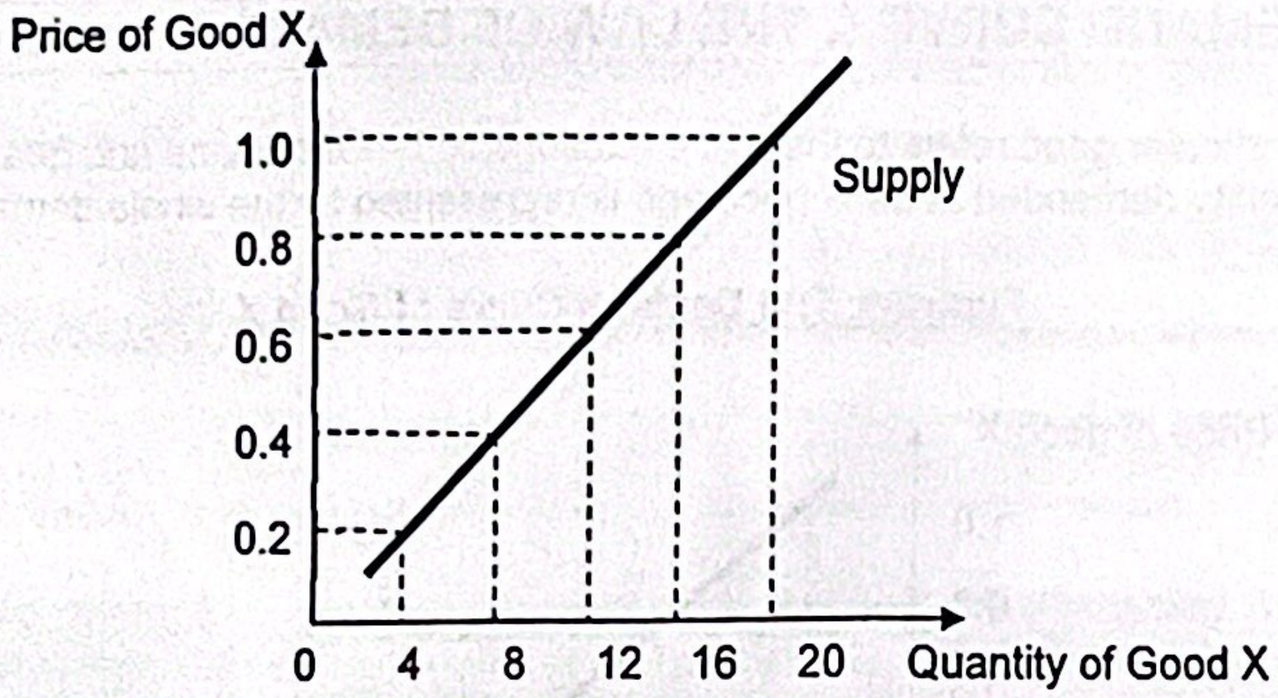
2.1.2.2 THE SUPPLY CURVE & THE LAW OF SUPPLY

The supply for a particular good refers to the entire relationship between price and quantity supplied. It is indicative of the quantity supplied at each price and is represented by the whole supply curve.

Figure 2: The Supply Curve of Good X



- The supply curve represents the **minimum price** at which producers are willing and able to supply at each quantity of the good or service.
- Producers' decision to supply depends on the marginal (additional) cost of producing each additional unit. Producers will not supply an additional unit of good if the price is below the marginal cost.
- Thus, as price increases, the quantity supplied will increase. Conversely, when the price falls, the quantity supplied will also fall.
- With reference to Figure 2, the quantity of good X supplied increases as the price of good X increases. This is because higher prices will result in higher revenue and hence higher profits for the producers, assuming the prices of the resources used to produce the good (i.e. costs) are held constant. In principle, the producer's motive is to sell his output at a profit.
- The supply curve is described as upward sloping from left to right. This reflects the rising marginal cost of production as additional units of the good are produced.
- The gradient of the supply curve is positive which is governed by the

Law of Supply which states that a **direct** relationship exists between the **price** and the **quantity supplied** of the good, ceteris paribus.

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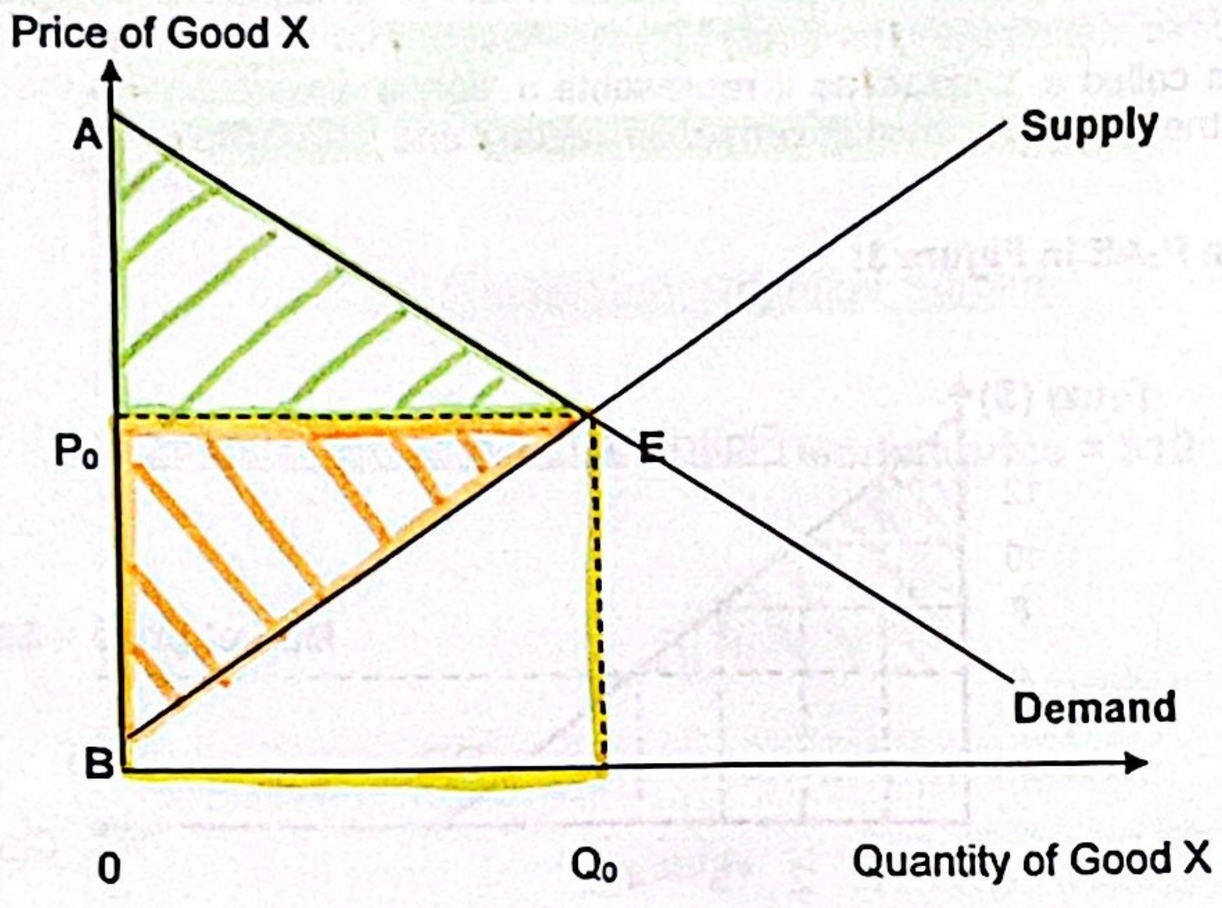
2.1.3 EQUILIBRIUM PRICE, QUANTITY, TOTAL REVENUE/EXPENDITURE, CONSUMER AND PRODUCER SURPLUS

Figure 3: Market Equilibrium of Good X



Referring to Figure 3:

- The market equilibrium price (P_0) and quantity (Q_0) for Good X is the price and quantity exchanged where the demand curve meets supply curve at point E, i.e. the quantity demanded equals the quantity supplied.

At this equilibrium, we can infer a few things:

• **Total revenue** (TR) earned by the producers which is also the **total expenditure** (TE) by consumers is price multiplied by quantity exchanged ($0P_0 \times 0Q_0$).	Area $0P_0EQ_0$.
• **Consumer surplus** is the difference between the price that buyers are willing and able to pay (i.e. maximum amount) for the good and the actual price paid. • It is the extra satisfaction gained by consumers from paying a price that is lower than that which they are prepared to pay. • It is approximately represented by the area under the demand curve and above the equilibrium price. ***Please see the section on CONSUMER SURPLUS for further explanation*	Area P_0AE
• **Producer surplus** is the difference between what a producer is willing and able to put up for sale (i.e. minimum amount received) for a good and the actual price charged and amount he receives. • It is approximately represented by the area above the supply curve and below the equilibrium price. ***Please see the section on PRODUCER SURPLUS for further explanation*	Area P_0BE

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FURTHER EXPLANATION ON CONSUMER SURPLUS

As a consumer, there could be many instances that you were delighted and thrilled by unexpectedly good bargains while shopping for the goods you want to buy. This positive feeling is the outcome of what economists would describe as '**consumer surplus**'. Consumers generally look out for such benefit because it enhances their consumer welfare.

This happens whenever the actual price paid is below what the consumer is willing and able to pay. In such an instance, the consumer is not paying for every bit of satisfaction that he derives from consumption. The 'unpaid' bit of satisfaction is called a 'surplus' as it represents a 'bonus' satisfaction to the consumer. The bigger the consumer surplus, the higher the level of consumer welfare and satisfaction.

Derivation of Area P_0AE in Figure 3:

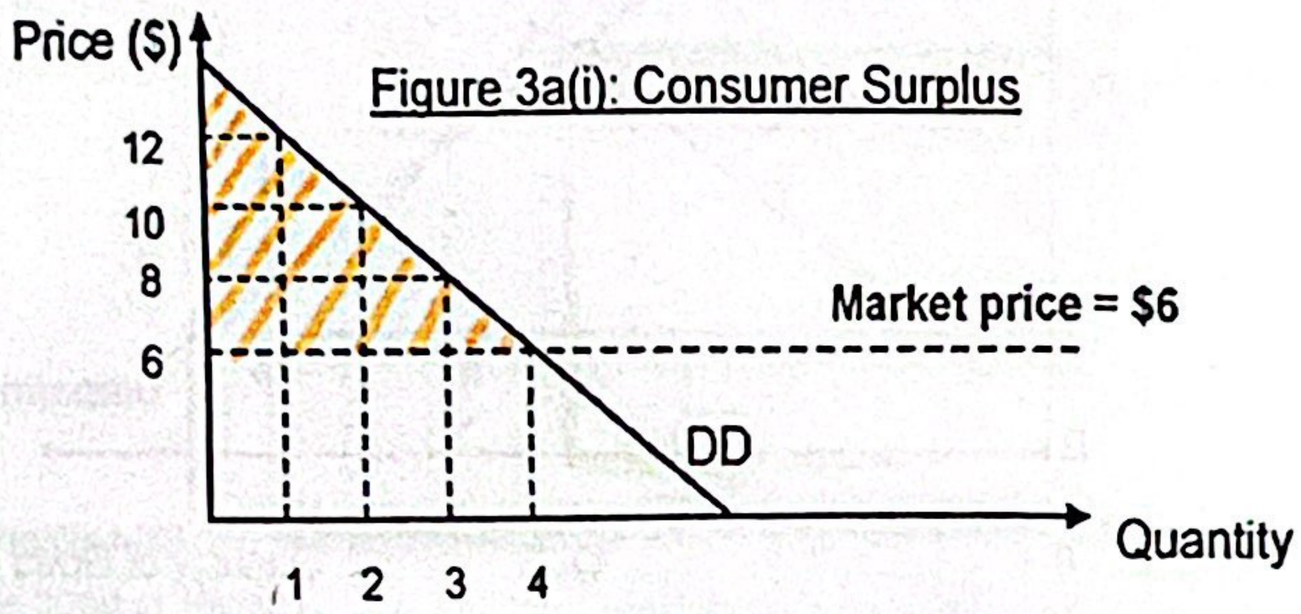

Figure 3a(i): Consumer Surplus

Referring to Figure 3a(i), the demand curve shows the maximum price a consumer is willing and able to pay for each unit of the good.

- For the 1st unit, the consumer is willing and able to pay $12.
- At the market price of $6, the consumer surplus for the 1st unit is **($12-$6) = $6.**
- For the 2nd unit, consumer surplus is **($10-$6) = $4.**
- Consumer surplus for the 3rd unit is **($8-$6) = $2** and the 4th is **$0.**
- Total consumer surplus will be the sum of all the consumer surpluses that is obtained from all the units consumed i.e. **($6 + $4 + $2 + $0) = $12 for a total of 4 units.**

So if you are able to divide the good into smaller units instead of whole numbers (drawing on the idea of Integration), consumer surplus is approximately represented by the shaded triangle shown in Figure 3a(ii). – **i.e. the area under the demand curve and above the equilibrium price.**

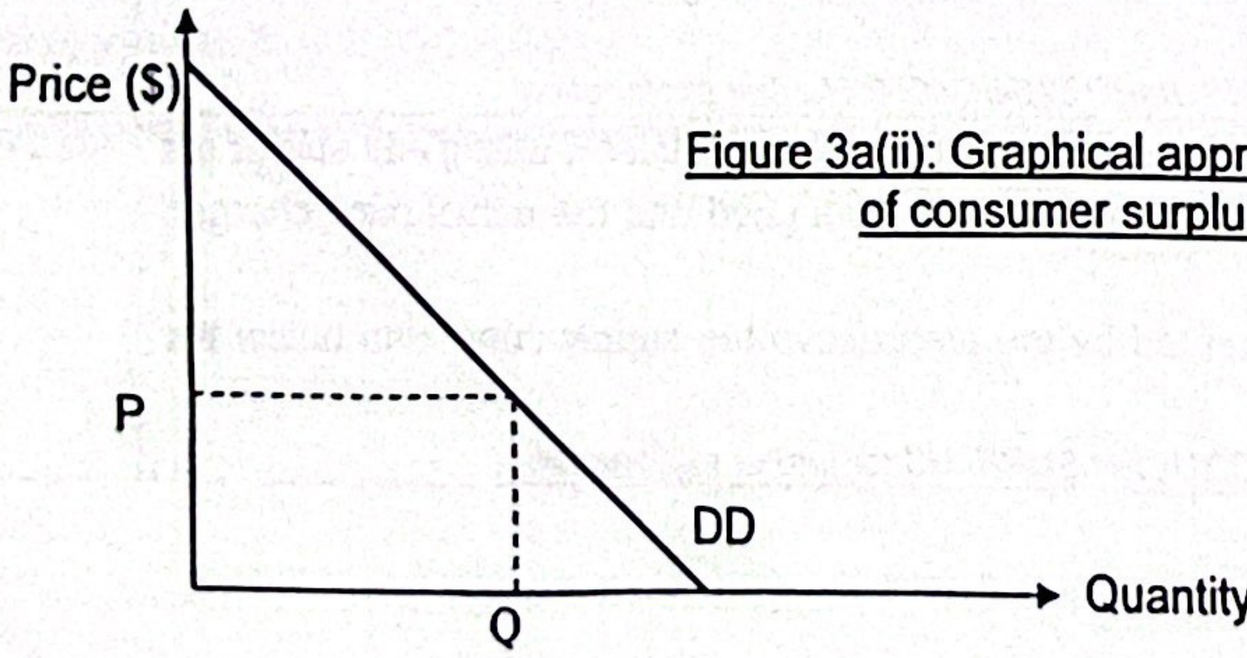

Figure 3a(ii): Graphical approximation of consumer surplus

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FURTHER EXPLANATION ON PRODUCER SURPLUS

This is the counterpart of consumer surplus. Producers also may enjoy a surplus. However, the 'surplus' for producers comes in the form of earnings rather than satisfaction.

Let's take a closer look at how the producer surplus is derived:

The supply curve shows the price a producer is willing to accept for each unit of the good (based on the costs of production).

Derivation of Area P_0BE in Figure 3:

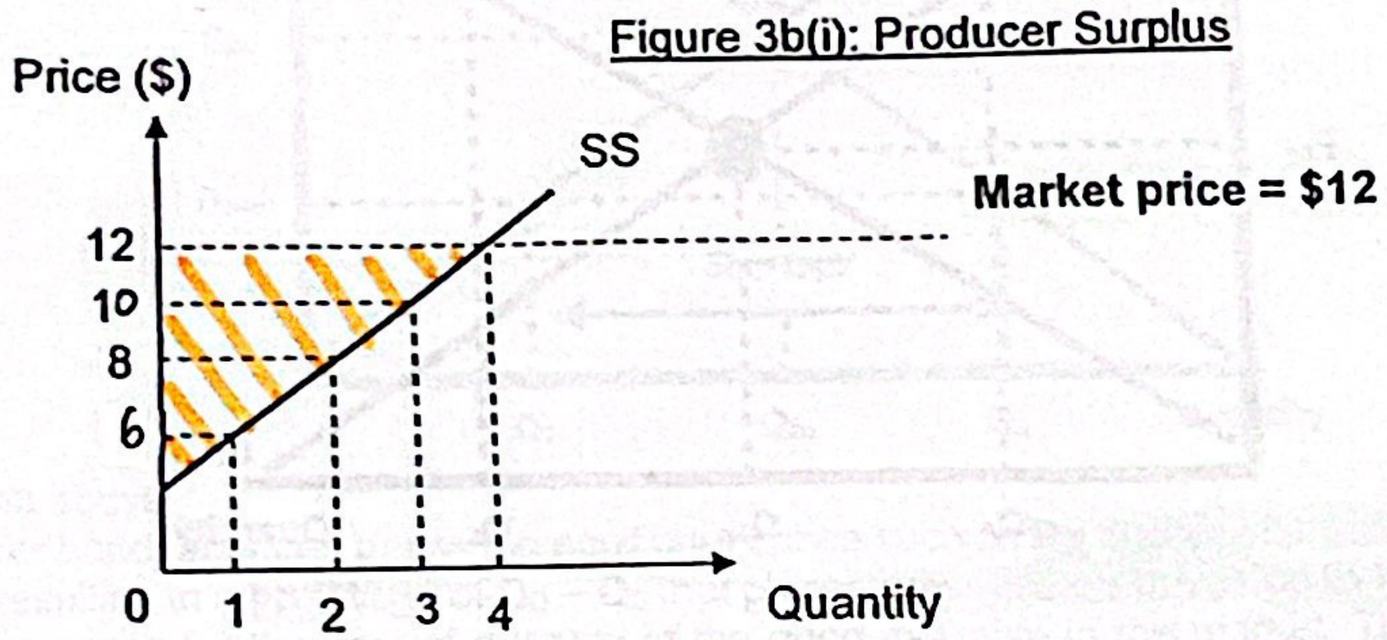

Figure 3b(i): Producer Surplus

Referring to Figure 3b(i),

- The producer is willing and able to sell the 1st, 2nd, 3rd and 4th unit of the good at **$6, $8, $10 and $12** respectively.
- At the price of **$12**, the producer will gain producer surplus of **($6 + $4 + $2 + $0) = $12 for a total of 4 units.**

Again if you are able to divide the good into smaller units instead of whole numbers (drawing on the idea of Integration), producer surplus is approximately represented by the shaded triangle shown in Figure 3b(ii). **i.e. the area under the equilibrium price and above the supply curve.**

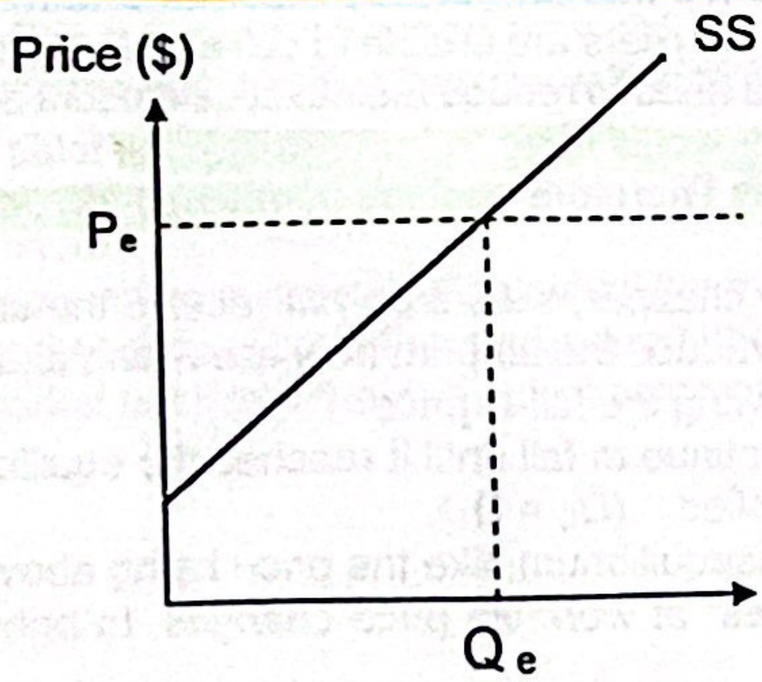

Figure 3b(ii): Graphical approximation of producer surplus

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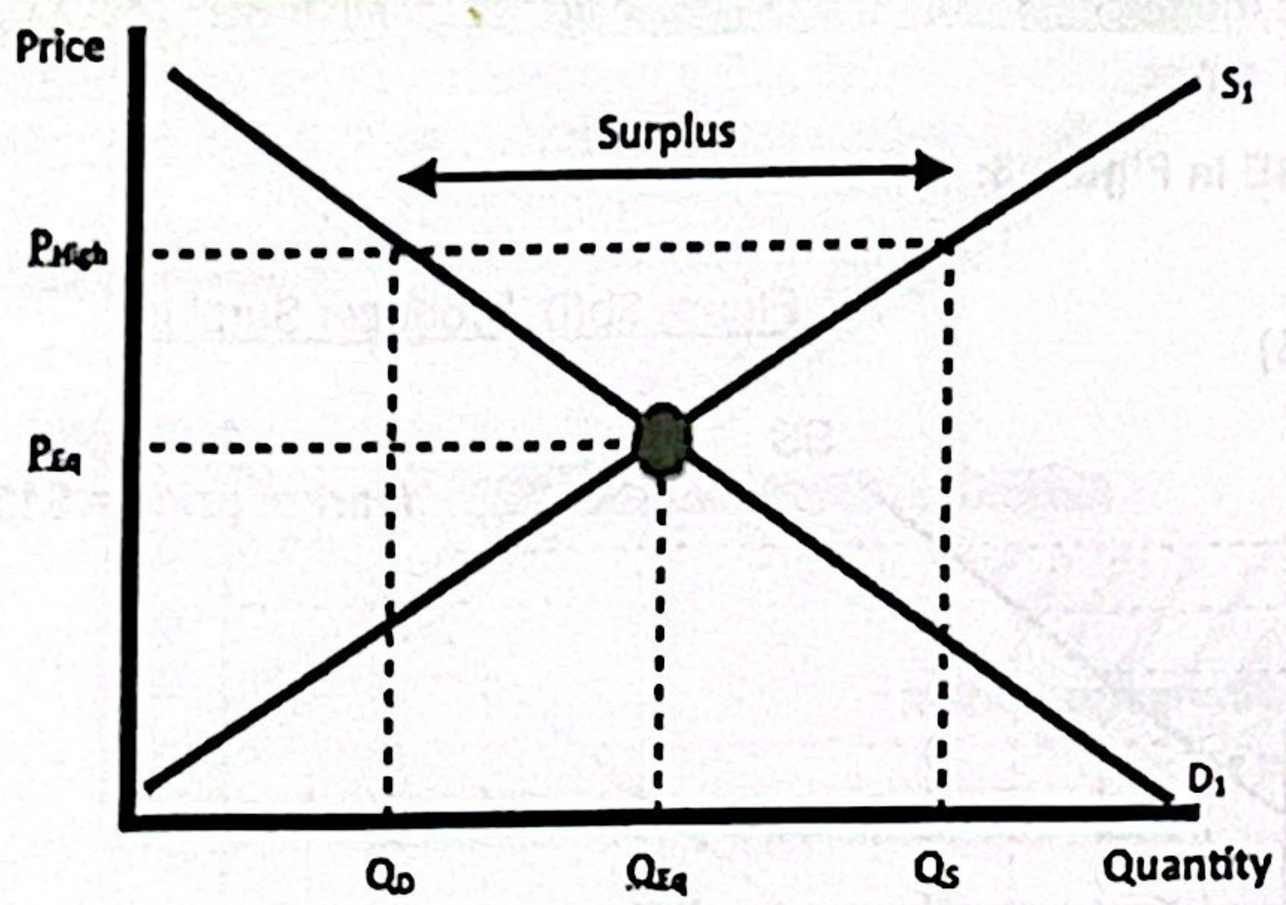
Market Surplus & Market Shortage

Market Surplus

What Happens when Price is above the Equilibrium Price?



Referring to the above:

- The market equilibrium price (P_{Eq}) and quantity (Q_{Eq}) for the good is the price and quantity exchanged where the demand curve meets supply curve at point (shown by the dot), i.e. the quantity demanded equals the quantity supplied.
- At prices above the equilibrium price such as P_{high}, the quantity supplied exceeds the quantity demanded, resulting in a **market surplus** of $Q_s - Q_D$. This places **pressure on the price to fall** as producers find they are unable to sell their output at the original price P_{high}. Thus, when the market price falls to market equilibrium price (P_{Eq}) and quantity (Q_{Eq}) for the good, the market will become stabilized and be at a state where it is unlike to change until the next external shock.

A detailed explanation of the adjustment process from a market surplus disequilibrium:

- When there is a surplus or excess supply for a good, suppliers are unable to sell all they want at the going price. Sellers find stocks increasing and that there is a need to reduce their excess amount of stock taking up valuable space in their stock rooms. The producer would have to lower their price to as falling prices increase the consumers' willingness and ability to buy Therefore *quantity demanded increases* following the fall in price.
- At the same time, the price of the good itself is now cheaper, sellers do not receive the same financial reward they did from selling the good and now, they reduce the amount they are willing and able to offer for sale. Therefore, *quantity supplied* decreases following the fall in price.
- As long as a **market surplus** exists, the price will continue to fall until it reaches the equilibrium price of P_{Eq}, where Quantity Demanded equals Quantity Supplied. ($Q_D = Q_S$).
- It is important to understand that if the market is in disequilibrium, like the price being above the market price (above the equilibrium), there will "natural forces" at work via price changes, to bring the market back into the desired situation of market equilibrium.

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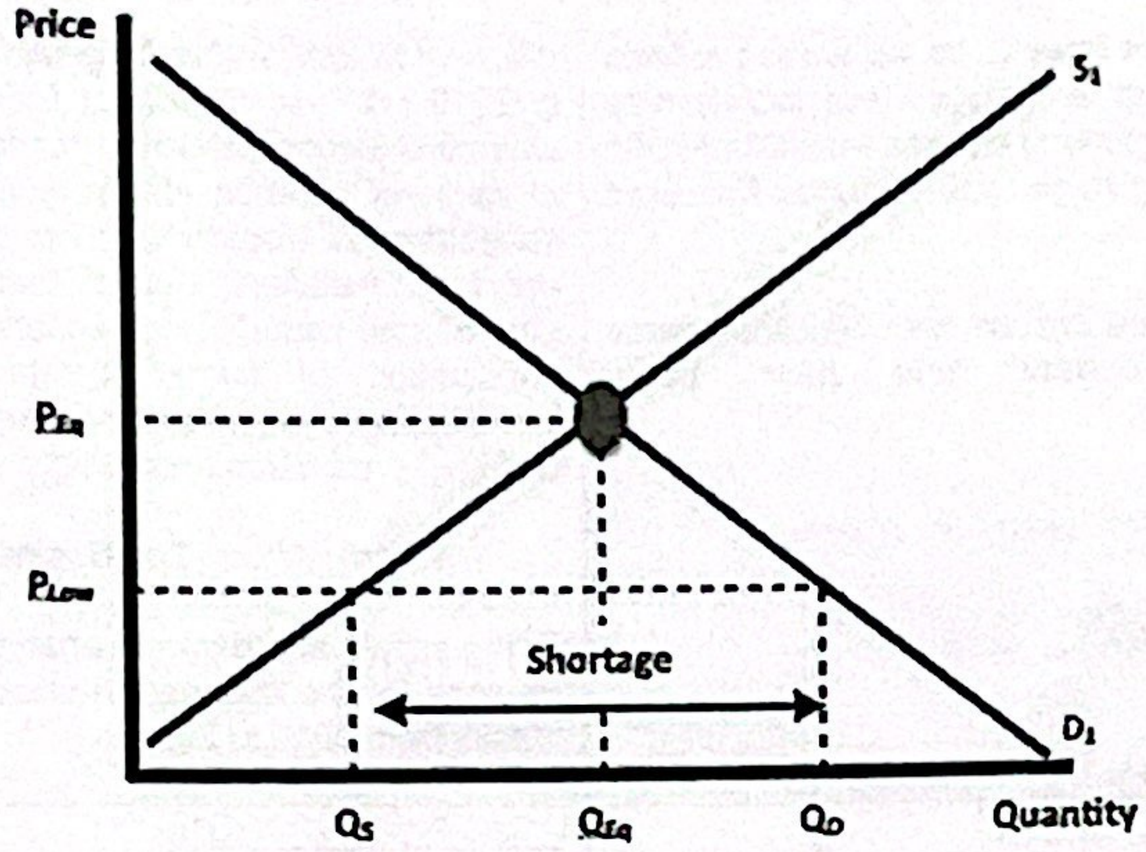
Market Shortage

What Happens when Price is below the Equilibrium Price?



Referring to the above:

- On the other hand, at prices below the equilibrium price such as P_2, quantity demanded exceeds quantity supplied, resulting in a **shortage** of $Q_D - Q_S$ that places **pressure on the price to rise** as consumers will offer higher prices for the limited quantity of the good available in the market. Thus, when the market price rise to market equilibrium price (P_{Eq}) and quantity (Q_{Eq}) for the good, the market will become stabilized and be at a state where it is unlike to change until the next external shock.

A detailed explanation of the adjustment process from a market shortage disequilibrium:

- With too many buyers chasing too few goods, sellers find that they cannot satisfy all their customers' needs at this price, so they respond to the shortage by raising their prices without losing sales. This rise in price has reduced the amount of the good that consumers was willing and able to buy as the price of the good itself is now more expensive. Therefore, quantity demanded falls following the rise in price.
- And since the price of the good itself is now more expensive, sellers receive a greater financial reward for selling the good now than they did before. As a result of this greater financial reward, sellers increase the quantity that they are willing to offer in the market. Therefore, quantity supplied increases following the rise in price.
- As the price rises, quantity demanded falls, quantity supplied rises and the market reaches equilibrium.
- It is important to understand that when the market is not in equilibrium, like when the price being below the market price (above the equilibrium), there are "natural forces" at work via price changes to bring the market back into the desired situation of market equilibrium.

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HWA CHONG INSTITUTION
Year One H2 Economics 2022
Chapter #2: Microeconomics II – Markets
Price Mechanism and its Applications

Note: Students will need to determine when the detailed explanation is required by looking at the question itself.

Past Questions that WILL require	Past Questions that WILL NOT require
<u>HCI 2019 BT1 Q5a</u> Due to scarcity, resources have to be allocated between competing uses. Farmers in Malaysia are increasingly allocating more land to growing durians instead of palm trees as the Chinese are huge fans of durian-flavoured food. Explain how the price mechanism can allocate scarce resources between durians and palm trees. [10]	<u>CJC Prelim 2021 Q1a</u> A box of 50 disposable surgical masks would cost $6.00 in 2019 but rose sharply to $50.00 a box in 2020. Yet when the Singapore Government recommended the use of bacterial filtration efficiency (BFE) >95% disposable surgical mask in early 2021, prices averaged at $12.00 per box. Retailers shared that they have "sufficient stocks" and have "placed orders by container loads" in anticipation of further demand. Local face mask manufacturers are also monitoring demand and are ready to adjust production accordingly. *Adapted from: The Business Times, 25 May 2021* Using supply and demand analysis, explain the possible reasons for the changes in price of disposable surgical masks from 2019 to 2021. [10]
<u>RVSH Prelim 2021 Q1b</u> Even with the recruitment of foreign nurses, the shortage of nurses continues to persist. This led to the latest round of salary adjustment, which saw the salaries of nurses increase by a significant 30%. Discuss whether increasing salaries of nurses is the most effective policy in tackling the shortage of nurses in Singapore. [15]	<u>ACJC Prelim 2021 Q1a</u> Recent wet weather conditions and COVID-19 movement restrictions in Malaysia have caused prices of vegetables in Singapore to double. In the midst of panic buying in supermarkets, the retail prices of fresh seafood, poultry and eggs have risen sharply even as the government assured the public that there are sufficient supplies of food. Source: straitstimes.com, published Jun 12, 2021; accessed 20th July 2021 Explain the demand and supply factors that may cause the prices of fresh food items like vegetables and poultry to increase sharply. [10]
<u>TYS 2018 Q1</u> The average price of tickets for two concerts performed by singer-song writer Ed Sheeran in November 2017 at the Singapore Indoor Stadium was S$180. Tickets went on sale six months earlier and both concerts sold out almost immediately. Some tickets were later being offered for resale at prices well above face value. Using supply and demand curves, explain why there is an excess demand for tickets and why there is a high resale price. [10]	<u>TYS 2017 Q2a</u> Falling interest rates, continued income growth and other factors contributed to a period of rapid residential property price inflation in Singapore from the middle of 2009. However, the government has successfully pursued policies to restrict this rise to the extent that residential property prices actually fell in 2014 and 2015. Use supply and demand analysis to explain why falling interest rates and continued income growth may have led to a rapid rise in residential property prices. [10]

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3. With the onset of Covid-19, it was reported that there was a shortage of face masks used as part of a slew of measures to suppress the transmission and save lives in Singapore.

Suggest a possible reason that gives rise to the shortage of face masks and explain the role of price mechanism in correcting the shortage.

Govt urged people to use masks with "better bacterial filtration capabilities"
- Tastes & Preferences - government policies & actions

"because of rising Covid-19 cases in the region"
- Tastes & Preferences — increased fear or anxiety
- Expected increase in future prices of face masks

2.1.4 MOVEMENTS ALONG vs. SHIFTS IN DEMAND AND SUPPLY CURVES

OVERVIEW:

You need to be able to differentiate between these two terminologies – quantity demanded vs demand and quantity supplied vs supply.

Movements upward and downward along the demand curve represent **changes in quantity demanded** arising solely from a **change in price of the good** itself when the supply curve shifts, ceteris paribus. Refer to Figure (a).

On the other hand, **movements upward and downward along the supply curve** represent **changes in quantity supplied** arising solely from a **change in price of the good** itself when the demand curve shifts, ceteris paribus. Refer to Figure (b).

Change in quantity supplied
- caused by a change in price (when demand shifts)
- represented by a movement along the supply curve

Change in Supply
- caused by a change in a non-price factor
- represented by a shift in the supply curve

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Figure (a): Movement along the demand curve (resulting from a shift in supply curve)

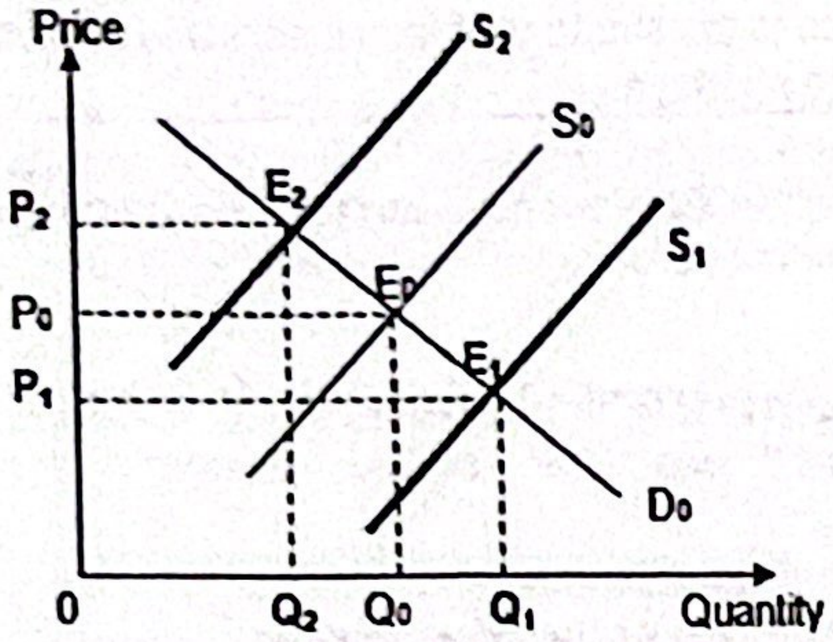
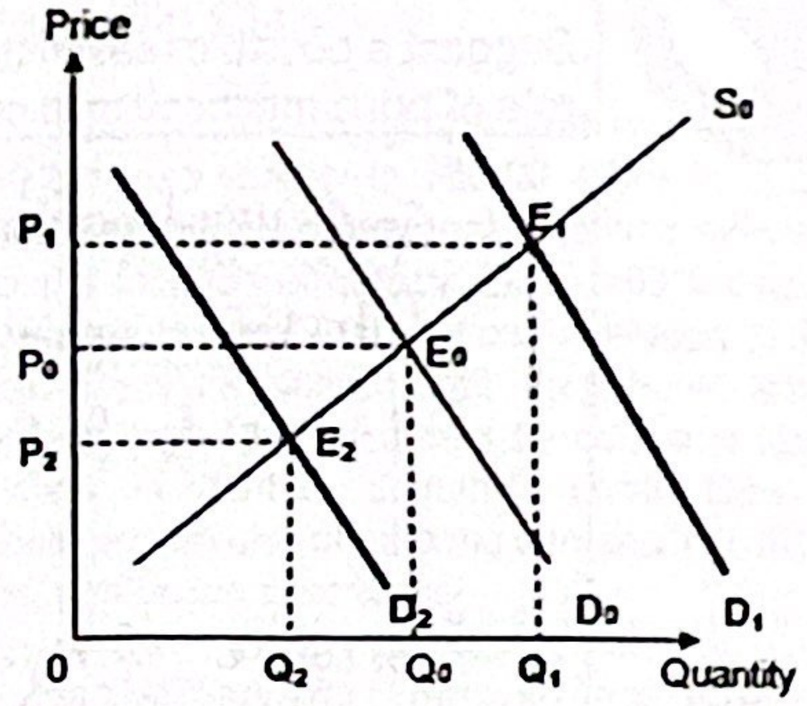


Figure (b): Movement along the supply curve (resulting from a shift in demand curve)



Shifts in the supply and demand curves represent changes in non-price determinants of supply and demand respectively.

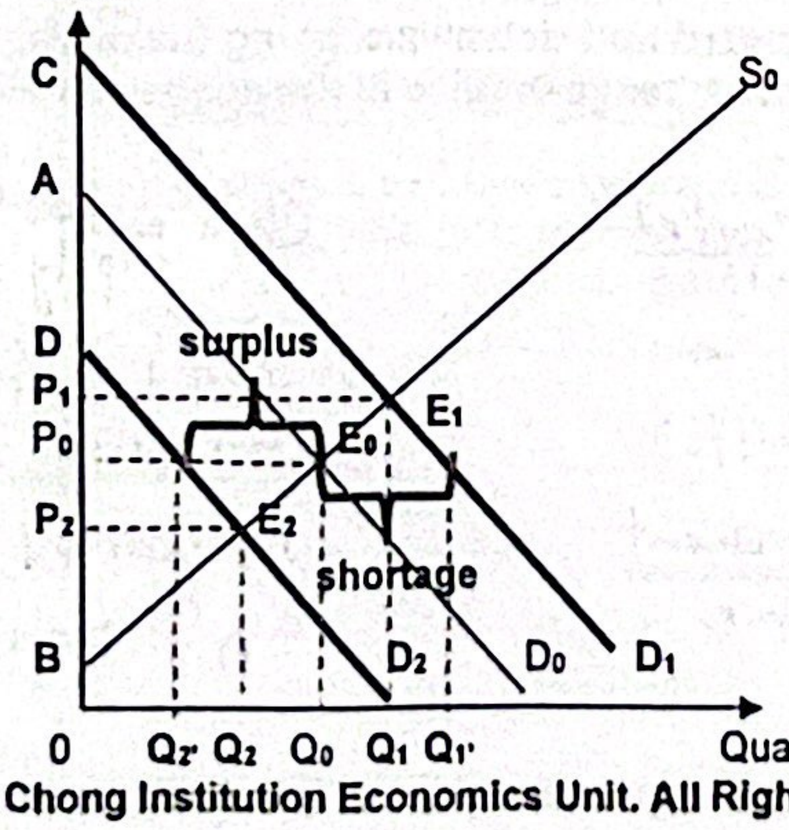
When supply and demand curves shift, there will be an impact on the:

- **equilibrium price**
- **quantity exchanged**
- **total revenue earned by the producers or total expenditure by consumers (price multiplied by quantity exchanged)**
- **consumer and producer surplus**

2.1.4.1 SHIFTS IN DEMAND CURVE (MOVEMENTS ALONG SUPPLY CURVE)

The demand for a particular good refers to the entire relationship between price and quantity demanded. It indicates the quantity demanded at each price and is represented by the whole demand curve. When one non-price determinant changes, we see that at every single price, the quantity demanded has either increased or decreased. This is illustrated by a **shift in the entire demand curve** (e.g. from D_0 to D_1 or D_2).The demand curve **moves along the supply curve**, (from point E_0 to point E_1 or E_2) in Figure 4. This gives rise to a change **price of the good itself** and thus changes the **quantity supplied.**

Figure 4: Movements along supply curve (shifts in demand curve)



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upward pressure on price

- When the demand increases from D_0 to D_1, at P_0, there will be a shortage since quantity demanded (Q_1) is more than quantity supplied (Q_0) and the price of the good will increase from P_0 to P_1, the quantity supplied will ultimately increase from Q_0 to Q_1. This involves an upward movement along the supply curve S_0 from point E_0 to point E_1. Beside, consumer and producer surplus increases from AP_0E_0 and BP_0E_0 to CP_1E_1 and BP_1E_1 respectively. Since an increase in demand causes both price and quantity to increase, total revenue increases from $0P_0E_0Q_0$ to $0P_1E_1Q_1$.

downward pressure on price

- When the demand decreases from D_0 to D_2, at P_0, there will be a surplus since quantity demanded (Q_2) is less than quantity supplied (Q_0) and the price of the good will decrease from P_0 to P_2, the quantity supplied will ultimately decrease from Q_0 to Q_2. This involves a downward movement along the supply curve S_0 from point E_0 to point E_2. Beside, consumer and producer surplus decreases from AP_0E_0 and BP_0E_0 to DP_2E_2 and BP_2E_2 respectively. Since a decrease in demand causes both price and quantity to decrease, total revenue decreases from $0P_0E_0Q_0$ to $0P_2E_2Q_2$.

- The above analysis is in sync with the law of supply that states the direct relationship between price and quantity supplied of the same good.

Factors that Shift Demand Curve

Recall, an effective demand has to include both willingness and ability to pay for the good. Thus, any factor that changes the willingness and ability of the consumers, will cause the demand to shift.

There are five key factors:
1. Consumer income
2. Price of related goods
3. Taste and Preferences
4. Demographics and
5. Consumers' expectations

(1) Consumer Income → YED

Affordability or the ability of consumers to buy goods is directly dependent on their income. Usually, as the income increases, consumers' purchasing power increases, thus more of a good will be demanded as it becomes more affordable. Such goods are called normal goods.

(i) **A normal good is a good whose demand is positively related to changes in income**, ceteris paribus. An increase in income will lead to an increase in demand, illustrated by a rightward shift in the demand curve as shown by Figure 4 from D_0 to D_1. At every price, more of the good will be demanded with the higher income level.

Some examples of normal goods are new cars and houses. As people become more affluent, they will want to own a car. This can be seen in countries like China where people turned away from bicycles to driving cars as the economy experiences strong growth in recent years.

But in reality, not all goods are normal goods.

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(ii) An **inferior good** is a good whose demand is inversely related to changes in income, ceteris paribus. An increase in income will cause a fall in demand. The demand curve will shift to the left from D_0 to D_2 when income increases, as illustrated by Figure 4.

Examples of inferior goods are hawker centre food (relative to restaurant meals), bus rides (relative to taxi rides), used or second-hand furniture and clothing (relative to new furniture and clothing). As income increases, consumers tend to switch from consuming these inferior goods to normal goods such as restaurant food, taxi rides, new furniture and new clothing respectively.

To sum up:

- A change in the income level will cause the demand for normal goods to change in the same direction. On the other hand, a change in the income level will cause the demand for inferior goods to change in the opposite direction.
- However, the extent of change, hence the extent of shift in demand curve, depends on the value of **income elasticity of demand**. *(Refer to Section 2.1.4.4)*

(2) Prices of Related Goods → CED

A change in the price of one good can cause a change in the demand of a related good.

Substitutes

- **Goods that have similar uses which satisfy the same want are substitutes**. A change in the price of one good causes the demand for another good to change in the same direction.
- For example, hardcopy books and e-books of same content are substitutes as they both satisfy the same consumer want. When price of e-books decreases, the quantity demanded for e-books will rise according to the law of demand. As a result, demand for hardcopy books falls as consumers switch from buying hardcopy books to e-books.
- Conversely, an increase in the price of one good will lead to an increase in the demand for its substitutes.
- Other examples are MRT train services and bus services, trousers and jeans, soft drinks and juices.

Complements

- **Goods that are jointly used to satisfy the same want are said to be complements**. A change in the price of one good causes the demand for another good to change in the opposite direction.
- For example, mobile phones and services of network providers are used together to satisfy the same want. A mobile phone by itself is incapable of providing satisfaction to users unless it can be connected to other users via a mobile network service provider such as Singtel, M1 or StarHub. Thus users usually buy a phone and subscribe to a company that provides the network connection.
- When the price of subscription plan decreases, quantity demanded for subscription plan increases according to the law of demand. Since subscription plans can only be enjoyed with the use of mobile phones, the demand for mobile phones will increase.
- Conversely, an increase in the price of the mobile subscription plan will lead to a decrease in the demand for the mobile phones.
- Other examples are car and petrol, tennis rackets and tennis balls, CDs and CD players.

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Note:

- *Do not confuse complements with derived demand. **Derived demand** is used for two goods with an **input-output** relationship, while **complementary demand** is used for **two final goods**.*
- *Derived demand is the demand for a good or service as an input to produce another good or service that is in demand. A typical example of derived demand is the demand for factors of production, such as flour and labour that are used in the production of bread, a final good. On the other hand, bread is eaten with coffee together to satisfy the need for a good breakfast and thus they are complementary goods.*

To sum up:

- A change in the price of a good will cause the demand for its substitutes to change in the same direction. On the other hand, a change in the price of a good will cause the demand for its complements to change in the opposite direction.
- However, the extent of change depends on cross elasticity of demand. *(Refer to Section 2.1.4.4)*

(3) Tastes and Preferences

Choices in food, clothing, movies, music, reading – indeed, all consumption choices – usually are influenced by consumers' tastes and preferences. Since tastes and preferences are merely consumers' likes and dislikes, a change in tastes and preferences can change demand. There are many underlying factors that have an influence on the desirability of a product to consumers and below is a list of common factors:

(i) Fashion or Fad

Usually demand is high for goods and services that are **fashionable.** Some local examples are "frozen yogurt" and "kendama" which were once the rage in Singapore. Usually there is a huge upsurge in demand for such goods when the craze is on. However once the craze is over, demand usually falls significantly or even disappears.

(ii) Advertising and Product Promotions

Consumers' tastes and preferences are also affected by **advertising** and product promotions. Effective and successful advertising by businesses **creates wants** so that at every single price, the consumer is now willing to purchase more of the good.

(iii) Government Policies and Action

Government actions can change the demand for a good. E.g. Educating the public on the fact that smoking causes lung cancer, or restricting cigarette advertisements are measures aimed at curtailing the demand for cigarettes. Government intervention to cool down the property market such as restricting home loans to potential buyers is another good example of how government policies influence demand in the market for goods and services. You will learn later the details of how government can intervene in the market to influence demand through measures such as controlling interest rates and setting rules and regulations.

(iv) Changes in Seasons and Weather; Festivals

Certain types of goods may have higher demand in certain times of the year. E.g. demand for flowers and chocolate usually soar during occasions like Mother's Day or Valentine's Day.

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(4) Demographics

Population or demographic factor is a key determinant of demand. Any change in population size or composition of the population could change the demand for goods and services in the market.

(i) Population Size / Market Size

The number of consumers for any product in the market is influenced by the population size. As the population size grows, the potential demand for many products will increase. In Singapore, the population rose to 5.6 million, increasing the demand for housing, transport, etc. However it should be noted that ultimately demand is not influenced simply by numbers but the purchasing power of the population.

(ii) Age Composition

For a country, the tastes and preferences of consumers is also influenced by the age profile or composition of the population. E.g. If the number of elderly people increases, the demand for dentures and old-age homes may increase. There is much talk about growing the "silver industry" to cater to the needs of the elderly as Singapore's population ages. Similarly, if the baby population declines, the demand for baby food and diapers will fall.

(iii) Gender Composition

Consumers' tastes and preferences are also influenced by the gender composition of the population. If there is a growing number of females, the demand for cosmetics and clothes for females will increase.

(5) Consumers' Expectations

What consumers buy or how much they decide to buy **NOW** can be influenced by their expectations of **FUTURE** changes to prices and income. For certain products, like property and stocks where prices fluctuate, expectations do play a key role in determining **current demand.**

(i) Changes in expected income

A consumer who is expecting a rise in pay is likely to increase his current demand of goods and services. Demand in this case is based not only on current income but on expectations of future changes in income. Workers expecting better bonuses at year end are more likely to spend. On the other hand, workers expecting pay cuts are more likely to hold back spending. Expectations however may or may not hold true.

(ii) Changes in expected prices

Demand is also affected by changes in price expectations. E.g. If consumers expect the price of electronic goods such as a current tablet model to decrease further (due to the release of a newer model), they will probably decrease their demand for tablets now and postpone it to a later date.

Changes in expectations will have less impact if the good in question is perishable. If an individual expects the price of fresh milk to go up next month, he will not buy extra cartons today. However, if the price of fresh milk is to increase tomorrow, the individual may increase his purchase of fresh milk by a little today.

(iii) Changes in speculative demand

Speculation involves the purchase of goods in order to earn a profit from the sale of it at a later date if the price of the good increases. For example, the property market in Singapore was subject to speculative demand and caused housing prices to jump 15% in 2010.

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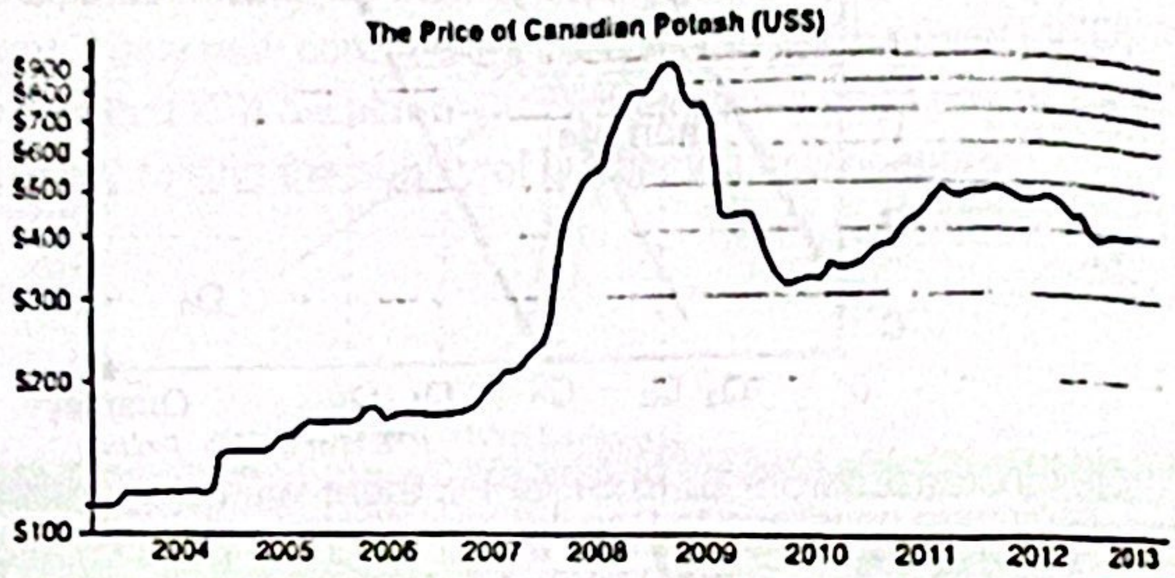
4. TYS 2015 CSQ1(a)

Extract 3 (Adapted)

Potash is a powerful agricultural fertiliser that makes crops more resistant to disease and boosts crop yields. In the last decade, potash prices have risen considerably, thanks to increasing demand for better food in a highly-populated emerging markets like China, India and Brazil. But over-capacity and farmers' willingness to find other methods to fertilise their crops helped reduce prices, along with determined negotiations by the Chinese government.



From Extract 3, identify and explain a factor that could be responsible for the upward trend in the price of potash shown in Figure 1. [2]

"highly populated":
- More people
↳ means more food

"emerging markets":
- Rising incomes
&/or
Changing Tastes & Preferences

2.1.4.2 SHIFTS IN SUPPLY CURVE (MOVEMENTS ALONG DEMAND CURVE)

The supply for a particular good refers to the entire relationship between price and quantity supplied. It is indicative of the quantity supplied at each price and is represented by the whole supply curve.

When one non-price determinant changes, the quantity supplied at every single price either increases or decreases.

This is illustrated in Figure 5 by a **shift in the entire supply curve** (e.g. from S_0 to S_1 or S_2). The supply curve **moves downwards** (from point E_0 to point E_1) **or upwards** (from point E_0 to point E_2) **along the demand curve.** This gives rise to a change in **price of the good itself** and thus changes the **quantity demanded.**

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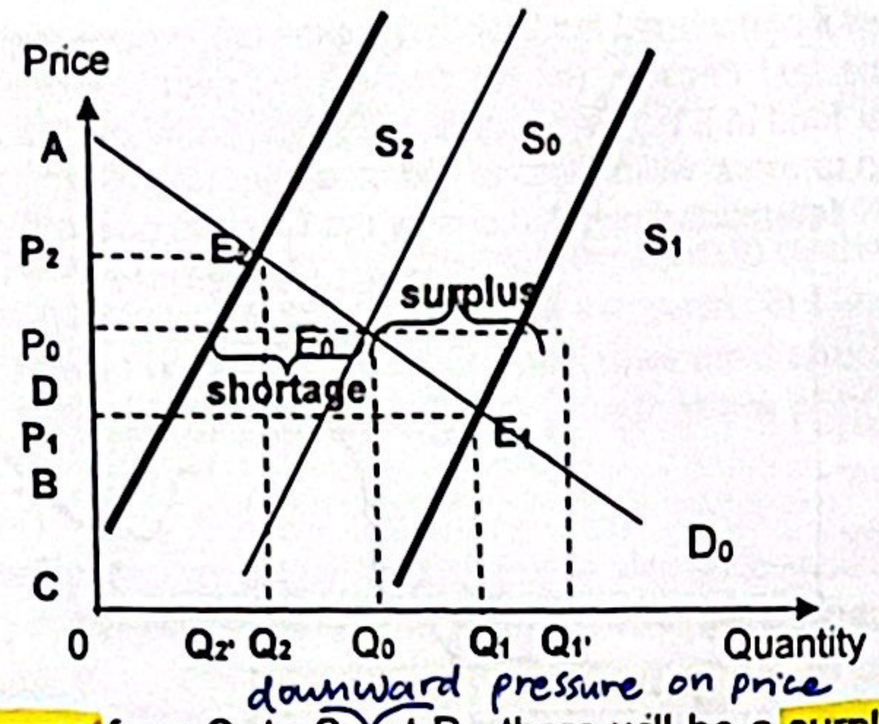
Figure 5: Movements along demand curve (shifts in supply curve)



- When the supply increases from S_0 to S_1, at P_0, there will be a surplus since quantity supplied ($Q_{1'}$) is greater than quantity demanded (Q_0) and the price of the good will fall from P_0 to P_1 and the quantity demanded will ultimately increase from Q_0 to Q_1. This involves a downward movement along the demand curve D_0 from point E_0 to point E_1. Beside, both consumer and producer surplus increase from AP_0E_0 and BP_0E_0 to AP_1E_1 and CP_1E_1 respectively.

- Similarly, when the supply decreases from S_0 to S_2, at P_0, there will be a shortage since quantity supplied (Q_z) is lesser than quantity demanded (Q_0) and the price of the good will increase from P_0 to P_2, the quantity demanded will ultimately decrease from Q_0 to Q_2. This involves an upward movement along the demand curve D_0 from point E_0 to point E_2. Besides, both consumer and producer surplus decrease from AP_0E_0 and BP_0E_0 to AP_2E_2 and DP_2E_2 respectively.

- The above analysis is in sync with the law of demand that states the inverse relationship between price and quantity demanded of the same good.

- However, the impact on total revenue will depend on the extent of the change in quantity demanded to that change in price and can be analysed using the concept of price elasticity of demand which details will be covered on pages 2.1.27 to 2.1.30.

Factors that Shift Supply Curve

Recall, supply has to include both willingness and ability to sell the good. Thus, any factor that changes the willingness and ability of the producers, will cause the supply to shift.

There are five key factors:

1. Number of producers
2. Cost of production
3. Prices of related goods
4. Supply shocks
5. Producers' expectations

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(1) Number of Producers

- Since the market supply is the total amount supplied by all producers, market supply depends on the number of producers in the market. If the number of producers increases, supply will shift to the right and vice versa. When the producers deem that selling certain goods is a lucrative business ensuring huge profits, they will enter the market, thus raising the market supply.
- E.g. During the bubble tea craze, many new competitors such as Gong Cha (now LIHO) and Share Tea entered the market when they saw that KOI & Each-a-Cup were making large profits, as evident from the long queues at their outlets, thereby raising the supply of bubble tea in Singapore.

(2) Cost of Production

(i) Changes in prices of inputs

- Changes in factor prices like wages, prices of raw materials and fuel will affect the cost of production. An increase in the price of electricity, for instance, will raise the cost of operating machines. Producers would be less willing and able to supply the good, causing its supply curve to shift to the left.

(ii) Changes in the State of Technology

- The state of technology represents the economy's stock of knowledge about how resources can be combined most efficiently. Technology is assumed to be constant for a given supply curve.
- If some new and effective method is devised to produce the good more efficiently, production costs will fall, so suppliers will be more willing and able to supply the good at each price. Supply will increase, as reflected by a shift to the right in the supply curve.
- For example, the microchip evolution has changed production methods and information handling virtually every industry in the world.

(iii) Changes in Efficiency or Productivity

- Costs can be lowered by improving the productivity of the factors of production. Improving productivity is achieved by using resources more efficiently so that more output can be produced with the same inputs or the same output can be produced with fewer inputs.
- For example, workers' productivity can be improved by upgrading their skills; giving workers better equipment; financial incentives as well as improving management and organization in the workplace. The inverse relationship between cost and productivity is an important economic principle in production. Any business or firm that wishes to cut cost can do so by improving productivity. Improving productivity saves cost because it means more output can be produced with less inputs or the same output can be produced with less inputs.

(iv) Government Policies: Indirect Taxes and Subsidies

- An indirect tax imposed on a good increases the cost to the producers for supplying that good, and the supply curve will shift to the left. Subsidies have the opposite effect. They lower the costs of supplying the goods to the market and thus increase supply.

(3) Prices of Related Goods

Markets are inter-related in the real world, a change in the price of a good in one market can also affect the supply of a good in another market. Let us consider two typical situations:

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(i) Competitive Supply

- If two goods use the same types of resources in production, a change in the price of one good can cause the supply curve of the other to shift.
- Goods, which are competitive in supply, use the same factors of production such that when the factors are being used to produce one good, they cannot be used to produce another. For example, if farmers plant corn on a piece of land, they can neither use that land nor the existing labour to produce wheat.
- Assuming there is a rise in demand for wheat that leads to a rise in the price of wheat. This means higher profits and will signal to the farmers to allocate more of their resources to produce wheat and less resources available to produce corn.
- Less corn is produced because the price of wheat has risen, not because the price of corn has declined. Thus, an increase in the price of wheat results in a rise in quantity supplied of wheat and a decrease in supply for corn, i.e. shift supply for corn to the left.

(ii) Joint Supply

- Goods in joint supply are goods that are produced together using the same inputs or source. Common examples of joint products are beef and leather, lumber and paper, gasoline and petrochemicals.
- An increase in the price of a good, which is produced jointly with another good, causes the supply curve for the other good to shift rightward.
- Assuming there is a rise in demand for beef that leads to a rise in price of beef which signals to the farmers to increase the quantity supplied of beef. When more cows are slaughtered for beef, there will also be a rise in the supply of leather.

(4) Supply Shocks

Supply can be affected by unexpected factors beyond human control. Such situations are termed supply shocks. There can be positive supply shocks or negative supply shocks.

Let us consider two typical examples of supply shocks:

(i) Changes in Climatic Conditions

This condition is especially applicable to the agricultural and fishing industries. When there is storm, flood or drought, poor harvest will cause the supply of agricultural goods to be adversely affected. Conversely, a bumper harvest will cause an increase in the supply of agricultural goods.

(ii) Changes resulting from Abnormal Circumstances

Adverse changes such as political turmoil will decrease supply. For example, the recent labour unrest in Cambodia led to a fall in supply of manufactured goods in the clothing and shoe industries.

(5) Producers' Expectations

Producers' expectations can cause the supply curve to shift. However, it is sometimes difficult to generalise how expectations of higher prices will affect present supply curve.

If price is expected to rise, producers may temporarily reduce the current supply. They are likely to build up stocks and only release them onto the market when the price does rise. At the same time they may install new machines or take on more labour, so that they can be ready to produce more when the price has risen. Also, some farmers/merchants/big suppliers of dried foodstuff like rice may hold back some of the current

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supply when they anticipate a war to break out. They will release the stock when the price has risen, as a result of increased demand, to fetch higher returns.

5. Barbecued pork and pork broth are 'comfort food' to Hong Kongers but they may have to dig deeper into their pockets as farmers in mainland China's pig rearing sector have been rocked by the nationwide outbreak of African swine fever since August 2018.

   Source: http://www.atimes.com/article/price-of-pork-soars-as-african-swine-fever-hits-supply/

   Explain what happened to the supply of pig and how it has resulted in a rise in price of pork in Hong Kong. ~ 2 markets ~

Swine fewer → supply shock → fall in SS of pigs →
rise in price of pigs → rise in cop of pork → fall in SS of pork
→ rise in price of pork SS factor of pork

6. With the price of key Malaysian export palm oil, used in everyday goods around the world from soap to margarine in a seemingly inexorable decline, farmers are increasingly turning to durians.

   Source: https://www.straitstimes.com/asia/se-asia/chinese-hunger-for-durians-blamed-for-deforestation-in-malaysia

   Explain the above scenario using demand and supply analysis.

2.1.4.3 SIMULTANEOUS SHIFTS IN DEMAND AND SUPPLY

Recall:

- An increase in supply causes price to decrease and quantity to increase definitely due to the law of demand and vice versa.
- An increase in demand causes both price and quantity to increase definitely due to the law of supply.

If both the demand and supply curves shift simultaneously, then either final price or quantity is **indeterminate.** It means given the respective direction in which the demand and supply curves are shifting it is theoretically not possible to predict with certainty what will happen to both the new equilibrium price or output.

For instance, if demand has risen but supply has fallen the new equilibrium price will certainly rise but the new equilibrium output will be indeterminate (i.e. may rise, fall or even remain unchanged).

Note: Please remember to check the scope of the question if you need a detailed explanation of the adjustment process from a market disequilibrium to a market equilibrium on Pg 2.1.10.

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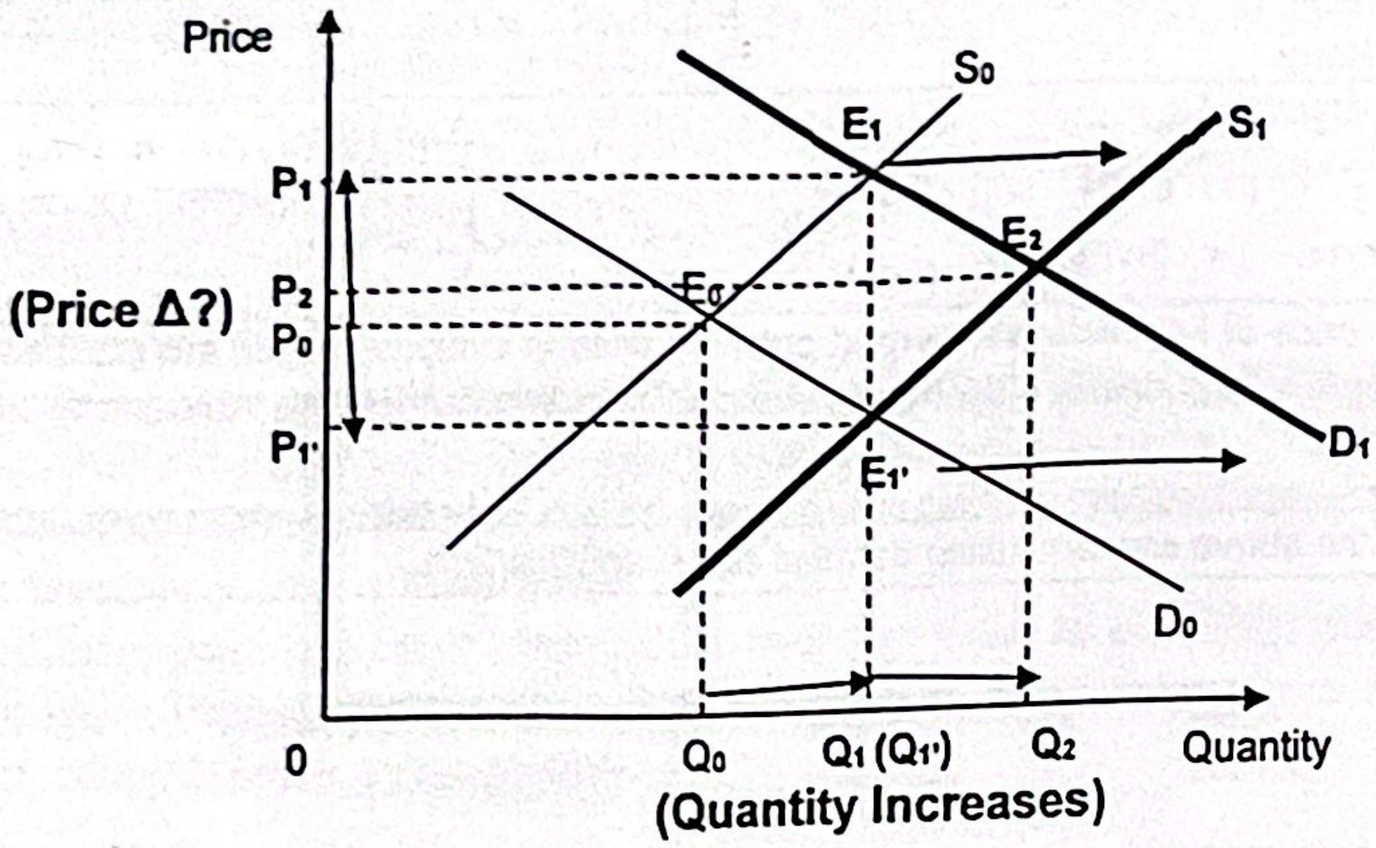
(A) An Increase in both Demand and Supply

The combination of rightward shifts in both the demand and supply curves causes the quantity exchanged in the market to increase. However, the effect on the price is uncertain.

Figure 6: Effects of increases in demand and supply



Self-practice:
Draw diagrams for the following scenarios

(1) Demand > Supply
(2) Demand < Supply
(3) Demand = Supply

Refer to Figure 6:

- When demand increases from D_0 to D_1 and supply is unchanged at S_0, equilibrium price and quantity at E_0 increases from P_0 and Q_0 to P_1 and Q_1 respectively at E_1.
- When supply increases from S_0 to S_1 and demand is unchanged at D_0, equilibrium price decreases at E_0 from P_0 to $P_{1'}$ at $E_{1'}$ but quantity increases from Q_0 to and $Q_{1'}$.
- Hence when both demand and supply increases, equilibrium quantity will increases **DEFINITELY OR UNAMBIGUOUSLY** but the impact on equilibrium price is **INDETERMINATE.**

- Whether equilibrium price rises or falls depends on the relative shift of the demand and supply.
- If demand shifts more than supply, the rise in price caused by the increase in demand will more than offset the fall in price caused by the increase in supply and the new equilibrium price will be higher.
- Conversely, if supply shifts more than demand, the fall in price caused by the increase in supply will more than offset the rise in price caused by the increase in demand and the new equilibrium price will be lower.

- In Figure 6 above, assume the increase in demand from D_0 to D_1 is larger than the increase in supply from S_0 to S_1. Hence the rise in demand and supply reinforce each other to cause the equilibrium quantity to increase from Q_0 to Q_1 to finally Q_2 and equilibrium price increases overall from P_0 to P_2.

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7. During the craze of Tau Huay (soya beancurd) started by the Lao Ban Soya Beancurd at the Old Kallang Airport Hawker Centre, long queues were seen. With the opening of new shops at malls and MRT stations and with the entrance of new competitors such as 51 Soya Bean, queue time now: literally none.
With the help of a demand and supply diagram, explain the above scenario.

craze for Tau Huay:
- Change in Tastes & Preferences towards soya beancurd
↳↑ in demand
↳↑ in price & quantity

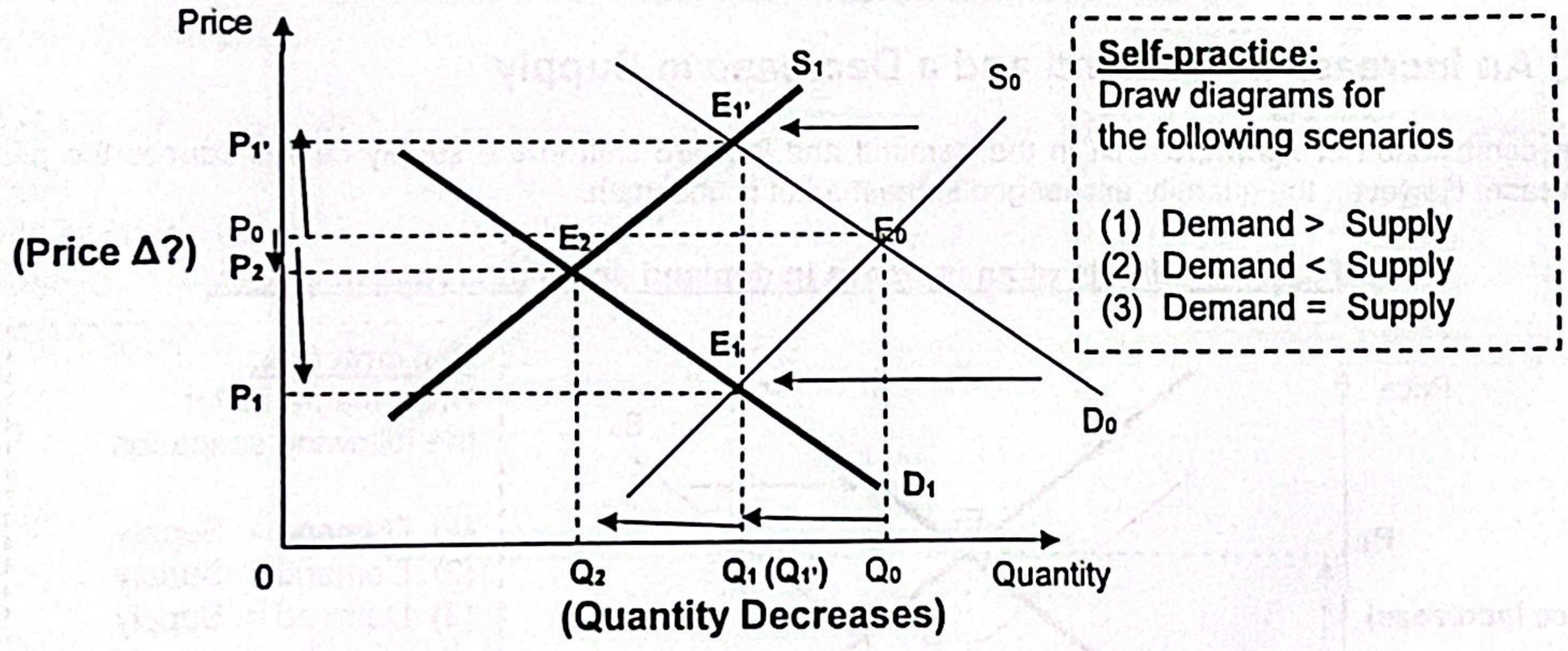
Opening of new shops:
- More producers in the soya beancurd market
↳ supply ↑
↳ equilibrium price ↓, quantity ↑

In this case, price returned to original as a result of an equal rise in demand & supply, in reality, the impact on equilibrium price would be indeterminate as it depends on the relative shifts & hence the extent of the rise in DD & SS.

(B) A Decrease in both Demand and Supply

The combination of leftward shifts in both the demand and supply curves causes the quantity exchanged in the market to decline. However, the effect on the price is uncertain.

Figure 7: Effects of a decrease in demand and supply



Self-practice:
Draw diagrams for the following scenarios

(1) Demand > Supply
(2) Demand < Supply
(3) Demand = Supply

Refer to Figure 7:
- When demand decreases from D_0 to D_1 and supply is unchanged at S_0, equilibrium price and quantity at E_0, decreases from P_0 and Q_0 to P_1 and Q_1 respectively at E_1.
- When supply decreases from S_0 to S_1 and demand is unchanged at D_0, equilibrium price at E_0 increases from P_0 to $P_{1'}$ at $E_{1'}$ but quantity decreases from Q_0 to and $Q_{1'}$.
- Hence when both demand and supply decreases, equilibrium quantity will decrease **DEFINITELY OR UNAMBIGUOUSLY** but the impact on equilibrium price is **INDETERMINATE**.
- Whether equilibrium price rises or falls depends on the relative shift of the demand and supply.

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- If demand shifts more than supply, the fall in price caused by the decrease in demand will more than offset the rise in price caused by the decrease in supply and the new equilibrium price will be lower.
- Conversely, if supply shifts more than demand, the rise in price caused by the decrease in supply will more than offset the fall in price caused by the decrease in demand and the new equilibrium price will be higher.

- In Figure 7, the decrease in demand from D_0 to D_1 is larger than the decrease in supply from S_0 to S_1. Hence the fall in demand and supply reinforce each other to cause the equilibrium quantity to decrease from Q_0 to Q_1 to finally Q_2 and equilibrium price decreases overall from P_0 to P_2.

8. Consider the poultry market. Use demand and supply analysis to explain how the quantity and price of poultry would change whenever the Bird Flu pandemic strikes.

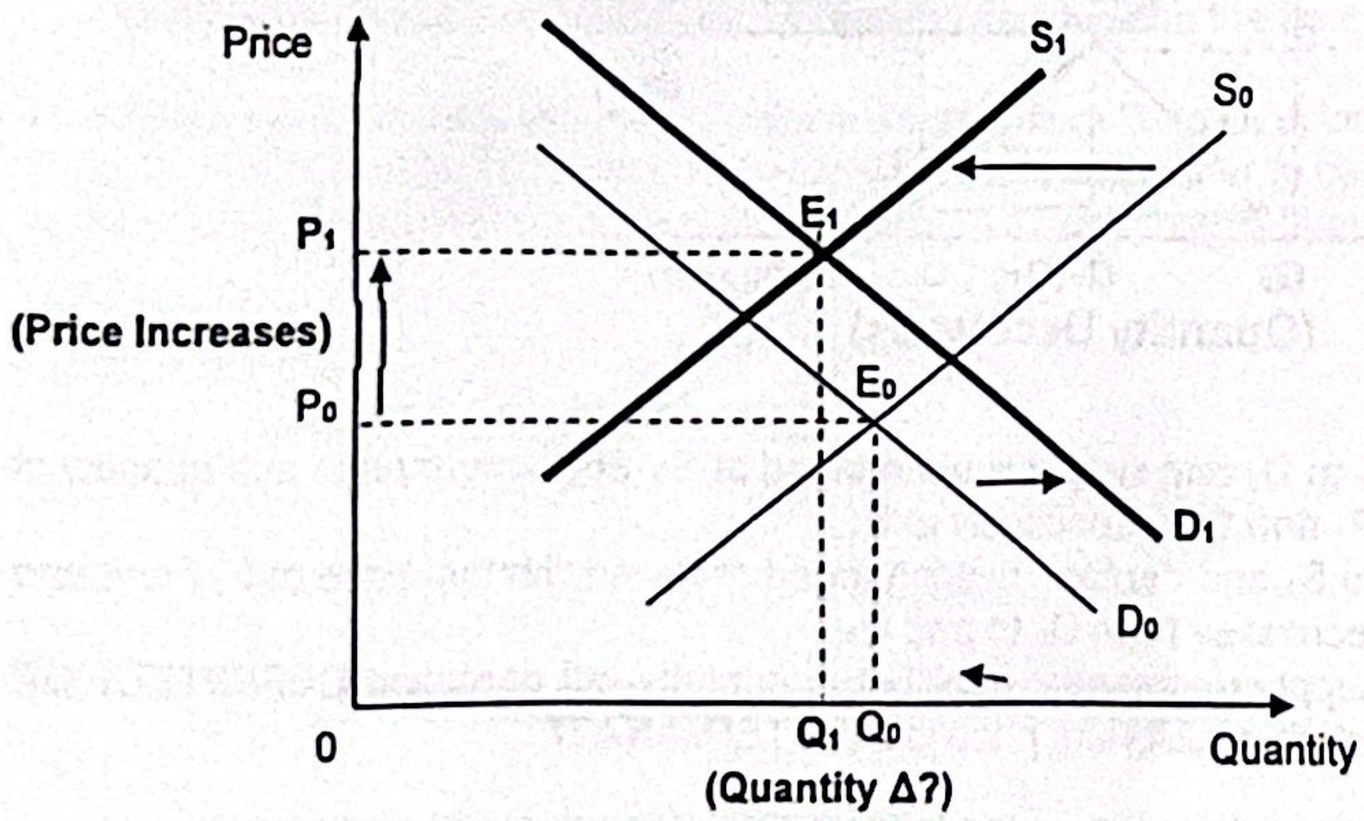
- Demand will decrease for chicken due to change in taste & preferences as consumers switch to other type of meat substitute. (eg. pork, beef) in fear of contacting the disease. This will cause price and output to fall.
- Supply will fall due to the culling of chicken and this will cause price to rise but output to fall further.

→ Overall, equilibrium quantity exchanged will fall significantly but impact on price is indeterminate.

(C) An Increase in Demand and a Decrease in Supply

The combination of rightward shift in the demand and leftward shift in the supply curves causes the price to increase. However, the quantity exchanged in the market is uncertain.

Figure 8: Effects of an increase in demand and a decrease in supply



Self-practice:
Draw diagrams for the following scenarios

(1) Demand > Supply
(2) Demand < Supply
(3) Demand = Supply

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Refer to Figure 8:

- When demand increases from D_0 to D_1 and supply is unchanged at S_0, equilibrium price and quantity increases.
- When supply decreases from S_0 to S_1 and demand is unchanged at D_0, equilibrium price increases but quantity decreases.
- Hence when demand increase and supply decreases, equilibrium price increases **DEFINITELY OR UNAMBIGUOUSLY** but the impact on equilibrium quantity is **INDETERMINATE.**

- Whether equilibrium quantity rises or falls depends on the relative shift of the demand and supply.
- If demand shifts more than supply, the rise in quantity caused by the increase in demand will more than offset the fall in quantity caused by the decrease in supply and the new equilibrium quantity will be higher.
- Conversely, if supply shifts more than demand, the fall in quantity caused by the decrease in supply will more than offset the rise in quantity caused by the increase in demand and the new equilibrium quantity will be lower.

- In Figure 8 above, the decrease in supply from S_0 to S_1 is larger than the increase in demand from D_0 to D_1. Hence equilibrium quantity decreases from Q_0 to Q_1 and equilibrium price increases from P_0 to P_1.

9. Brace yourself for a more expensive Chinese New Year this year - with prices of some products ranging from vegetables to seafood set to rise. Wholesalers and experts The New Paper contacted said the cost price of some food items are hitting "record" levels this festive season because of factors like poor weather and the weakening Singapore dollar.

   Source: *The Newpaper*, 14 Jan 2017

   Account for the rise in price of Chinese New Year's products.

- Demand will ↑ for CNY products due to the festive season. This will cause price & output to ↑.
- Supply will ↓ due to supply shock from poor weather, and also a weakening SGD ↑ the cost of production as producers need more SGD to buy the same products. This will cause price to ↑ further and output to ↓.
- Overall, equilibrium price will ↑ significantly but impact on quantity exchanged is indeterminate.

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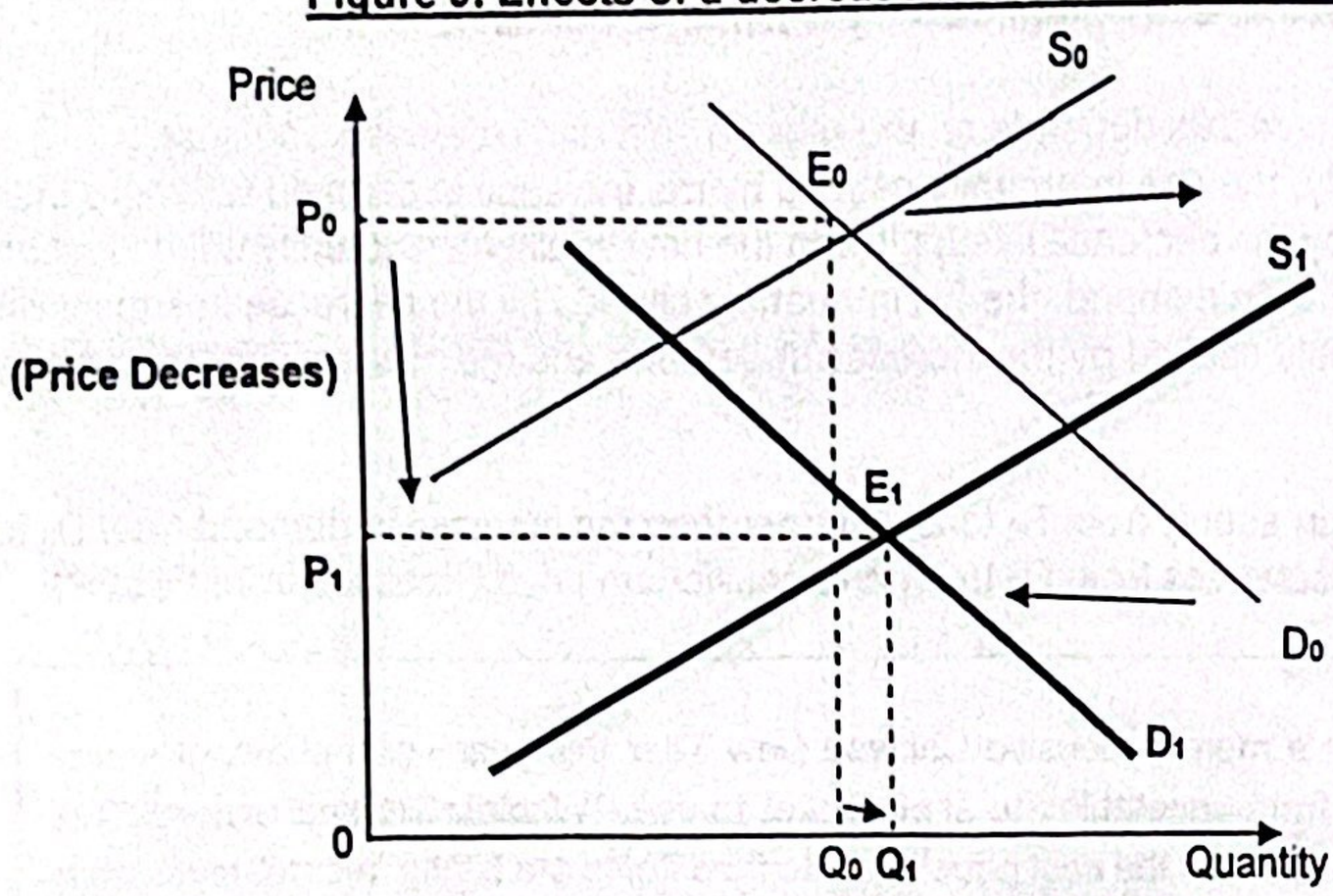
(D) A Decrease in Demand and An Increase in Supply

The combination of leftward shift in the demand and rightward shift in the supply curves causes the price to decrease. However, the quantity exchanged in the market is uncertain.

Figure 9: Effects of a decrease in demand and an increase in supply



Self-practices:
Draw diagrams for the following scenarios

(1) Demand > Supply
(2) Demand < Supply
(3) Demand = Supply

(Quantity Δ?)

Refer to Figure 9:

- When demand decreases from D_0 to D_1 and supply is unchanged at S_0, equilibrium price and quantity decreases.
- When supply increases from S_0 to S_1 and demand is unchanged at D_0, equilibrium price decreases but quantity increases.
- Hence when demand decrease and supply increases, equilibrium price decreases **DEFINITELY OR UNAMBIGUOUSLY** but the impact on equilibrium quantity is **INDETERMINATE.**

- Whether equilibrium quantity rises or falls depends on the relative shift of the demand and supply.
- If demand shifts more than supply, the fall in quantity caused by the decrease in demand will more than offset the rise in quantity caused by the increase in supply and the new equilibrium quantity will be lower.
- Conversely, if supply shifts more than demand, the rise in quantity caused by the increase in supply will more than offset the fall in quantity caused by the decrease in demand and the new equilibrium quantity will be higher.

- In Figure 9 above, the increase in supply from S_0 to S_1 is larger than the decrease in demand from D_0 to D_1. Hence equilibrium quantity increases from Q_0 to Q_1 and equilibrium price decreases from P_0 to P_1.

10. Can you think of an example that reflects the above demand and supply analysis?

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2.1.4.4 EXTENT OF IMPACT ON EQUILIBRIUM PRICE, QUANTITY, CONSUMER EXPENDITURE/ PRODUCER REVENUE

You have learnt how equilibrium price, quantity, hence, consumer expenditure and producer revenue, as well as consumer surplus and producer surplus would change accordingly. In many instances, simultaneous shifts in demand and supply will result in indeterminate outcomes on price and quantity. Hence, it is important to know **how much** demand and supply **respond to changes in price and other non-price determinants** such as income and price of related goods. The quantitative relationship between these determinants and the price and quantity exchanged is explored using the concept of elasticity.

(A) When SUPPLY changes... (ceteris paribus)

On page 2.1.18, you see that a rise in supply will cause price to fall and quantity exchanged to rise and vice versa. Hence, the impact on consumer expenditure/ producer revenue is indeterminate. Therefore, the **extent** of change in quantity exchanged relative to price has to be analysed using the concept of **price elasticity of demand**.

PED

(i) Price Elasticity of Demand

D elastic: ↓P → ↑TR, ↑P → ↓TR D inelastic: ↓P = ↓TR, ↑P = ↑TR

Price elasticity of demand (PED) measures the degree of responsiveness of **quantity demanded** of a good to a change in **its own price**, ceteris paribus.

Note: *Students often interchangeably use the terms 'quantity demanded' and 'demand'. This is wrong as a change in price of the good itself will only cause **quantity demanded** to change (i.e. movement along a given demand curve, refer to pg 2.1.18).*

Formula for calculation,

$$\text{Price Elasticity of Demand} = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in own price}}$$

Formula in symbols,

$$PED = \frac{\Delta Qd}{Qd} \div \frac{\Delta P}{P} = \frac{\Delta Qd}{\Delta P} \times \frac{P}{Qd}$$

where

- *Qd is the change in quantity demanded; Qd is the original quantity demanded*
- *P is the change in price; P is the original price*

Sign and Magnitude of Price Elasticity of Demand

- Since the price and quantity demanded are inversely related, **PED is always negative** and the **sign is usually ignored.**
- The magnitude or coefficient value of the price elasticity of demand, PED, can vary from zero to infinity.

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(1) Demand is Price Elastic (1 < IPEDI <)

- Demand for a good is said to be price elastic when a given change in own price brings about a more than proportionate change in quantity demanded, ceteris paribus.
- One of the reasons for goods having price elastic demand is due to the existence of strong substitutes. For example, the demand for Chinese cuisine, will be price elastic. With a rise in price of Chinese cuisine, consumers can easily turn to other cuisines, resulting in a more than proportionate fall in quantity demanded for the Chinese cuisine.

Note: Do not confuse absolute vs. relative change in values. It is inaccurate or imprecise to say that when demand is price elastic, quantity demanded increases by 'a lot'. The focus is not on absolute change but on % or relative change. E.g. if the quantity demanded changes from 1 unit to 2 units, the absolute change is only 1 unit (i.e. small absolute change) but the relative change is a 100% (i.e. huge relative change since quantity demanded doubles).

(2) Demand is Price Inelastic (0< IPEDI <1)

- Demand for any product is said to be price inelastic when a change in price brings about a less than proportionate change in quantity demanded, ceteris paribus.
- Examples of goods that have a price inelastic demand will be necessities like utilities. If the price of utilities increases, consumers will only decrease their quantity demanded less than proportionately since utility is essential in our daily lives.

Impact on P, Q and TE/TR when supply changes with different PED values

Figure 10(a): A Price Elastic Demand

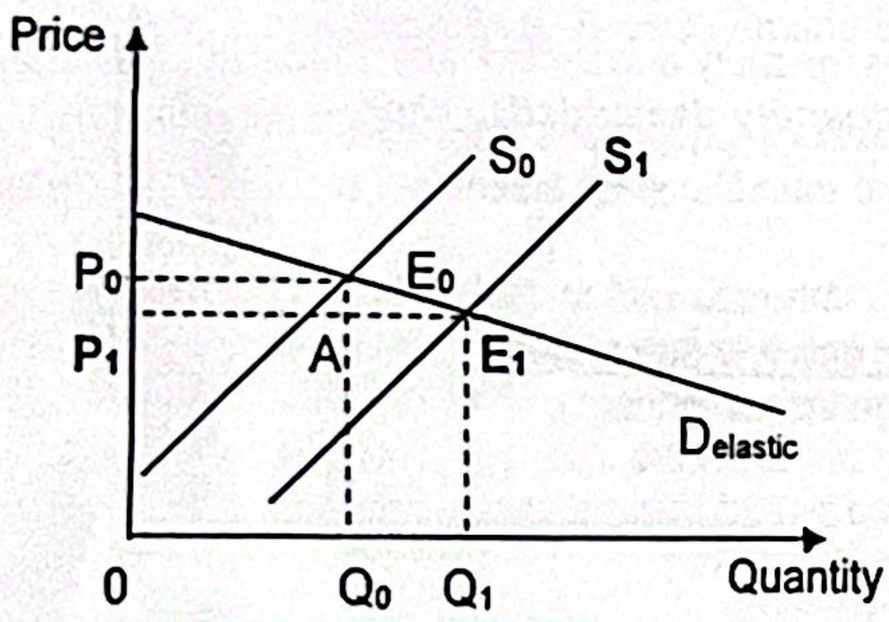
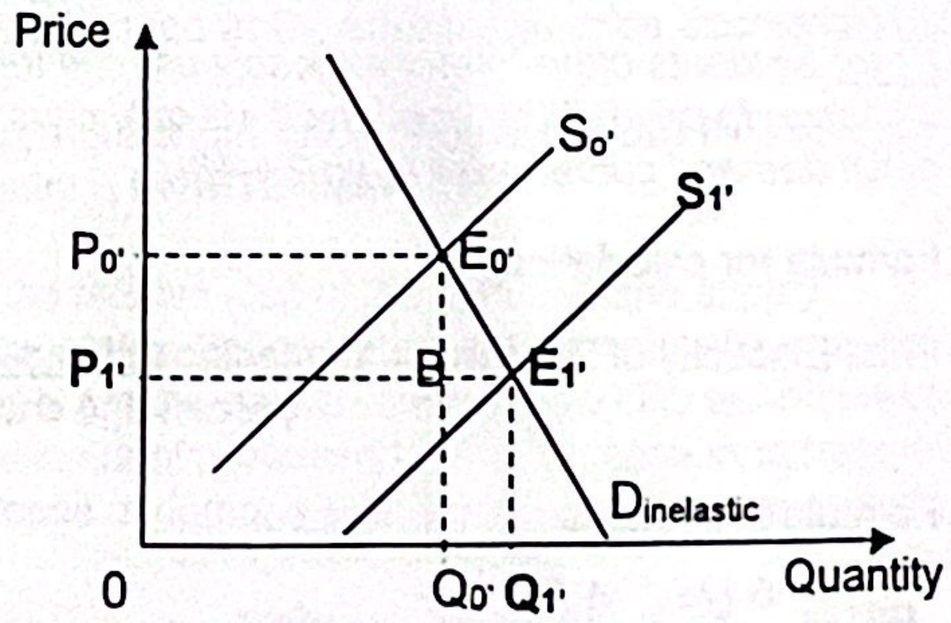


Figure 10(b): Price Inelastic Demand



- A relatively gentle demand curve is used to illustrate a relatively price elastic demand in which a change in price will result in a more than proportionate change in quantity demanded in Figure 10(a).
- When supply shifts from S_0 to S_1, it causes a decrease in price from P_0 to P_1 and result in a more than proportionate increase in quantity demanded from Q_0 to Q_1. As a result, the total revenue will increase from $0P_0E_0Q_0$ to $0P_1E_1Q_1$ since the gain in revenue due to the rise in quantity of Q_0AE1Q_1 is higher than the loss in revenue of $P_0E_0AP_1$ due to the fall in price.
- A relatively steep demand curve is used to illustrate a relatively price inelastic demand in which a change in price will result in a less than proportionate change in quantity demanded in Figure 10(b).
- When supply shifts from $S_{0'}$ to $S_{1'}$, a decrease in price from $P_{0'}$ to $P_{1'}$ will result in a less than proportionate increase in quantity demanded from $Q_{0'}$ to $Q_{1'}$. As a result, the total revenue will decrease

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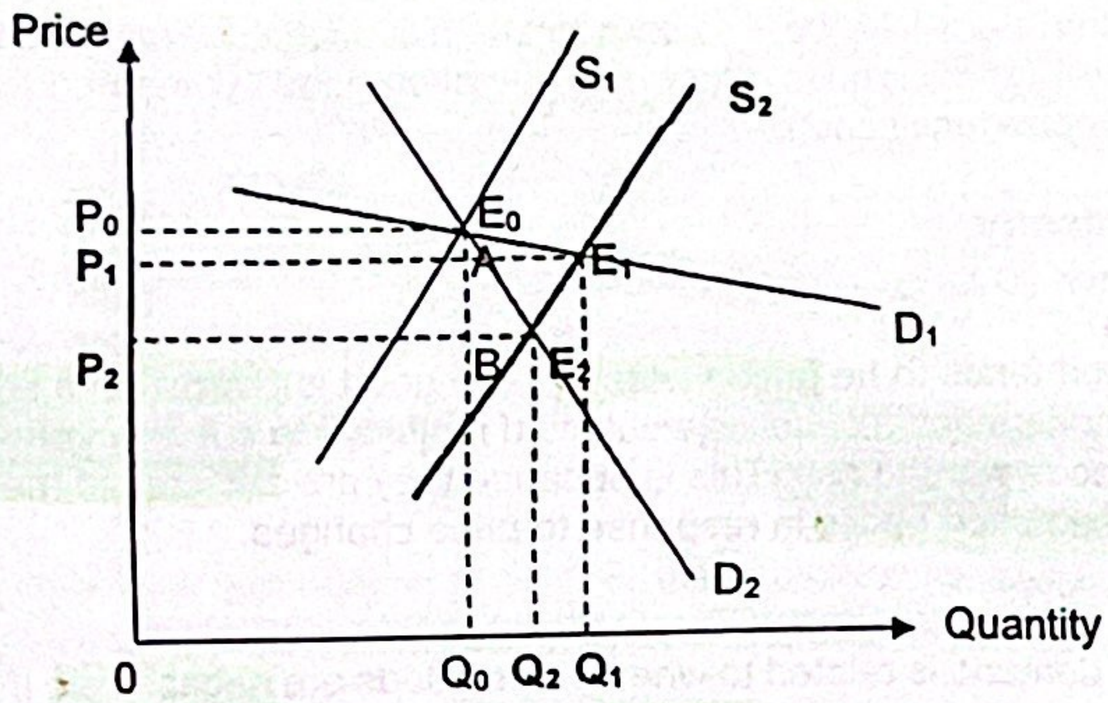
from $0P_0E_0Q_0$ to $0P_1E_1Q_1$ since the gain in revenue due to the rise in quantity of $Q_0BE_1Q_1$ is less than the loss in revenue ($P_0E_0BP_1$) due to the fall in price.

Note: Mathematically, the gradient of a demand curve is ΔP/ΔQd, and is NOT EQUAL to price elasticity of demand which is (ΔQd/ΔP)(P/Qd).*

Comparing Price Elastic Demand and Price Inelastic Demand when Supply Shifts

Figure 11: Price Elastic Demand vs. Price Inelastic Demand



Referring to Figure 11 above with both D_1 and D_2 cutting S_1 at E_0,

- When demand is price elastic (D_1), a rise in supply from S_1 to S_2 will result in a small fall in price from P_0 to P_1 and quantity exchanged to increase more than proportionate from Q_0 to Q_1 and total revenue will increase from $0P_0E_0Q_0$ to $0P_1E_1Q_1$ since the gain in revenue due to the rise in quantity of $Q_0AE_1Q_1$ is higher than the loss in revenue of $P_0E_0AP_1$ due to the fall in price.
- When demand is price inelastic (D_2), a rise in supply from S_1 to S_2 will result in a significant fall in price from P_0 to P_2 and cause the quantity exchanged to increase less than proportionate from Q_0 to Q_2 and total revenue will decrease from $0P_0E_0Q_0$ to $0P_2E_2Q_2$ since the gain in revenue due to the rise in quantity of $Q_0BE_2Q_2$ is lower than the loss in revenue of $P_0E_0BP_2$ due to the fall in price.

Determinants of Price Elasticity of Demand

(1) Availability of Substitutes

- The most important determinant is the number and closeness of substitutes. The greater the number of substitutes available for a good and the closer the substitutes, the more price elastic the demand for that good is. For instance, consumers have a wide range of choices for bread spreads such as butter, margarine and jam. Thus demand for a particular spread tends to be price elastic. This is because more consumers are likely to switch to these alternatives when the price of the good increases. Conversely, the demand for electricity is likely to price inelastic as there is no close substitute for electricity currently.

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- Additionally, the number and closeness of substitute goods also depend on the broadness of the definition of the good. The broader the definition, the more price inelastic is the demand. For example, food in general tend to have a price inelastic demand as compared to Korean cuisine, which probably has a price elastic demand given that there are many other cuisines to choose from.

(2) Proportion of Income

- The higher the proportion of income spent on a good, the more price elastic is the demand. E.g. Demand for table salt is likely to be relatively price inelastic as consumers spend a tiny fraction of their income on it. Consumers would have little difficulty paying for it and hence unlikely to reduce consumption of it, even if there is a relatively large percentage increase in the price of salt.
- In contrast, there will be a much bigger effect when major items of purchase, such as cars and houses rise in price as the costs take up a large proportion of income. This means consumers who choose purchase a car will sacrifice quite a lot of consumption goods compared to purchasing table salt (i.e. there is a higher opportunity cost).

(3) Degree of Necessity

(i) Habit / Addiction

- Demand for a good tends to be price inelastic if the good is bought on a habitual basis. For instance, many habitual smokers and alcoholics would find it difficult to cut down on smoking or drinking even if prices of these goods were to rise. This is because they are addicted to the product and cannot easily change their consumption habits in response to price changes.

(ii) Basic Goods

- Price elasticity of demand is related to whether the goods are necessities. If the goods are necessities, the consumption of such goods is essential and usually cannot be delayed or postponed. These are goods that are required for daily consumption in order to sustain a basic quality of life. It is easier to forgo non-necessities but not necessities. As such, the demand tends to be relatively price inelastic. E.g. Staple food items like rice and bread, utilities, clothing and public transport.

(4) Time period

- In general, the demand for most goods and services would be relatively price inelastic in the short run and relatively price elastic in the long run. This is because when prices rise, consumers may take time to adjust their consumption patterns and find suitable alternatives. The longer the time period after a price change, the more price elastic will be the demand for the good as consumers had more time to make the necessary adjustments in response to the price change.
- A good case in point is the crude oil market in the 70s. Between December 1973 and June 1974 the price of crude oil quadrupled, which led to large increases in the prices of petrol and central-heating oil (which are produced from crude oil). Over the next few months, there was only a very small reduction in the consumption of oil products. This is because demand was highly price inelastic as consumers needed to drive their cars and heat their houses to maintain their quality of life.
- Over time, however, as the higher oil prices continued, more drivers switched to smaller cars which are more fuel-efficient. Similarly, households spent more money insulating their houses to save on fuel bills. Demand for oil thus became much less price-inelastic in the long run.

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11. Spot any error or/and inadequacy and make correction(s) to the following sentences.

- 'Price elasticity of demand measures the degree of responsiveness of demand of a good to changes in its own price.'
- Demand for Xbox 360 Kinect is elastic.

12. TYS 2011 CSQ1(ai) & (bi)

Table 1: Estimates of elasticities for flights from UK airports

	Price elasticities of demand
Business flights to UK destinations	n/a
Leisure flights to UK destinations	– 1.0
Business flights to non-UK destinations	n/a
Leisure flights to non-UK destinations	– 0.2

(ai) With reference to the data in Table 1, explain the effect on the total revenue from leisure flights to UK destinations of a fall in price. [2]

(bi) Explain one possible reason why the demand for leisure flights to non-UK destinations is less price elastic than that for UK destinations. [2]

13. TYS 2016 CSQ1(b)

Japan increased its sales tax in April 2014. Using a diagram, explain what determines the size of the increase in the price of a good following such a tax increase. [4]

14. 'Demand for skilled labour is price inelastic and demand for unskilled workers is price elastic'. Explain why.

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(B) When DEMAND changes... (ceteris paribus)

When demand changes, both price and quantity exchanged would change in the same direction. To determine the extent of the change in price and quantity, we can consider the magnitude of shifts in demand (e.g. income elasticity of demand and cross elasticity of demand values, the degree of change in taste and preference) as well as the price elasticity of supply.

(ii) Income Elasticity of Demand YED

Income elasticity of demand (YED) measures the degree of responsiveness of **demand to a change in the **income of consumers**, ceteris paribus.**

Formula for calculation,

$$\text{Income Elasticity of Demand} = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

Formula in symbols,

$$YED = \frac{\Delta Qd}{Qd} \div \frac{\Delta Y}{Y}$$

$$= \frac{\Delta Qd}{\Delta Y} \times \frac{Y}{Qd}$$

where

- *Qd is the change in quantity demanded; Qd is the original quantity demanded*
- *Y is the change in income; Y is the original income*

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Sign and Magnitude of Income Elasticity of Demand

(1) Positive income elasticity (YED > 0) – Normal Goods

- Goods with positive YED are called normal goods.
- Demand moves in the same direction as income.
- When income increases, demand for these goods rises. Conversely, when income falls, demand for these goods fall.
- Normal goods with an income inelastic demand are called necessities while normal goods with an income elastic demand are called luxury goods.

Income inelastic (0 < YED < 1) - Necessities	Income elastic (YED > 1) - Luxury Goods
• If demand for a good is income inelastic, a 1% change in income leads to a less than proportionate change in demand for that good. Examples of necessities are food and newspapers. • As people become richer, they may consume more staple food items but since they are only to sustain daily living, the increase will not be significant. Similarly, a fall in income will not lead to cutting back on consumption drastically.	• If demand for the good is income elastic, a 1% change in income leads to a more than proportionate change in the demand for that good. • Some examples of luxury goods are new cars and private properties. As people become more affluent, they will want to own a car. This can be seen in countries like China where people turned away from bicycles to driving cars as the economy experiences strong growth.

(2) Negative income elasticity (YED < 0) – Inferior Goods

- Goods with negative income elasticity are called inferior goods.
- Demand moves in the *opposite* direction of income. Consumption of such goods decreases in response to an increase in income. Conversely, consumption of these goods increases with a fall in income.
- Examples of inferior goods are hawker centre food (relative to restaurant meals), bus rides (relative to taxi rides), used or second-hand furniture and clothing (relative to new furniture and clothing). As income increases, consumers tend to switch from consuming these inferior goods to normal goods such as restaurant food, taxi rides, new furniture and new clothing respectively.

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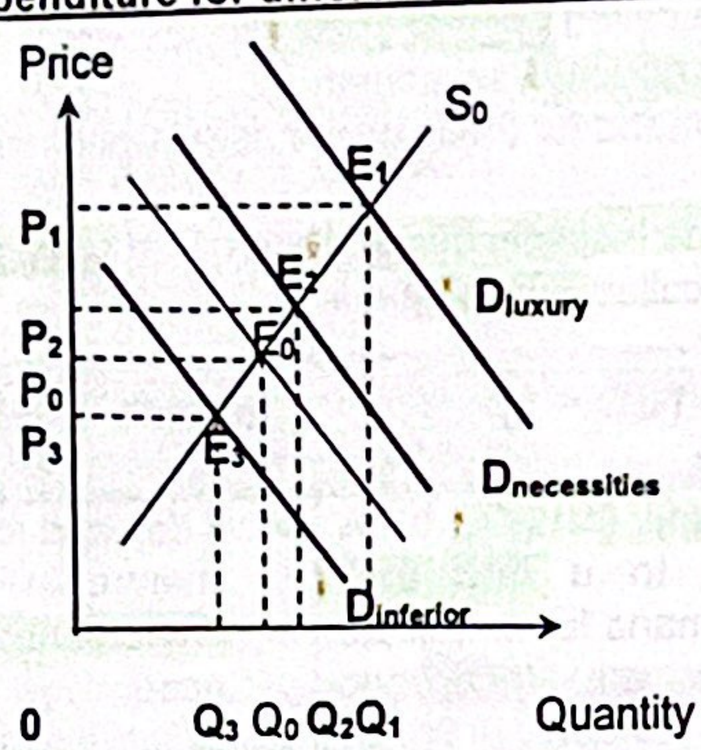
Impact on P, Q and TR when demand changes with different YED values

Figure 12: Change in total expenditure for different types of goods when income changes

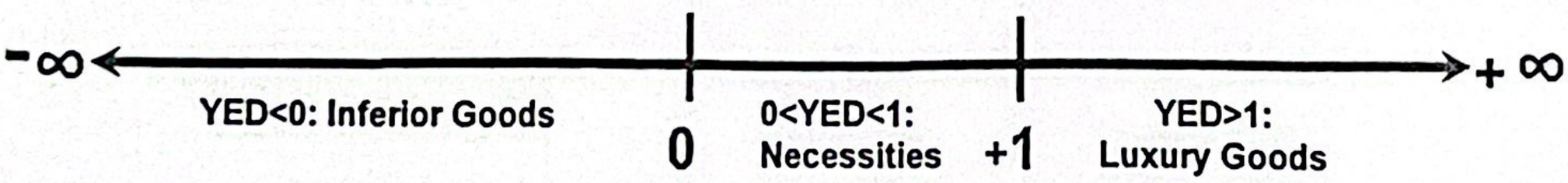


Refer to Figure 12,

- For the consumers, a strong growth in a country is likely to lead to rising income and thus the demand for luxury goods with YED>1 such as branded cars is likely to rise more than proportionately with consumer expenditure rising significantly from $0P_0E_0Q_0$ to 0P
- $_1E_1Q_1$.
- In comparison, the demand for necessities such as rice with 0<YED<1 would rise less than proportionately and the consumer expenditure would increase only to $0P_2E_2Q_2$.
- So while both necessities and luxury goods have positive YED, the magnitude affects the extent of change in price, quantity and total expenditure.
- For inferior goods such as used books with YED<0, a rise in the national income of a country is likely to lead to fall in demand, leading to a fall in consumer expenditure to $0P_3E_3Q_3$.

Note: *The assumption here is that all 3 types of goods have the same level of demand and supply to begin with for ease of comparison.*

Income Elasticity of Demand (YED) on a number line



Determinants of Income Elasticity of Demand

(1) Nature of the Good

Goods can be classified as necessities or non-necessities. In general, demand for necessities is income inelastic whereas demand for non-necessities such as luxury goods is income elastic.

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Necessities:
Income elasticity of demand is mainly determined by the degree of necessity for the good. Necessities such as basic food items and clothing sustain basic needs for daily living. Such basic goods usually have relatively low positive income elasticities. However, YED is still positive for such items as the demand still increases with increase in income for such goods. And YED is relatively low because the desire for increased consumption usually does not grow in direct proportion to increased incomes for such basic goods (which are meant to provide for a minimum decent living standard). On the other hand, when income falls in recession, there is not much room to cut back expenditures on basic goods as consumption of such goods cannot be postponed or delayed.

Luxury goods (non-necessities)
The income elasticity of demand for luxury goods or non-necessities is positive and high. This is because people generally prefer to spend a higher percentage of their extra income on them to enhance their quality of life when they become affluent. On the other hand, these are goods that people will consider first in cutting back expenditures when times are bad and incomes fall.

(2) Level of Income or Affluence of Consumers

- The same good might be considered an inferior, normal good or luxury good, depending on the income level of the consumer. For example, cars are luxury goods to most working class families. However, for the wealthier buyers, the low-end models might be considered as inferior goods as they can afford high-end models like Ferrari and Lamborghini. In general, what may be considered as luxuries to the poor or low-income households might be considered as necessities or even inferior to the wealthy or high income households.
- As our income rises we tend to want to consume what we deem 'better quality goods'. A good example in Singapore is the demand for homes. As the economy grows and families become more affluent (i.e. level of income rises) there is more demand for higher-end residential units like private condominiums. The demand for high-end housing can be said to have positive income elasticity. The lower-end smaller public flats they used to live in are then considered as inferior goods.

Note: *Do not confuse this determinant with the proportion of income which is a determinant of price elasticity of demand.*

15. Spot any error or/and inadequacy and make correction(s) in the following sentences.

- 'Income elasticity of demand measures the degree of responsiveness of quantity demanded of a good to changes in income.'
- 'Demand for normal goods is income inelastic and luxury goods is income elastic.'

16. TYS 2013 CSQ1(a)
What do the rising sales of own-label products from discount stores Aidi and Lidi, despite the fall in real disposable incomes, tell us about the nature of the products sold by these 2 stores. [2]

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17. TYS 2011 CSQ1(aii) & (bii)

Table 1: Estimates of elasticities for flights from UK airports

	Income elasticities of demand
Business flights to UK destinations	1.4
Leisure flights to UK destinations	1.5
Business flights to non-UK destinations	0.6
Leisure flights to non-UK destinations	0.7

(ai) With reference to the data in Table 1, explain the effect on the total revenue from leisure flights to UK destinations of a rise in income. [2]

(bii) Explain one possible reason why the income elasticity of demand for business flights to UK destinations is higher than that for non-UK destinations. [2]

(iii) Cross Elasticity of Demand CED

Cross elasticity of demand measures the degree of responsiveness of **demand** for one good to a change in the **price of another good**, ceteris paribus.

Formula for calculation,

$$\text{Cross Elasticity of Demand} = \frac{\text{percentage change in quantity demanded of Good X}}{\text{percentage change in price of Good Y}}$$

Formula in symbols,

$$CED_{xy} = \frac{\Delta Qx}{Qx} \div \frac{\Delta Py}{Py}$$

$$= \frac{\Delta Qx}{\Delta Py} \times \frac{Py}{Qx}$$

where

- Qx is the change in quantity demanded of good X; Qx is the original quantity demanded of good X
- Py is the change in price of good Y; Py is the original price of good Y

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Examples:

Cross elasticity of demand for tea with respect to the change in price of coffee is:

$$\frac{\text{\% change in quantity demanded for tea}}{\text{\% change in price of coffee}}$$

If a 5% increase in the price of coffee leads to a 10% increase in demand for tea, then the cross elasticity of demand for tea with respect to coffee is 10%/5% = +2. (cross elastic)

Cross elasticity of demand for coffee with respect to the change in price of tea is:

$$\frac{\text{\% change in quantity demanded for coffee}}{\text{\% change in price of tea}}$$

Thus, if a 5% increase in the price of tea leads to a 20% increase in demand for coffee, the CED coffee/tea is equals to +4.

Sign and Magnitude of Cross Elasticity of Demand

Negative Cross Elasticity (CED<0) Complements		Positive Cross Elasticity (CED>0) Substitutes	
$-\infty < CED < -1$	$-1 < CED < 0$	$0 < CED < 1$	$1 < CED < \infty$
• A change in the price of a good will cause the demand for its complements to change in the opposite direction and thus CED is negative. • If the pair of goods are complements, for example, DVD players & DVDs, then a fall in the price of DVD player will cause demand for DVDs to rise and vice versa.		• A change in the price of a good will cause the demand for its substitutes to change in the same direction and thus CED is positive. • If a pair of goods are substitutes, for example, PC tablets and desktops, then a decrease in the price of tablets will lead to a fall in the demand for desktops and vice-versa.	

CED between two goods can range from minus infinity to plus infinity.

- The **stronger or closer** one good is a substitute or a complement of another, the **bigger the effect** of a change in price of one good on the demand of the substitute or complement. Hence, the **greater the magnitude** of cross elasticity of demand.
- For example, if people are more willing to substitute coffee for tea rather than hot chocolate for tea, then the cross elasticity of demand for coffee with respect to tea will be greater in magnitude than that for hot chocolate with respect to tea. When 2 goods are perfect substitutes for one another, their cross elasticities of demand tend towards positive infinity.
- The less closely related one good is to another, the smaller the effect on demand of the first good when there is a change in the price of a substitute or complement. Hence, the smaller the magnitude of cross elasticity of demand. When two goods are independent goods or are unrelated to each other, their

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cross elasticity of demand will be zero. For instance, butter and golf balls. When the price of butter falls, there is no effect on demand for golf balls.

18. Spot any error or/and inadequacy and make correction(s) in the following sentences.
• 'Cross elasticity of demand measures the degree of responsiveness of quantity demanded of a good to changes in price.' • 'Complements have a positive cross elasticity of demand and substitutes have a negative cross elasticity of demand.'
19. TYS 2011 CSQ1(c) Explain the likely value of the cross-elasticity of demand between high-speed rail travel and air travel. [2]

(iv) Price Elasticity of Supply PES

Price elasticity of supply measures the degree of responsiveness of **quantity supplied of a good to a change in **its own price**, ceteris paribus.**

Price Elasticity of Supply = $\frac{\text{percentage change in quantity supplied}}{\text{percentage change in own price}}$

Formula in symbols,

Formula in symbols,

$$PES = \frac{\Delta Qs}{Qs} \div \frac{\Delta P}{P}$$

$$= \frac{\Delta Qs}{\Delta P} \times \frac{P}{Qs}$$

where
- *Qs is the change in quantity supplied; Qs is the original quantity supplied*
- *P is the change in price; P is the original price*

Sign and Magnitude of Price Elasticity of Supply

- Price elasticity of supply is always positive as price and quantity supplied change in the same direction (due to the Law of Supply). Producers are only induced to supply more when offered a higher price.
- The magnitude of the price elasticity of supply, PES, can vary from zero to infinity.
- If supply is price inelastic (PES < 1), when demand increases, price increases significantly while quantity supplied increases less than proportionately.

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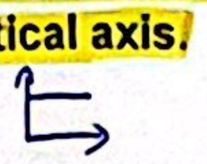
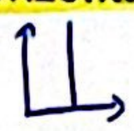
- If supply is price elastic (PES > 1), when demand increases, there is a minor increase in price but quantity supplied increases more than proportionately.
- Diagrammatically, a price inelastic supply curve cuts at the horizontal axis and a price elastic supply curve cuts at the vertical axis.





Impact on P, Q and TE/TR when demand changes with different PES values

Figure 12(a): Price Inelastic Supply

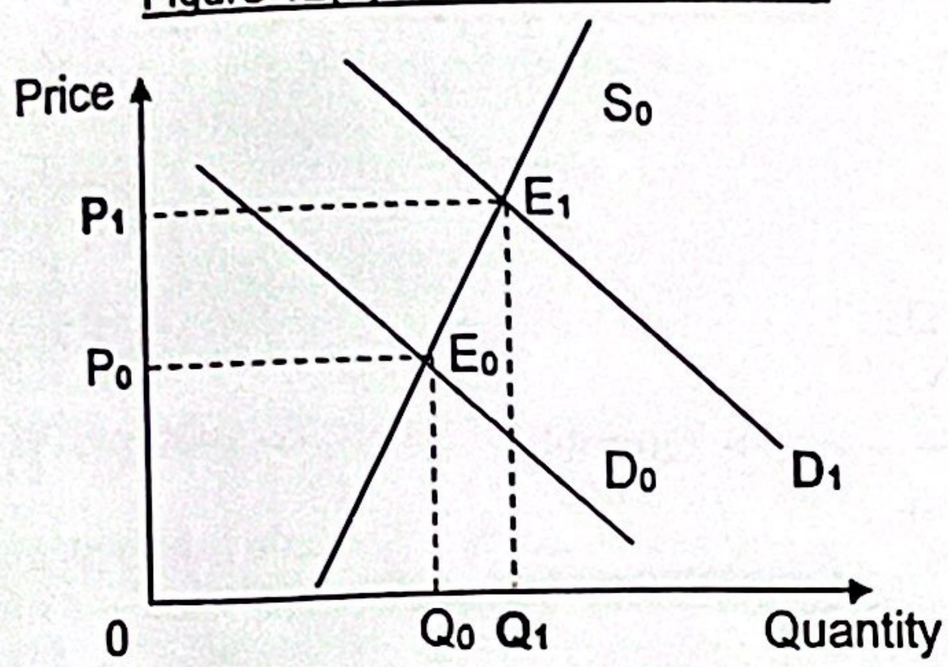
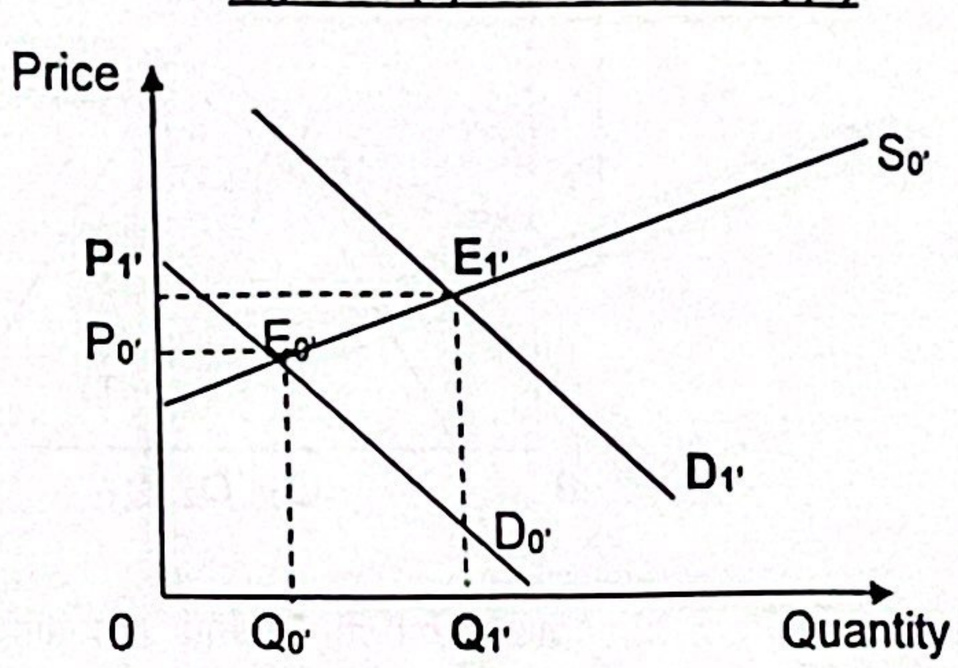


Figure 12(b): Price Elastic Supply



- Refer to Figure 12(a), when demand increases from D_0 to D_1, it causes a significant increase in price from P_0 to P_1 and quantity to increase less than proportionately from Q_0 to Q_1. Since both price and quantity increase, the total revenue increases from $0P_0E_0Q_0$ to $0P_1E_1Q_1$.
- Refer to Figure 12(b), when demand increases from $D_{0'}$ to $D_{1'}$, it causes a small increase in price from $P_{0'}$ to $P_{1'}$ and quantity to increase more than proportionately from $Q_{0'}$ to $Q_{1'}$. Since both price and quantity increase, the total revenue increases from $0P_{0'}E_{0'}Q_{0'}$ to $0P_{1'}E_{1'}Q_{1'}$.

- **Regardless the value of PES, price, quantity and total revenue change in the same direction of the shifts in demand but the extent of change on price and quantity differs.**

- **Thus, for a question that asks only for changes in total revenue, the PES analysis need not be included.**

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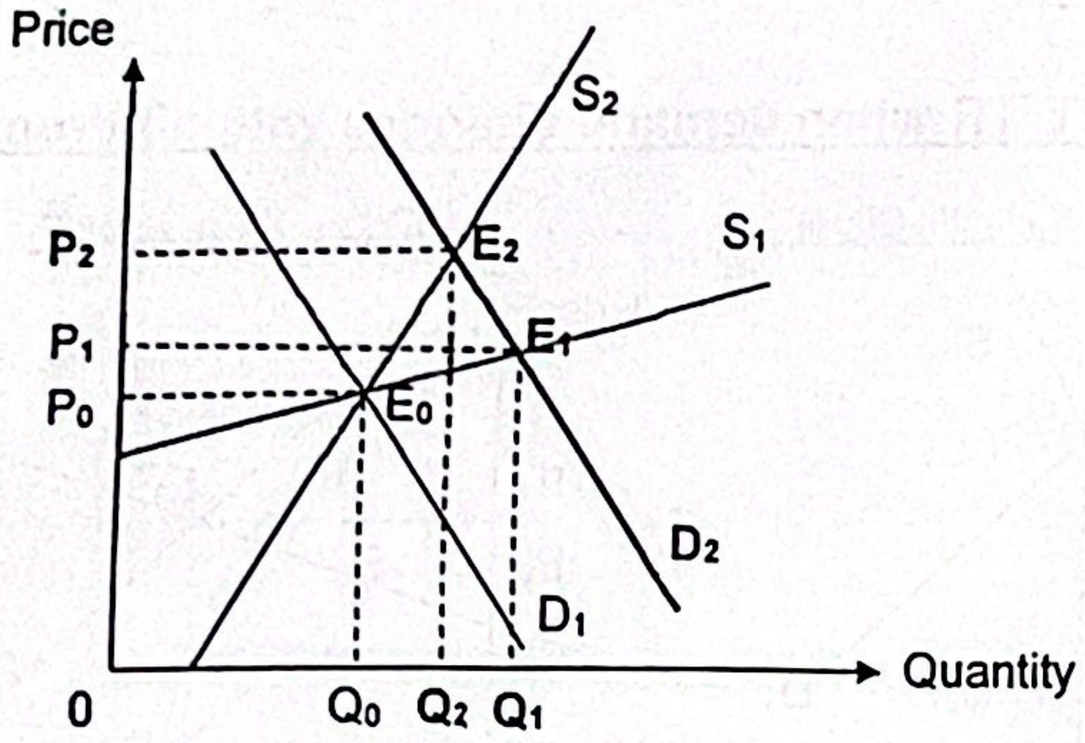
Comparing Price Elastic Supply and Price Inelastic Supply when Demand Shifts

Figure 13: Price Elastic Supply vs. Price Inelastic Supply



Referring to Figure 13 above with both S_1 and S_2 cutting D_1 at E_0,

- When supply is price elastic (S_1), a rise in demand from D_1 to D_2 will result in a small increase in price from P_0 to P_1 and quantity exchanged to increase more than proportionate from Q_0 to Q_1 and total revenue will increase from $0P_0E_0Q_0$ to $0P_1E_1Q_1$ definitely since both price and quantity increase.
- When supply is price inelastic (S_2), a rise in demand from D_1 to D_2 will result in a significant increase in price from P_0 to P_2 and cause the quantity exchanged to increase less than proportionate from Q_0 to Q_2 and total revenue will increase from $0P_0E_0Q_0$ to $0P_2E_2Q_2$ definitely since both price and quantity increase.

Determinants of Price Elasticity of Supply

(1) The existence of spare capacity

If spare or unused capacity exists, i.e. variable inputs such as labour and raw materials are available, it should be possible to increase production quickly. In this case, the supply will be considered price elastic. The reverse is also true, for example, if a factory is already operating round the clock, it is almost impossible to further increase production even if there is a higher demand for its goods that raises its price, so supply will be price inelastic.

Note: Do not confuse spare capacity with new capacity or expansion of existing capacity. If new capacity is added to the existing capacity, the supply curve will shift to the right.

(2) The nature of production

(i) The ease of factor substitution (degree of factor mobility)

Many firms produce a range of products and are able to switch factors like machines and labour from one production to another. If factors of production can be switched easily in terms of its use, then the supply of that

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product will tend to be price elastic. For example, a firm that has both phone and tablet manufacturing plants. If it receives a higher price for its phones and can swiftly switch its workers working in its tablet manufacturing plant to the phone plant, the supply of phone is considered to be price elastic since its production can respond easily to the increase in its price. Thus, the **degree of mobility of resources** determines the extent to which factor substitution can be carried out.

(ii) The length of the production period

The shorter the time period for firms to convert factor inputs into outputs, the more price elastic is the supply of the good. The supply of agricultural products tend to be rather price inelastic. This is because the production period is determined by nature. For instance, rice has a 'gestation period' of about 4 months for the crop to mature and cannot be artificially shortened. Even if there is a sudden surge in demand and price for rice, there is not much that can be done to increase crop yield in the short term. For this reason, prices of agricultural commodities tend to rise sharply in times when there is an upsurge in demand. In this case, supply of rice is relatively price inelastic. In contrast, the supply of manufactured goods is relatively much more price elastic because of a shorter production period. For instance, if necessary, factories can manufacture more goods at short notice by working overtime.

(3) The ease of accumulating inventory or stocks

Inventory is a term used to refer to the firm's stocks of unsold goods. These are **goods which are produced but have yet to be sold or put on sale in the market.** Inventories are therefore not counted as part of the current supply of goods in the market. Businesses or firms keep inventories as back up in places like warehouses. If it is easy to store unsold stocks at low cost, firms will be able to meet a sudden increase in demand & price by running down stocks. Likewise, they can respond to a sudden fall in demand and price by taking supply off the market and by diverting production into stock accumulation. Hence, supply of such goods is likely to be price elastic.

(4) Time Period

In general, the supply for most goods and services is price inelastic in the short run and relatively more price elastic in the long run. In the short run there may be greater difficulty for sellers to increase quantity supplied in respond to higher demand due to the lack of spare capacity; immobility of resources or inadequate stocks. However, in the long run, firms can take measures to rectify these "supply bottlenecks" and thus be in a better position to increase production.

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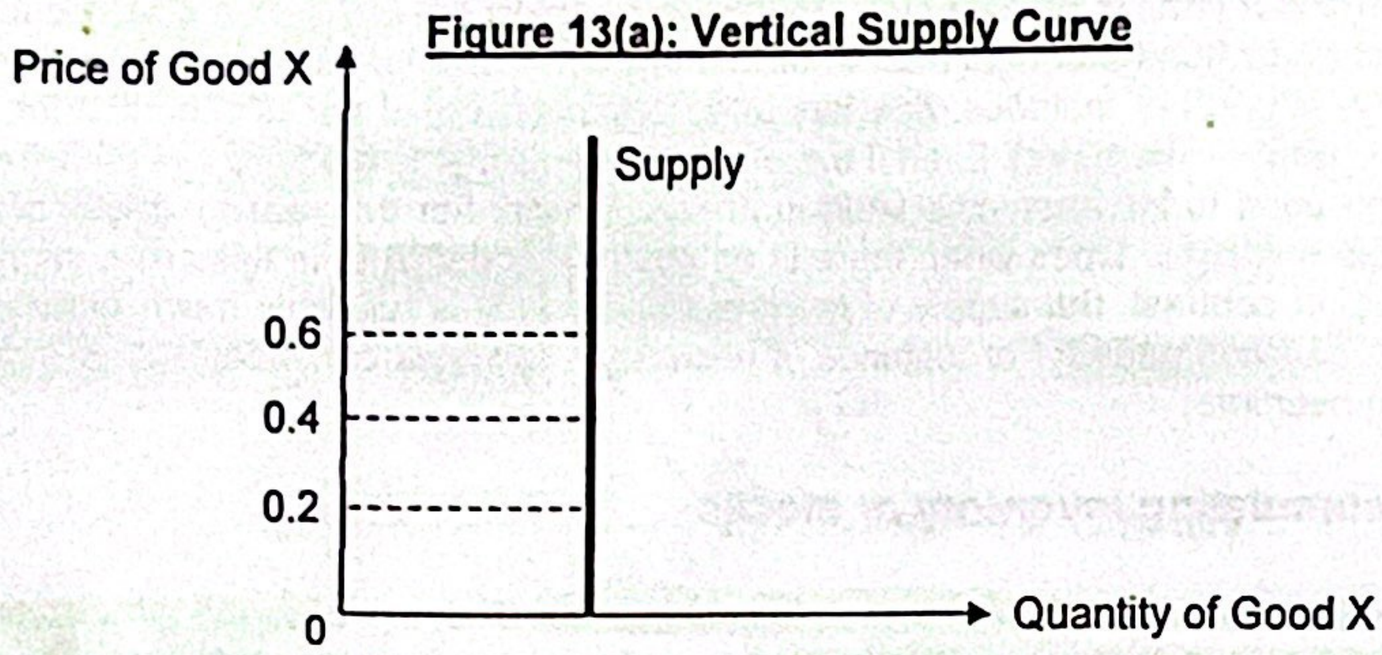
PRICE INELASTIC OR VERTICAL SUPPLY CURVE

In special cases, supply curves can take the shape of a vertical straight line as in Figure 13 (a). Such supply curves are said to be **perfectly price inelastic.**

A vertical supply curve means that the quantity supplied does not change when prices change. Examples of goods with a vertical supply curve would include one-of-a-kind antiques or paintings.

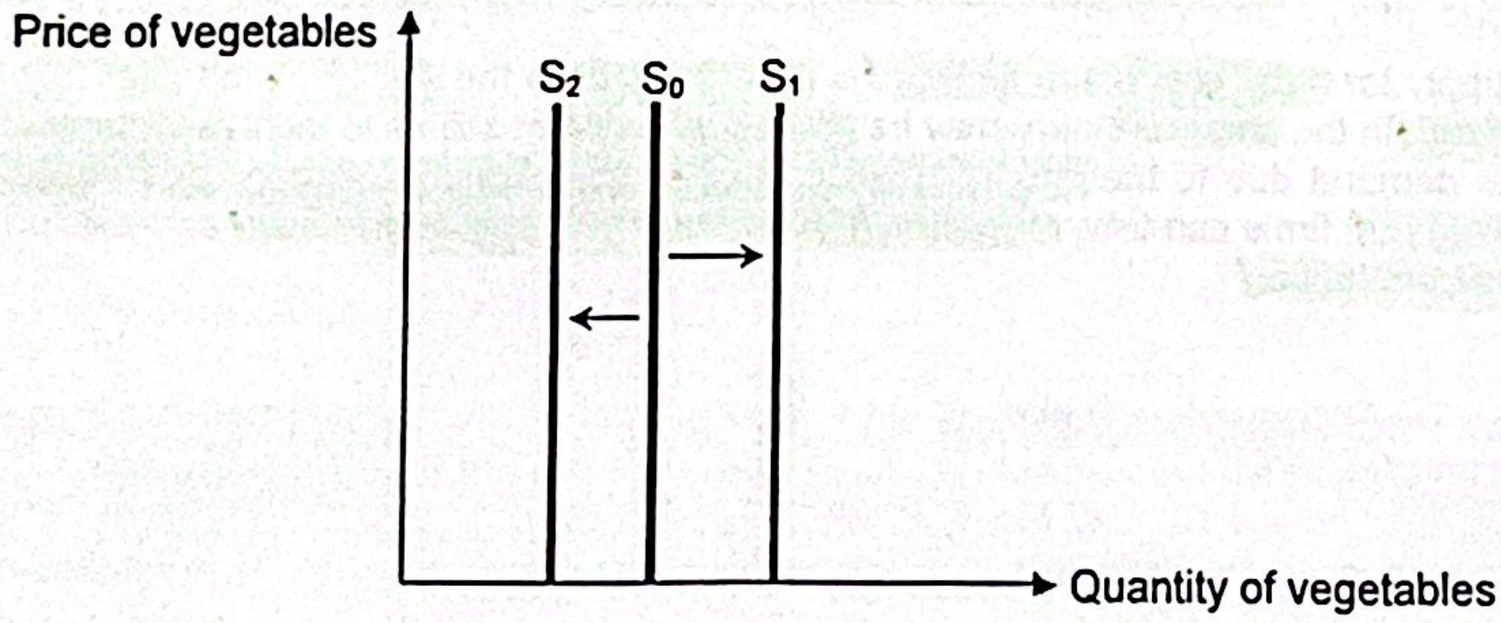
Figure 13(a): Vertical Supply Curve



The supply curve of agricultural products is usually vertical (or highly price inelastic in the short-run), implying that the quantity supplied cannot change in the short run once the crop is harvested.

However, the supply can change over time. In years where the weather is ideal for agricultural production, the supply may be greater (represented by S_1 in Figure 13(b) than in years when there is a drought (represented by S_2 in Figure 8).

Figure 13(b): Shifts in the vertical supply curve



Other examples are quota on Certificate of Entitlements (COEs) in Singapore and the existing stock of houses.

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20. Explain the extent of the impact on price, output and total revenue when demand increases for rice crops.

21. TYS 2009 CSQ1(c)

With the help of a diagram, explain why an increase of 70 million mouths to feed each year may cause food prices to rise, showing how low stocks of food would affect the extent of this rise in the short run. [4]

22. 'Supply for skilled labour is price inelastic and supply for unskilled workers is price elastic'. Explain why.

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Chapter #2: Microeconomics II – Markets
Price Mechanism and its Applications

Tutorial 2.1

Question 1: TYS 2009 Case Study Question 1

Extract 3: Food or Fuel?
Vulnerable regions of the world face the risk of famine over the next three years as rising energy costs spill over into a food crisis.

Global oil output has been stagnant for four years, failing to keep up with rampant demand from Asia and the Middle East. China's oil imports, for example, rose 14% last year. Bio-fuels from grain, oil seed and sugar are satisfying the demand to some extent, but this is drawing away food supplies at a time when the world is adding more than 70 million extra mouths to feed a year.

'China is terrified of the current situation. It has serious shortages of food,' said a commodity trader. China still has painful memories of starvation in the 1960s. We are facing an entirely new situation because now changes in the prices of energy and food have 'converged' as resources can increasingly be switched from one use to another. Corn can be used for bio-fuel in cars and power plants, as well as baking tortillas. Natural gas can be made into fertilizer for food output.

Land use for bio-fuels has shot up from 12 million to more than 80 million hectares worldwide over six years. Bio-fuel provides 3% of global energy needs, which will rise to an estimated 10.6% by 2030. The European Union (EU) has set itself only until 2010 to reach a 10% bio-fuel target. In a market without government intervention, sugar cane would be the only viable crop for making bio-fuel but government subsidies make other crops viable too. These include corn, wheat, rapeseed and soybean.

Source: *Daily Telegraph*, 9 February 2008

d) Extract 3 describe the use of subsidies in the market for bio-fuels. With the use of diagrams, explain the way in which subsidies affect the allocation of resources between bio-fuels and food. [4]

Question 2: TYS 2007 Essay Q1

In 2005 the rate of Goods and Services Tax (GST) in Singapore rose from 3% to 5%. Incomes rose by approximately 4.5% in 2005.

(a) Explain the likely impact of this change in GST on expenditure by consumers on different types of goods. [10]

(b) Discuss whether the combined effect of the rise in incomes and the rise in GST is likely to cause the quantities of different types of goods sold to rise or fall. [15]

Hint for part (b): The question aims to examine several possible impact/outcomes on the output of various types of good, given the combined effect of the rise in incomes and GST.

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Put a √ on the boxes that you think are possible descriptions of certain categories of goods. These will be the ones that you have to examine in details in the essay.

Note: Don't √ all as you will end up examining 6 scenarios in the essay!

	Price elastic good (with close substitutes / a high proportion of income)	Price inelastic good (with few substitutes / a small proportion of income)
Positive income inelastic good (necessities)		✓
Positive income elastic good (Luxuries)	✓	
Negative income inelastic good (inferior goods)		

Question 3

Try working out the changes to equilibrium price and quantity (↑, ↓ or ?):

	in demand	in supply	equilibrium price	equilibrium quantity
1	Rise	–		
2	Fall	–		
3	–	Rise		
4	–	Fall		
5	Rise	Rise		
6	Fall	Fall		
7	Rise	Fall		
8	Fall	Rise		

In general, when the demand and supply curves shift in the same direction, equilibrium quantity also changes in the same direction. However, the effect on equilibrium price depends on which curve shifts more.

If the curves shift in opposite direction, equilibrium price will move in the same direction as demand. The effect on equilibrium quantity depends on (1) which curve shifts more and (2) the relative elasticity of the curves.

Question 4: TYS 2016 Essay Q1 (attempt part b only)

The price of a pair of jeans can be as little as S$20 or as much as S$500.

(a) Explain what might cause price elasticity of demand and cross elasticity of demand to be different for different products. [10]

(b) **Assess the likely effects of a rise in price of one brand of jeans on the revenue earned by both retailers of that brand of jeans and those who sell other related goods. [15]**

↑ PED required

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Question 5: TYS 2018 Essay Q1 (attempt part a only)

The average price of tickets for two concerts performed by singer-song writer Ed Sheeran in November 2017 at the Singapore Indoor Stadium was S$180. Tickets went on sale six months earlier and both concerts sold out almost immediately. Some tickets were later being offered for resale at prices well above face value.

(a) Using supply and demand curves, explain why there is an excess demand for tickets and why there is a high resale price. [10]

(b) Discuss possible strategies that concert organisers could use to improve the market outcome for this type of concert for producers and consumers. [15]

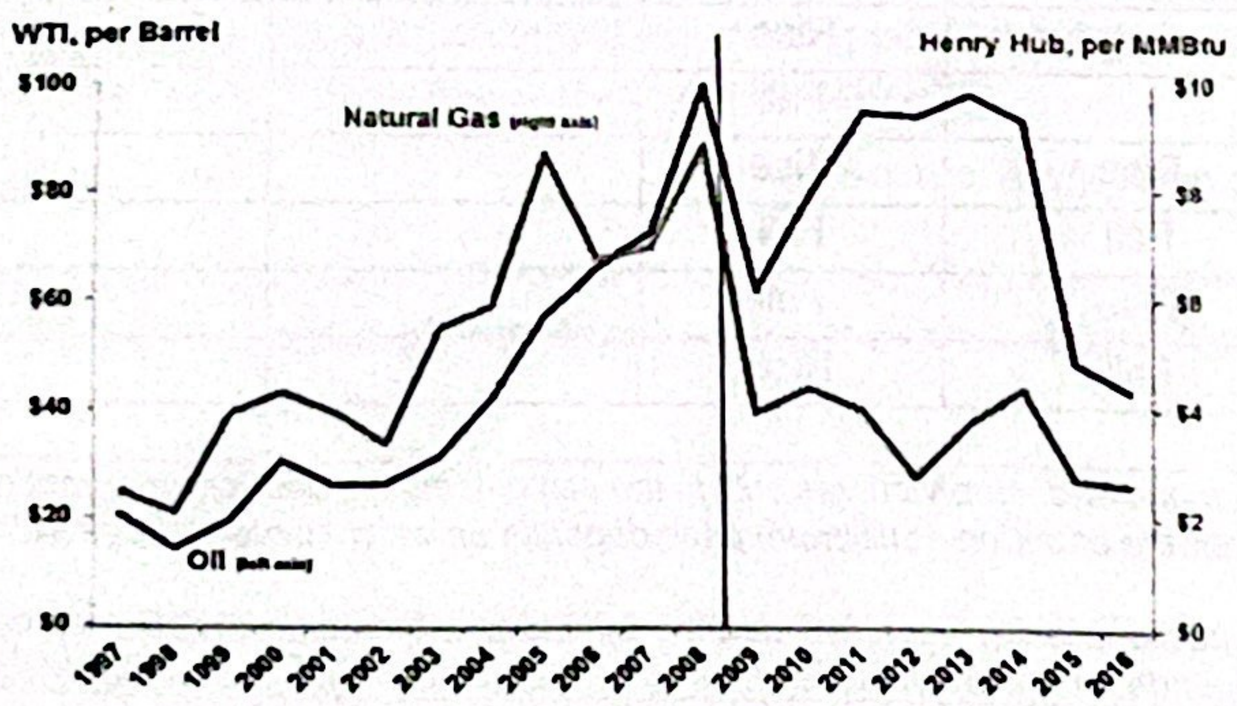
Question 6: TYS 2015 Essay Q2(modified)

Recent years have seen a dramatic rise in the output of computer-based products such as smartphones, laptops and tablets.

(a) Explain the demand and supply factors that determine the output of computer-based products [10m]
(b) Discuss which is the most important factor that affect the output of computer-based products. [15]

Question 7 [Refer to Case Study Skills Package on describing and comparing trends, and stating relationships between trends]

Figure 1: US Crude Oil and Natural Gas Prices



http://www.trane.com/commercial/north-america/us/en/about-us/newsroom/blogs/the-relationship-between-oil-and-natural-gas-prices-.html

(a) (i) Summarise the trend of crude oil price in Figure 1. **[2]**

(ii) Explain two possible reasons for the above changes. **[4]**

(b) (i) Compare the trends in crude oil and natural gas prices in Figure 1.[2] **[2]**

(ii) Describe the relationship between crude oil and natural gas prices in Figure 1 and explain why it is so. **[3]**

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Question 8: TYS 2012 CSQ1(a), (b), (d) and (e) [excluded Extract 3]

When attempting case studies, always read thoroughly all data and extracts and make notes to link to economic concepts. This will help you answer the questions later.

The market for cotton

Table 1: Cotton in selected economies (million bales)

	Production		Consumption	
	2008/09	*2009/10*	*2008/09*	*2009/10*
Brazil	5.4	5.3	4.2	4.4
China	36.7	32.0	44.0	48.5
India	22.6	23.2	17.7	19.5
Pakistan	8.7	9.6	11.3	11.0
United States	12.8	12.2	3.6	3.5
World total	107.1	101.2	109.9	117.2

Source: United States Department of Agriculture

Extract 1: Brazil's cotton growers seek to boost output as India restricts exports

Cotton prices have soared 73% in the past year and reached a 15-year high of US$1.064 on 28 September 2010 after India, the world's second-biggest exporter after the United States, said it would limit exports. The Indian government will limit exports to 5.5 million bales in 2011, compared to 2010 when exports were 8.3 million bales. The price of cotton is expected to stay above US$1 until June 2011.

Cotton growers in Brazil, the world's fifth-largest exporter of the fibre, plan to increase output in 2011 after the rise in world prices. Planting for the 2011 harvest may rise to 1.1 million hectares from 830000 hectares in 2010.

Brazil's government may consider increased financial support for cotton growers to encourage them to raise output in 2011, according to the Brazilian Agriculture Ministry. A four-month drought hurt the quality of the crop this year in Brazil, causing output to fall. In September the government temporarily eliminated a 10% tariff on cotton imports as domestic supplies fell short of demand.

Source: *Bloomberg*, 1 October 2010

What are some demand and supply factors that can cause cotton price to soar?

Calculate the % increase in cotton from 2010 to 2011 for Brazil. Compare the figure to the rise in cotton price of 73%. What can you conclude?

How will the measures taken by the government affect the market of cotton?

Extract 2: UK retail clothing firms far from cheerful about future of cheap fashion

It was a sign of the times: fashion so cheap it became 'disposable' as globalisation brought container loads of low-cost clothes to the UK. But clothes retailers are now warning that the era of constantly falling prices is coming to an end and that prices could rise in 2011. A huge rise in the price of cotton to a 15-year high could not be ignored, they said. At the same time, retailers are facing higher labour costs in Asia, the impact of a weaker pound and a rise in Value Added Tax (VAT) from 17.5% to 20% from January 2011.

The chief executive of clothes retailer Next predicted that the prices of Next's clothes were going to rise by up to 8% in 2011. He said that he suspected that shoppers would have to cut back on the number of new outfits they buy: 'Our best guess is that if prices do rise by 8%, then volume of sales will be down by 10%. The clothing retail industry hasn't experienced price increases for 15 years and the truth is we don't really know what the response will be.'

The director of a leading research company said consumers are facing what could be a permanent change in the clothing market: 'Prices can't keep falling forever: they reach a floor, and we are now at a point where retailers' profits are really quite low. Because of the recession they are finding it difficult to maintain sales. This means that when costs rise, they have to be passed on to the consumer.'

Primark, a clothing company known for its ability to emulate designer looks at rock-bottom prices, has been at the forefront of the disposable fashion movement. Its breathtaking

How will the rise in cotton price affect clothes? Why?

What concept can be used to analyse the impact of a change in volume to the price change? And how would total revenue be affected?

How will a recession impact on the market for clothes?

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prices -this autumn you can still buy jeans for £8 and a top for £4 -caused a stampede when its first store opened on London's Oxford Street in 2007. Another company, Asda, sold its cheapest pair of own brand jeans for £14.97 in 2000; now the price is down to £4. Some have argued that the increase in the cotton price has its roots in the financial crisis of 2008, when farmers stopped planting low-value cotton and switched to higher-value crops such as corn and soya. When retail sales picked up, demand for cotton also rose and prices shot up -just at a time when major cotton-producing regions such as China and Pakistan were suffering devastating floods, and India, the second largest producer, was limiting exports.

The deputy chief executive of a well-known department store explains that 60% of the cost of clothing is in the fabric and about 30% of the fabric cost is in the raw materials: 'The approach we are taking is to pass it on to customers and we think most other retailers will have to do the same.' He says its prices will rise, like Next's, by up to 8%. He also points to 'increased labour costs all around the world', less spare capacity in Chinese factories, rising freight costs and the unfavourable impact of foreign exchange movements as other pressures being faced by retailers.

Some analysts argue, however, that the gloom is being overdone. The chairman of the department store John Lewis Partnership, which last week reported a 20% increase in fashion sales, certainly thinks the future is brighter than some of his peers say. 'Prices may rise a little but tough competition will take some of the heat out of these rises.'

Source: *The Observer*, 19 September 2010

What is the economic relationship between cotton and higher value crops?

What economic concepts can you elicit from this paragraph?

Questions (selected)

(a) (i) Why might the changes shown in Table 1 have led to an increase in the world price of cotton? [1]

(ii) Given the information contained in Table 1, identify the country that has had the greatest impact on world prices. Justify your answer. [3]
change, not absolute value

(b) What can you conclude from the evidence in Extract 1 about the price elasticity of supply of cotton in Brazil? [2]

(d) In Extract 2 the chief executive of Next considers the effect of an 8% rise in the price of Next's clothes. With reference to the concept of price elasticity of demand, explain the expected impact of this price rise on the firm's total revenue. [3]

(e) With reference to the data where appropriate, discuss the view that supply factors are likely to be more important than demand factors in explaining changes in the price of cotton. [8] analysis 6m, evaluation 2m

[10] analysis 7m, evaluation 3m

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Year One H2 Economics 2022
Chapter #2: Microeconomics II – Markets
Price Mechanism and its Applications

PART 2: APPLICATIONS OF DEMAND AND SUPPLY ELASTICITIES BY FIRMS AND GOVERNMENT INTERVENTION

CHAPTER OUTLINE

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PED, PES: gradient of curve is different
YED, CED: extent by which the curve shifts is different

2.2 APPLICATIONS OF DEMAND AND SUPPLY ELASTICITIES BY FIRMS AND GOVERNMENT INTERVENTION

2.2.1 APPLICATIONS OF DEMAND AND SUPPLY ELASTICITIES BY FIRMS

2.2.1.1 PRICE ELASTICITY OF SUPPLY (PES)

(PES < 1) Understanding price elasticity of supply can aid firms and producers in making their output decisions. If the supply is very price inelastic, the firm knows that it is not able to respond quickly to increases in price as demand increases. Considering its resource constraints as well as the costs and benefits, it may then decide to increase its output before an anticipated increase in the demand for its goods. For example, in anticipation that there will be an increase in demand for airplanes (which will lead to an increase in its price), airplane manufacturers like Airbus or Boeing can start to expand its capacity and produce aircraft now, since the supply of airplanes is relatively price inelastic.

PES < 1: Long time to build → Inability to ↑ qty supplied quickly when P↑ (Demand ↑) → Anticipate, prepare & ↑ capacity & production before demand ↑

2.2.1.2 PRICE ELASTICITY OF DEMAND (PED)

The price elasticity of demand concept helps a producer make pricing decisions on whether to increase or decrease price to increase total revenue. If demand for the good is price inelastic, the firm should raise its price since quantity demanded will fall less than proportionately and total revenue will increase. However, if demand for the good is price elastic, then the firm should lower its price as it will lead to a more than proportionate rise in quantity demanded, increasing it total revenue.

Exemplification:
The degree of price elasticity of demand for a good in general varies with time. As such, the firm may use different strategies for different time periods.

- In the short run, when a fashionable product such as the Samsung Galaxy S21 has just been launched, consumers' demand for new phones is likely to be relatively price inelastic (due to lack of close substitutes). Samsung considers the consumers' perspective in this aspect and decides to charge higher prices to increase its TR (since quantity demanded falls less than proportionately to an increase in price, ceteris paribus).

- In the long run, with consumers' demand for such phones being more price elastic, as more Samsung Galaxy S21 equivalent smart phones such as iPhone 12 become available, Samsung will take the consumers' perspective into account and consider lowering the price of the Samsung Galaxy S21 to raise TR.

YED Eg: Using YED, explain how a property developer of high-end properties would react to news of strong economic growth?
↳ ↑ in incomes, ↑ in demand for high-end residential properties (due to high YED for such properties)
↳ Demand will ↑ > proportionately to ↑ in incomes

2.2.2 X: Producers will then ↑ price of such residential properties to ↑ revenue.

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✓: Producers will then ↑ production of such residential properties to ↑ revenue.

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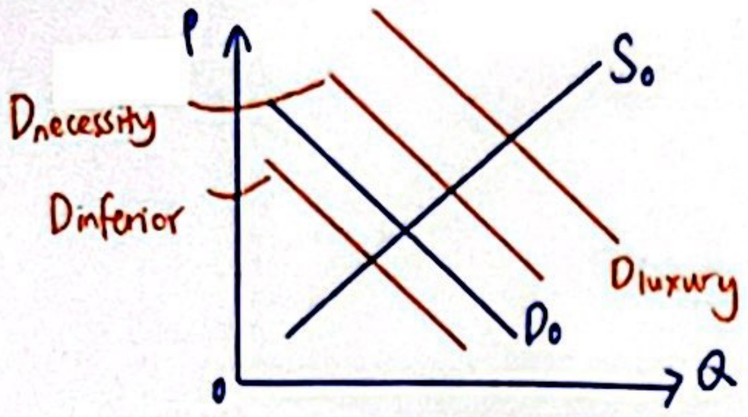

Economic Boom:
↳ expect sales of high-end goods to ↑
↳ ↑ production of luxury goods / services [NOT ↑ price]

Economic slump / recession:
↳ expect sales of low-end goods to ↑ (↓ production of high end goods)
↳ ↑ production of low-end goods / services [NOT ↓ price]

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2.2.1.3 INCOME ELASTICITY OF DEMAND (YED)

(a) Respond to changes in income levels

If the product has a high positive income elasticity of demand (YED>1), demand for such luxury goods is likely to increase more than proportionately as the Gross Domestic Product (GDP) and thus consumers' income rises. Hence sales revenue will rise significantly. The producers while considering consumers' perspectives, can do the following:

- Increase current production: E.g. for a firm selling luxury goods, like luxurious watches, a good time to increase its production would be in times of an economic boom when income is rising.
- Make the product more up-market: A producer can also make the demand for his products more income elastic by making it more prestigious and up-market via advertising.
- Stock up on luxury goods in anticipation of continued future rise in demand for the good.
- Plan to expand its scale of production and have more outlets.

On the other hand, demand for the same luxury good will fall more than proportionately if the economy enters into recession and the sales revenue will fall significantly as compared to a good with YED positive but <1. The firm should thus cut back its production on luxurious goods during a recession; and choose to introduce a lower-end version of the goods, for example, house-brands or no-frills brands, because the demand for inferior goods rises when income falls. The producer can also focus marketing efforts to the budget conscious group of consumers.

Note: *Selling luxurious goods during an economic boom is not equivalent to raising price (even though such goods may cost more). The emphasis is on the increased willingness and ability to pay more for higher-end goods during good times. Similarly, people tighten their belts during bad times and do not mind buying lower-end products, which usually cost less.*

2.2.1.4 CROSS ELASTICITY OF DEMAND (CED / XED)

Firms will wish to know the cross elasticity of demand for their product, in relation to other products, when considering the effect of a change in the price of a rival's or a complementary product on the demand for their product. These are vital pieces of information for firms to understand their competitor's perspective and to strategise in order to raise revenue or sales.

(a) Change in price of substitutes

If rival firm (eg. Shell) slashes price, Esso will follow suit → lower their price since their products are close substitutes and have high and positive CED [Price Competition]

Non-pricing strategy - Product differentiation: In response to a firm's competitor lowering its price, the firm can try to differentiate its products. For example it could improve the quality of the product/ service to → to create brand loyalty lower the degree of substitutability between its goods and that of its competitors. This reduces the value of CED. Thus the demand for their goods and their total revenue will fall less significantly.

(b) Change in price of complements

Pricing strategy – Lower price of complements: By lowering the price of its complements, a firm can increase the demand for a higher profit margin product and increase its overall profitability. For example, companies have been known to lower the price of their printers so that the demand for their companies' unique and higher profit margin ink cartridges can increase more than proportionately, increasing the overall profitability of their operations.

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Note: Raw materials and means of advertising are not complements. For example, straws, cups, 'pearls', flyers, etc., are not complements of bubble tea!

2.2.1.5 LIMITATIONS OF DEMAND ELASTICITY CONCEPTS

The general limitations of the demand elasticity concepts are as follows:

- **Ceteris Paribus Assumption**
  The limitation imposed by the ceteris paribus assumption is a fundamental drawback in terms of real world application of elasticity concepts. The use of the ceteris paribus assumption is meant to simplify economic analysis. It assumes no other factors except own price; income; price of a related good changes when we use PED, YED and CED respectively. However, in real-life, at any particular point of time, many factors such as the price of a related good and income level may be changing simultaneously. For e.g. when the price of non-4G phones falls, the demand for non-4G subscription plans is unlikely to rise as many phone-users are turning to 4G smart phones (due to change in tastes and preferences of consumers).

- **Ignores cost-side of the profits equation**
  The concepts are only useful to help firms increase total revenue. The PED concept helps businesses decide on appropriate pricing strategies. The YED concept helps businesses decide on output strategies and the CED concept helps businesses to decide on joint and reactionary-marketing strategies. However, none of these elasticity concepts deal with the cost-side of the equation – cost-cutting strategies or productivity enhancing strategies.

  Profits = Total Revenue − Total Costs

  In short, the above concepts are unable to help firms formulate strategies to maximise profits as these concepts do not take costs into consideration. In reality, firms need to look at both revenue and costs to formulate strategies to boost profits.

  Profits = Total Revenue – Total Costs

  Note: Concepts on profits, costs, and revenue relating to the behaviour of firms will be covered in Chapter 4 Firms & Decisions.

- **Informational Problem**
  The validity of applying elasticity concepts in formulating business marketing strategies rest on the crucial assumption that all information pertaining to elasticities are available to firms. In other words, it is assumed firms have perfect information to make rational business decisions. However, in reality it is often not possible for firms to acquire perfect information and the available information may not even be reliable or accurate. Under such imperfect circumstances, there is no guarantee the strategies adopted by firms will always be successful even if they were to apply elasticity concepts to formulate their business policies.

- **Ignores the supply side of the market**
  Also while strategising, firms should also take price elasticity of supply into consideration – whether they can respond fast to the change in demand. It simply assumes supply can easily cope with any change in demand. However, in reality cutting prices to stimulate demand may not successfully raise sales and revenue if supply cannot cope with the increased demand.

- **Market level analysis – is it appropriate for a firm?**
  Demand curves can represent either the demand of the product for a single firm or the entire industry. In general, using demand curves that represent **market demand** for the entire industry's product is inappropriate in analysing the impact on an **individual firm's** revenue or sales.

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In theory the impact on pricing and output policies for individual firms is best analysed by using cost and revenue functions pertaining to each firm.

- **Market structure – Is it a realistic model?**

  Moreover, the ability of an individual firm to decide its pricing policy is subject to the type of market structure in which it operates. When applying the PED concept to a firm's pricing policy, we have implicitly assume that the firm is a price-setter (e.g. monopolist or oligopolist) operating in an imperfect market. Only price-setting firms have market power or pricing power. On the other hand, price-taking firms have no market power to set its own price. Such firms are found in perfectly competitive markets. It is therefore too simplistic to assume every firm has market power to set its own price.

  Note: Details will be covered later in Chapter 4 on Firms and Decisions.

Specific to the Individual concepts:

PED: This concept at best is able to help a firm decide whether to reduce or increase price to raise revenue. However, PED concept cannot indicate what exactly is the equilibrium or best price and output for maximising the firm's profit. In theory, the firm's best output and price for maximising profit is where MC=MR (i.e. marginal cost of production is equals to the marginal revenue).
Note: Details will be covered under the topic 'Firms and Decisions'.

YED: If different factors that affect demand change simultaneously besides income, using YED to plan the firm's output strategy may not work. E.g. when income increases, the demand for luxury goods which are income elastic normal goods like boutique clothes are expected to rise in accordance with the prediction of YED concept. Businesses seizing on this opportunity may however end up with poor sales if the designs are no longer in fashion. In other words, besides income, there could be simultaneous changes in other factors such as tastes and preferences that affect sales.

Note: The above are more detailed explanations of why the ceteris paribus condition does not hold.

Conclusion: At the end of the day, the above list of limitations suggests that the various elasticity concepts, whilst certainly useful in many instances, are too simplistic for real world applications.

EXTRA: DEMAND ELASTICITY CONCEPTS IN MACROECONOMICS (J2)

Note: Balance of trade is export revenue (PxQx) minus import expenditure (PmQm) and details will be covered under macroeconomics.

Concept	Application
PED	• How does a change in the price of domestic goods affect the export revenue of the country? If there is a highly price inelastic demand for the economy's exports such as crude oil in Saudi Arabia, when price increases, the export revenue will rise. • Similarly, the PED of imports will affect the economy's import expenditure. Since Singapore imports mainly necessities, the demand for imports is highly price inelastic. Therefore when price of crude oil or food rises, import expenditure will rise.
YED	During the global economic downturn in 2009 in which many countries suffered from a recession, their demand for imports fell drastically. As a result, countries that are (1) heavily reliant on the export revenue gained from selling exports to these countries for survival and (2) produce mainly positive income elastic

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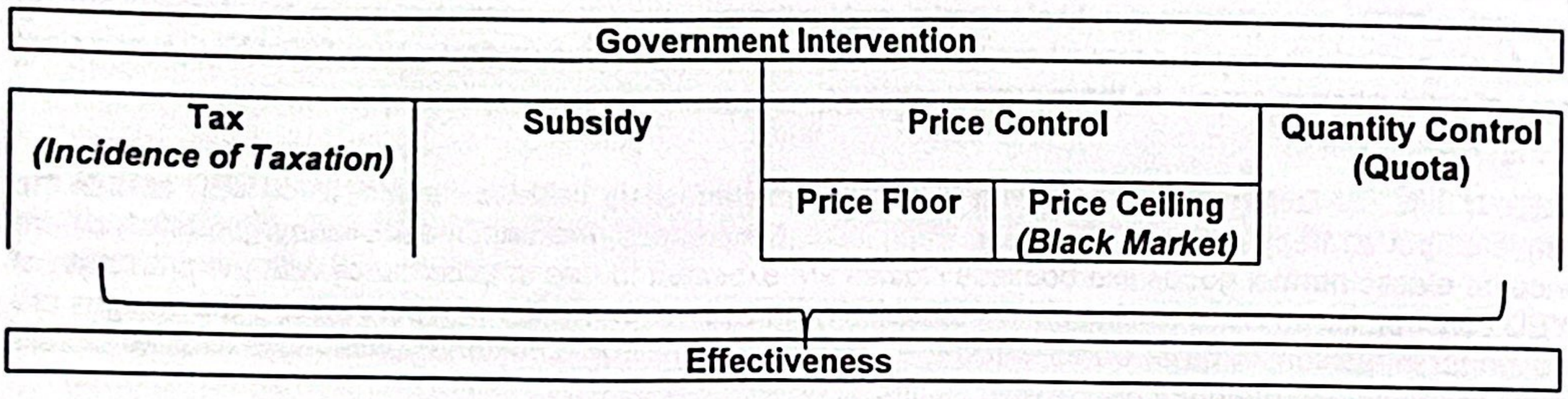
	goods were adversely affected and experienced a shrink in the export revenue and the balance of trade worsened.
CED	How does a change in the price of domestic goods affect the demand for imports? If there is a high cross elasticity of demand for imports (because they are strong substitutes for domestically-produced goods), and if prices at home rise due to inflation (a rise in the general price level of goods and services in an economy over a period of time), the demand for imports will rise substantially, worsening the balance of trade.

2.2.2 GOVERNMENT INTERVENTION

Conceptual Outline:



In the context of a market economy, the price mechanism can perform the role of distributing scarce goods among the different uses or consumers efficiently most of the time. However, in some situations, the price mechanism does fail – these instances involve public goods (such as defence and street lightings) or merit goods (healthcare and education) or demerit goods (liquor and tobacco). And even when the market operates efficiently, there are times when the government intervenes (e.g. redistribution of income via taxes and subsidy) to achieve equity. The various forms of government intervention discussed in this chapter include indirect taxes, subsidies and price controls.

2.2.2.1 INDIRECT TAXES

An example of government intervention in markets to collect revenue is the imposition of indirect taxes on goods and services. The government also uses such taxes to restrict the consumption of certain goods it deems as socially undesirable (e.g. cigarettes and alcohol) to raise the price of the good, making it relatively more expensive and reduce the quantity exchanged in the market.

Types of indirect taxes

- A **specific tax** or per unit tax is a **fixed amount** of tax per unit of a good, i.e. the amount of tax is the **same at all prices**. E.g. A specific tax of 20 cents per litre of petrol

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- An ad valorem tax is calculated as a percentage of the sale price of a commodity. As the price increases, the amount of the tax to be paid will increase as well. E.g. 7% Goods & Services Tax (GST) that Singaporeans have to pay and 25% Value-added-tax (VAT) that Swedish are paying.

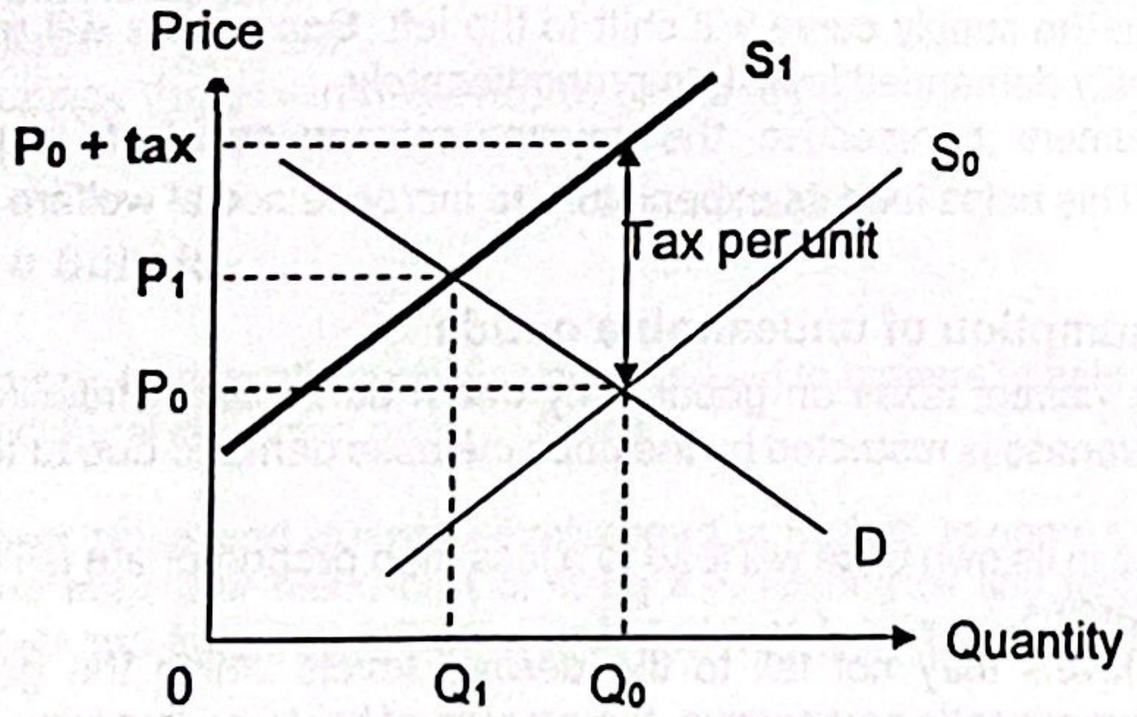
Table 1: Indirect taxes of Selected Countries

Country	VAT/GST	Country	VAT/GST
Australia	10%	South Korea	10%
China	17%	Sweden	25%
India	12.50%	United Arab Emirates	0%
Japan	8%	United Kingdom	0% / 5% / 17.50%
Singapore	7% GST	United States	0-9.75% in state & local sales tax; typically around 8.5%, but up to 16.75% when including other taxes

(A) Effects of an Indirect Tax on Supply

- When the government imposes a specific tax on the supplier for the quantity sold, the tax is perceived to add to the cost of production. As such, it will cause an **upward parallel (or leftward) shift of the supply curve**. Referring to Figure 1, the vertical distance between S_0 and S_1 represents the tax per unit imposed.
- But why does the supply curve shift upwards (leftwards) by the amount of the tax? To be persuaded to produce the same quantity before the imposition of the tax (i.e. Q_0), firms must now receive a price which allows them to fully recoup the tax they have to pay (i.e. P_0 + tax).
- The effect of the tax is an **increase** in equilibrium price from P_0 to P_1 and **reduction** of quantity exchanged from Q_0 to Q_1.

Figure 1: Effects of a Specific Tax on Supply



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1. Draw the demand and supply diagram for the case of government imposing an ad valorem tax on a good.

Recall: An ad valorem tax is calculated as a percentage of the sale price of a commodity. As the price increases, the amount of the tax to be paid will increase as well.

(B) Effectiveness of Indirect Taxes

The knowledge of price elasticity of demand of various goods can help governments in implementing appropriate policies to achieve its various goals.

(a) To raise tax revenue

- If the government aims to raise revenue through such means, then such indirect taxes should be levied on goods with relatively price inelastic demand. The indirect tax would raise the cost of production of these goods and hence the supply curve will shift to the left. Consumers will respond to an increase in price by reducing quantity demanded less than proportionately.
- Considering the consumers' perspective, the government can decide to impose the indirect tax to increase tax revenue. This helps fund its expenditure to increase social welfare.

(b) To reduce the consumption of undesirable goods

- The government uses indirect taxes on goods they deem as socially undesirable (e.g. cigarettes and alcohol) but the effectiveness is restricted by the price inelastic demand due to the addictive nature of the product.
- Hence a given increase in its own price will lead to a less than proportionate fall in the quantity demanded for the good, ceteris paribus.
- So the consumption levels may not fall to the desired levels which the government had intended. Therefore, from the government's perspective, the amount of tax to be imposed will need to be sufficiently large in order to achieve the desired level of consumption.

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2.2.2.2 SUBSIDIES

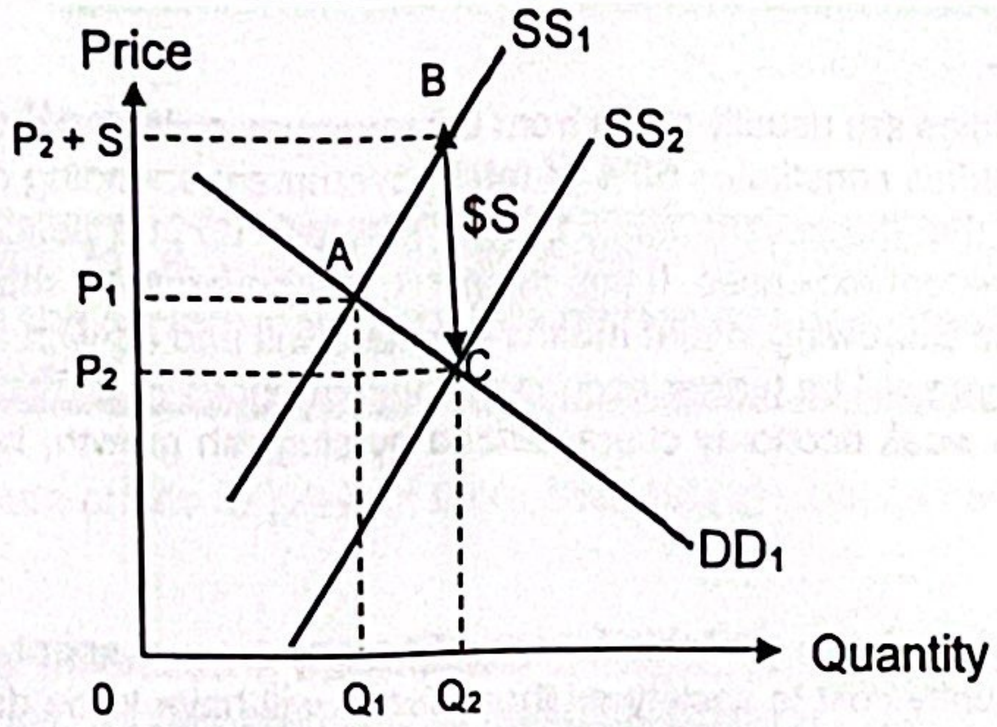
(A) Effects of Subsidies on Supply

The idea of providing a subsidy to producers is to **artificially bring costs down.**

A per unit subsidy is a fixed amount of money given to the producers for each unit they sell.

The economic impact of subsidies on production costs is that it lowers the cost of producing a good and thus shifts the supply curve **downwards (or rightwards)** by the amount of the subsidy. Subsidies are often given to agricultural producers e.g. to help raise their income levels.

Figure 2: Effect of a subsidy on supply curve



With reference to Figure 2,

- a per unit subsidy of $S shifts the supply downwards from SS_1 to SS_2
- quantity increases to Q_2 while equilibrium price decreases to P_2
- gain in consumer surplus is P_1ACP_2
- gain in producer surplus is $(P_2+S)BAP_1$
- the total amount of subsidy the government has to pay is $\underline{(S)*Q_2}$

(B) Consequences of a Subsidy

- **Producers' income is raised.** Usually subsidies are provided to farmers to help raise their incomes. A good example is the EU agricultural subsidies given to farmers.

- **Consumers pay a lower price and quantity exchanged is higher.** In some countries such subsidies are provided to cushion the impact of rising cost of living e.g. soaring oil and food prices in recent years. In Malaysia, substantial fuel and food subsidies are provided to help buffer the adverse impact of rising cost of living on consumers.

- To the extent that tax revenues are used to finance the subsidy, there will be a **transfer of income from taxpayers to the producers.**

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wasteful consumption → inefficient resource allocation

Drawbacks: The effect is to cause a redistribution of income which may not always be desirable. Taxpayers are also consumers. Thus, in Europe, taxpayers are sometimes resentful of providing income support for their own farmers especially when most of the farm output is exported and not available for domestic consumption.

- **Additional resources are allocated to the subsidised industries or sectors.**

  Drawbacks: In the absence of market failure, subsidies may end up distorting the efficient allocation of resources. Indeed, it is often argued that it encourages wasteful consumption (i.e. excessive or over-consumption) leading to resources not being allocated optimally. For example, fuel subsidies may encourage the inefficient use of fuel. Consumers "fooled" by the artificially lower costs might resort to excessive consumption without weighing the full or real cost of production to society. There is no incentive to cut down wasteful consumption; adopt more efficient forms of energy e.g. green energy. In the long run, an economy's competitiveness and growth may be stifled.

- **Strain on the government's budget**

  Budget Deficits Revenue < Expenditure
  The funds to finance subsidies are usually taken from tax revenues collected by the government. In Malaysia, the amount spent on subsidies constitutes 50% of total government spending or 3% of GDP! The economic effect of such spending is that the government's budget may end up in a deficit i.e. tax revenue may not be enough to cover all government expenses. If this happens, the government may have to resort to borrowing to finance its budget deficit. Borrowing in turn means the state will end up with a national debt or public debt. If national debt balloons there will be further economic consequences (e.g. The Greek sovereign Debt Crisis 2010). The end result is a weak economy characterized by sluggish growth, high unemployment and rising poverty.

  Opportunity Costs
  Moreover, given the limited tax funds available for spending, any amount spent on subsidies on say food and fuel would incur an opportunity cost to society as these funds will have to be diverted away from other uses such as education, health-care and housing. Thus the state on behalf of the people has to carefully weigh the opportunity costs involved in providing subsidies.

Conclusion: Singapore Government Policy
In Singapore, government policy refrains from providing unnecessary subsidies, especially consumption subsidies that may result in distorting efficient market allocation of resources. The government believes in the principle of free market allocation to maximise economic efficiency and growth. However, there are special situations where the government would provide subsidies. During the 2008 global financial crisis, the government implemented the Skills Programme for Upgrading and Resilience (SPUR) from Nov 2008 – Nov 2010 to enhance productivity and growth. Existing subsidies include the Workfare Income Supplement (WIS) for low income workers and Workfare Training Support (WTS) to upgrade workers' skills through subsidising training. And during Covid-19 pandemic, the government rolled out Jobs Support Scheme and Enhanced Training Support Package & Enhanced Absentee Payroll.

2.2.2.3 PRICE CONTROLS

At the equilibrium price, there is no shortage or surplus. However, this existing free market equilibrium price may not be the most desirable or appropriate and hence the government may intervene to artificially impose a price different from this equilibrium price.

When the government sets price controls, they are artificially imposing a price different from the market clearing price (the equilibrium price in which quantity demanded = quantity supplied). Controls can take the

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form of stipulating a **maximum price** (price ceiling) or fixing a **minimum price** (price floor) for a good or service.

When the government sets price controls, they usually have the following objectives **(Intended consequences)** in mind:

- To keep the price of the good at a level that is **affordable** to the majority. Examples include necessities, basic amenities and rents.
- To **prevent exploitation by suppliers** who may charge a high price in times of shortages especially during wartime.
- To **stabilise prices.** In the interest of consumers and producers, the government may want to smooth out wide fluctuations in price.
- To **support incomes** at a higher level than would be the case at market wages. Examples: agricultural pricing for farmers, income of unskilled workers.

(A) Price Floor (Minimum Price)

An effective price floor is a legally established minimum price above the market equilibrium price. When the government sets this minimum price, producers are prohibited from selling below the stipulated price.

The government sets minimum prices to prevent them from falling below a certain level. It may do this for various reasons.

- To protect producers' incomes. If the industry is subject to supply fluctuations (e.g. fluctuations in weather affecting crops), prices are likely to fluctuate severely. Minimum prices will prevent the fall in producers' incomes that would accompany periods of low prices.

- To create a surplus (e.g. of grains) – particularly in times of plenty – which can be stored in preparation for possible future shortages.

- In the case of wages (the price of labour), minimum wage legislation can be used to prevent workers' wage rates from falling below a certain level. This may form part of a government policy on poverty and inequality.

Examples of price floors:

- Agriculture price floor – to maintain the incomes of farmers by preventing sales below the price floor. An example would be Thailand's government-run price support scheme. Under this scheme, the government guarantees farmers up to 15,000 baht (S$605) per tonne of white rice, more than 50% higher than world prices.
- Minimum wages – the main aim of which is to maintain the income of unskilled workers. This is used to correct income inequality.

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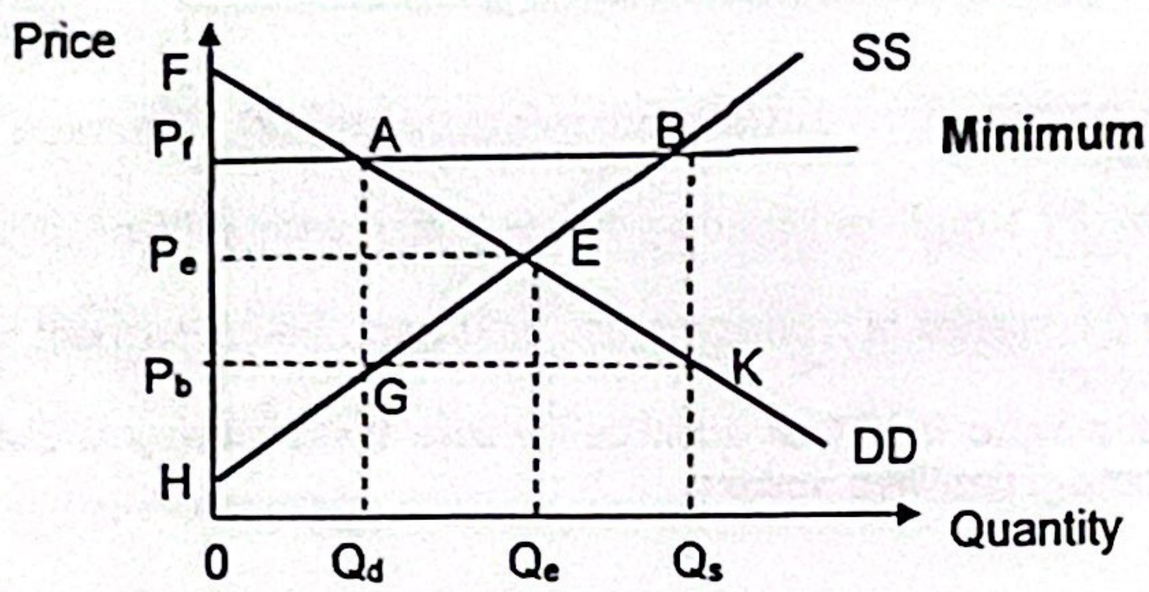
In the case of <u>agricultural products</u>:

<u>Figure 3: Price floor on agriculture products</u>



Referring to Figure 3,

- Equilibrium price: P_e and quantity exchanged: Q_e units of goods.
- When the minimum price P_f is imposed, a surplus of (Q_s-Q_d) is created
- Impact of a price floor on consumers:
  - If the demand is price inelastic, total expenditure by consumers will rise from $0P_eEQ_e$ to $0P_fAQ_d$
  - If the demand is price elastic, total expenditure by consumers will fall from $0P_eEQ_e$ to $0P_fAQ_d$
  - Consumer surplus will fall from P_eFE to P_fFA

- Impact of a price floor on producers:

  <u>The government may buy up the excess</u>
  - The farmers earn $0P_fAQ_d$ from the consumers and Q_dABQ_s (which is the surplus of Q_S-Q_d multiplied by the price floor of $0P_f$) from the government purchase.
  - Therefore, farmers' total earnings increases from $0P_eEQ_e$ to $0P_fBQ_s$
  - Producer surplus will increase from HP_eE to HP_fB

  Buffer Stock Scheme
  One way to maintain the price at Pf is for government or farmers association to set up a buffer stock scheme. When free market price is below the price floor, the buffer stock agency would buy up the surplus of Q_S-Q_d to restore price to Pf by shifting the DD curve to the right. However, one major difficulty concerning buffer stock schemes is that considerable amount of capital is needed to set them up. Money is required to buy the surplus when equilibrium price is too low. There are also the costs of administration and storage of the stockpile.

  <u>The government does not buy up the excess</u>
  - With Q_d sold, farmers will earn $0P_fAQ_d$, producer surplus is now HP_fAG
  - However a **black market situation can arise (unintended consequence of price floor)**
  - Firms with surpluses may try to evade the price control and cut their prices
  - Goods are **sold illegally below the minimum price P_f fixed by the government.** If all available supply Q_s is sold in the black market, the black market price will be at P_b. Producers will now earn an additional Q_dGKQ_s

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Summary

The government can use various methods to deal with the surpluses associated with minimum prices.

- The government could buy the surplus and store it, destroy it or sell it abroad in other markets.
- Supply could be artificially lowered by restricting producers to particular quotas. In Figure 3, supply could therefore be reduced to Qd.
- Demand could be raised by advertising, by finding alternative uses for the good, or by reducing consumption of substitute goods (e.g. by imposing taxes or quotas on substitutes, such as imports).

One of the problems with minimum prices is that firms with surpluses on their hands may try to evade the price control and cut their prices.

Another problem is that high prices may cushion inefficiency. Firms may feel less need to find more efficient methods of production and to cut their costs if their profits are being protected by the high price. Also, the high price may discourage firms from producing alternative goods which they could produce more efficiently or which are in higher demand, but which nevertheless have a lower (free market) price.

2. What if the price floor is set below the free market price?
3. TYS 2015 CSQ2(d) With the help of a diagram, explain whether an agreed minimum price for solar panels will always result in 'a new market equilibrium at a sustainable price'. [4]
4. How will price elasticity of demand and supply affect the impact of the price floor?

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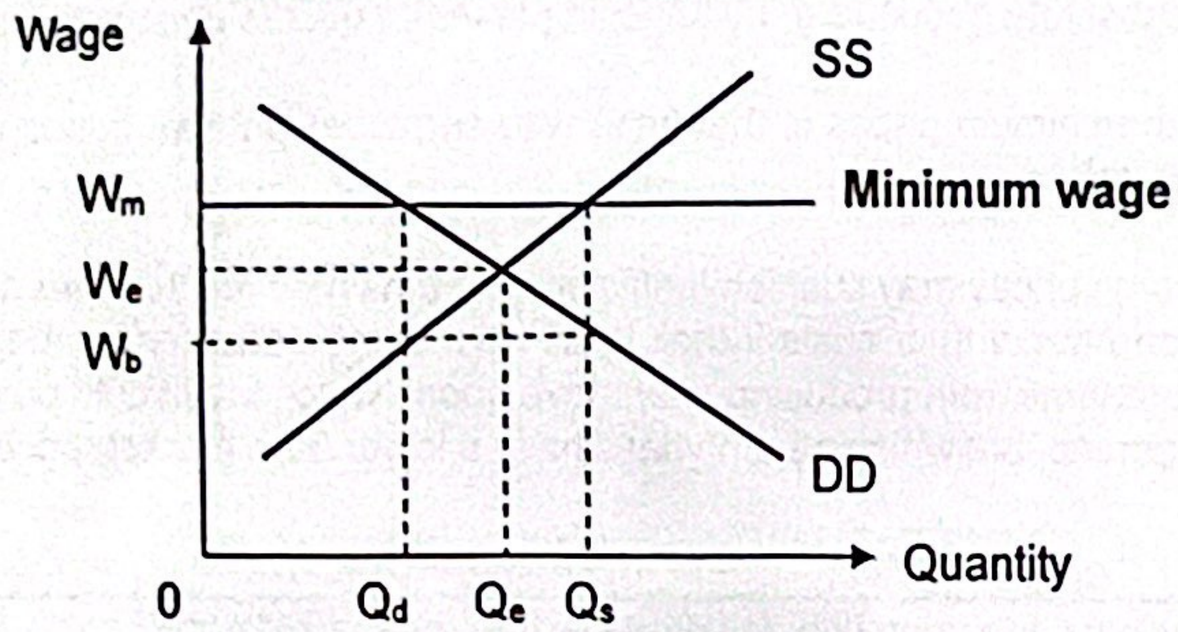
In the case of **unskilled labour** *(Note: Refer to Section 2.2.2.5 Labour Market)*:

A minimum wage law is a regulation that makes hiring labour below a specific wage illegal. By legislating the minimum wage (W_m) workers earn, it raises the wages of the bottom earners, reducing the income gap.

Figure 4: Price floor (minimum wage)



Referring to Figure 4,

- Initially equilibrium wage is W_e and quantity exchanged is Q_e units of labour.
- After the minimum wage is imposed, only Q_d units of labour are hired but these workers will earn a higher wage rate W_m.
- There will be a retrenchment of (Q_e-Q_d) units of labour (workers) while (Q_s-Q_e) units of labour represent those who join the market seeking for a job due to the minimum wage but are unable to find a job.
- Together, these 2 groups make up the surplus of (Q_s-Q_d) units of labour arising from imposition of minimum wage.

Effectiveness:

- The effectiveness of a minimum wage policy is dependent on the **price elasticity of demand of labour.** The **intended consequence** of minimum wage is to increase the wage of workers, whose market equilibrium wage is deemed too low. However, there is an **unintended effect** of retrenchment of (Q_e – Q_d) of workers. This **unintended consequence** will be significant as demand for workers who earn low wages is likely to be price-elastic. This is because low wage earners are typically unskilled or low skilled workers who can be more easily substituted by machines. For example if the wages of cashiers increase, it can be quite easy for firms to replace them with self-checkout counters. In addition, the supply of unskilled workers tends to be relatively price elasticity as there is no specialized and lengthy training to be completed.

- Another unintended consequence is a black market situation may arise when workers illegally offer to work at a wage lower than the minimum wage W_e. For example, if workers are able to find jobs and are hired at wage Wb, then this may result in the minimum wage (aimed at increasing the wages of bottom earners) being ineffective.

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5. (a) Using a minimum wage diagram and considering the PED and PES of unskilled labour, explain why the Singapore government is reluctant to impose a minimum wage law.

(b) In many countries, the government aims to help raise the wages of this group of workers through equipping them with better skills i.e. upgrading skills and productivity. Using a diagram, show how this will increase wage and is a better policy than imposing a minimum wage.

(B) Price Ceiling (Maximum Price)

An effective price ceiling is a legally established maximum price below the market equilibrium price. When the government sets this price, producers are prohibited from selling above the stipulated price.

The government may set maximum prices to prevent them from rising above a certain level. This will normally be done for reasons of fairness. In wartime, or times of famine, the government may set maximum prices for basic goods so that poor people can afford to buy them.

They usually have the following objectives (**Intended consequences**) in mind:

(a) To keep the price of the good at a level that is affordable to the majority.

An example of a price ceiling will be **rent control**. One of the best modern day examples is New York City, where rent ceilings have been used since World War II (when they were introduced as a temporary measure). The **Intended consequence** of such rent controls is to alleviate the housing problem faced by low-income tenants who cannot afford the 'exorbitant' market rentals in certain places. In theory, the underlying objective

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of the government is to ensure a more equitable society, where the poorer segments of the population can enjoy fairly decent housing at government controlled rentals.

(b) To prevent exploitation by suppliers who may charge a high price in times of shortages especially during wartime.

Price ceiling is also a measure that governments may use to **control rising prices of basic necessities especially during food shortages or inflationary times**. In recent years, food shortages have affected many countries and prices tend to skyrocket because of meager supply. In such a situation, the government may decide to step in and control the soaring prices of food by fixing a maximum price. The idea is to make the basic necessity accessible to the masses.

(c) To stabilise prices.

The government may use price control as a measure to control inflationary pressures caused by rising cost of key consumer items like fuel and food.

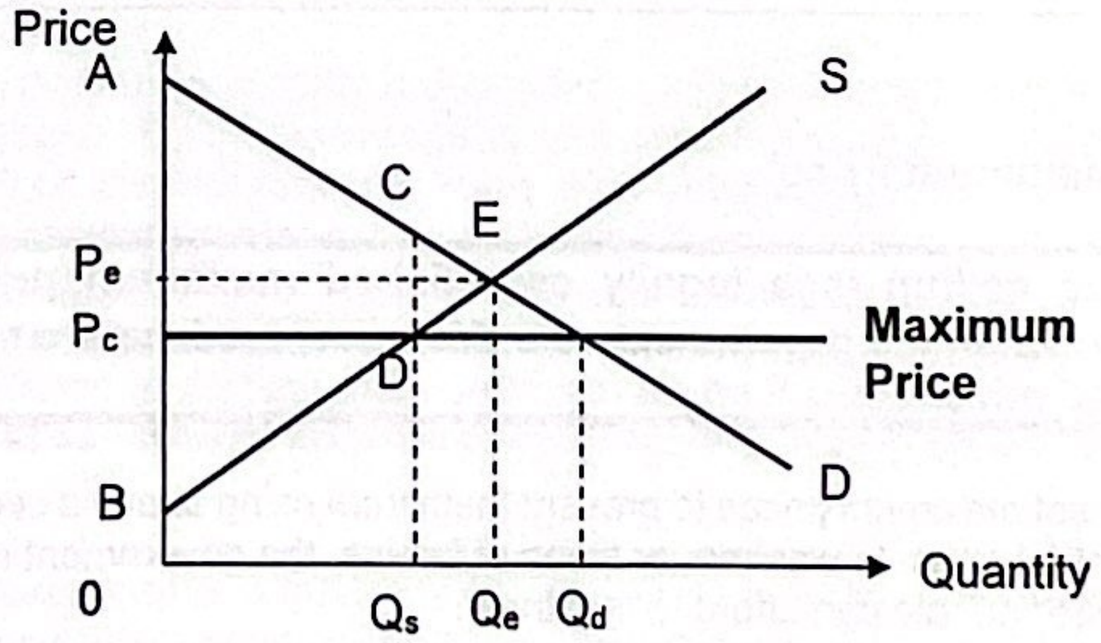
Referring to Figure 5, suppose the market of rental petrol was initially at equilibrium P_e and Q_e.

- After the government imposes a price ceiling P_c, a **shortage of $Q_d - Q_s$** arises

- Impact of a price ceiling on consumers:
  - Total expenditure by consumers will decrease from $0P_eE\ Q_e$ to $0P_cDQ_s$
  - Consumer surplus will increase from P_eAE to P_cACD

- Impact of a price ceiling on producers:
  - Producers' revenue decreases from $0P_eEQ_e$ to $0P_cDQ_s$
  - Producer surplus decreases from BP_eE to BP_cD

Figure 5: Price Ceiling on the market for fuel



The resulting shortages, however, create further problems. If the government merely sets prices and does not intervene further, the shortages will lead to the following:

- Allocation on a "first come, first served" basis. This is likely to lead to queues developing or firms adopting waiting lists. Queues were a common feature of life in the former communist east European countries where governments kept prices below the level necessary to equate demand and supply. In the 1990s, as part of their economic reforms, they lifted price controls; this had the obvious benefit of reducing or eliminating queues. However, the consequential sharp increase in food prices made life very hard for those on low incomes.

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- Firms deciding which customers should be allowed to buy: for example, giving preference to regular customers.

Neither of the above may be considered fair since some people in need may be forced to go without. Therefore, the government may adopt a system of rationing. People could be issued with a set number of coupons for each item rationed.

A major problem with maximum prices is likely to be the emergence of **underground markets**, where customers, unable to buy enough in legal markets, may well be prepared to pay very high prices: prices above Pc in Figure 5.

If a buffer stock is set up, the agency could restore price at Pc by selling stocks it has accumulated. This would increase supply of $Q_d - Q_s$ (Figure 5), forcing the price down to the intervention level of Pc by shifting the supply curve to the right.

Another problem is that the maximum prices reduce the quantity produced of an already scarce commodity. For example, artificially low prices in a famine are likely to reduce food supplies: if not immediately, then at the next harvest, because of less being sown. In many developing countries, governments control the price of basic foodstuffs in order to help the urban poor. The unintended consequence, however, is to reduce incomes for farmers, who are then encouraged to leave the land and flock into the ever-growing towns and cities.

6. What if the price ceiling is set above the free market price?

7. TYS 2013CSQ1(b)

8.

Table 1: Petrol Prices in the UK (December 2010 to August 2011)

Month	Unleaded petrol average price in all outlets* (pence per litre)	% of average price taken as tax	Unleaded petrol price in supermarkets (pence per litre)
December 2010	122.2	62.5	120.2
January 2011	128.3	62.3	126.7
February 2011	128.8	62.4	127.4
March 2011	132.9	61.0	130.0
April 2011	135.8	59.3	133.3
May 2011	136.9	59.0	134.6
June 2011	136.1	59.2	134.6
July 2011	135.6	59.4	133.0
August 2011	135.7	59.4	133.5

**including supermarkets* Source: AA Petrol Price Survey

What would have been the effectiveness of a maximum price of 129 pence for petrol in the UK between Dec 2010 and August 2011? [2]

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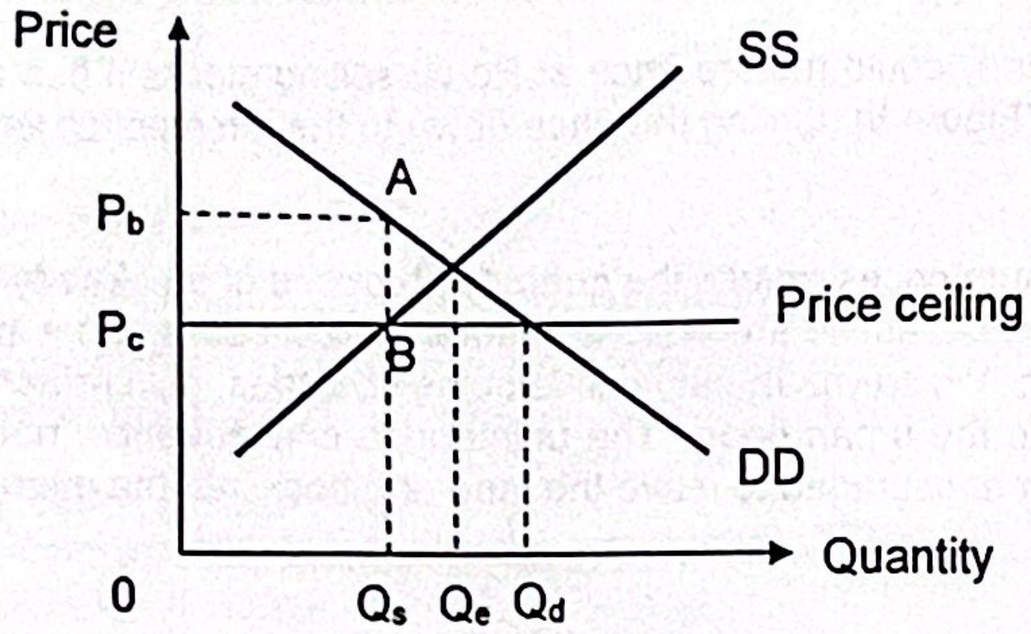
Black markets (Unintended consequence of price ceiling)

- A major problem with maximum prices is the likely emergence of a **black market where sellers ignore the government's price restrictions and sell illegally at a price higher than P_c.**
- It exists because unsatisfied consumers, unable to buy enough in legal markets, may well be prepared to pay very high prices. The opportunity to make higher profits presents itself if the good is bought at the controlled price and sold at the black market price P_b.

Figure 6: Effect of price control on black market prices



Referring to Figure 6, when a price ceiling, P_c, below the equilibrium price is imposed,

- Shortage of $(Q_d - Q_s)$ results
- Rationing becomes necessary i.e. some means of distributing or rationing the goods in short supply must be implemented e.g. on first-come-first served basis; via sellers' preferences or even by balloting or random distribution.
- If all available supply, Q_s, is sold in the black market, the black market price will be P_b.
- Sellers in the black market earn extra receipts given by P_bABP_c.

Figure 6 illustrates the limiting case in which all the available quantity supplied is sold in the black market. The development of such a market depends on there being few people willing to risk heavy penalties by running a black market supply network and a reasonably large number of people prepared to purchase goods illegally in such markets. Usually, some and not all, of a price-controlled commodity is sold in a black market.

To minimise these types of problems the government may attempt to reduce the shortage by encouraging supply: by drawing on goods accumulated in buffer stock, by direct government production, or by giving subsidies or tax relief to firms. Alternatively, it may attempt to reduce demand: by the production of more alternative goods (e.g. home-grown vegetables in times of war) or by controlling people's incomes.

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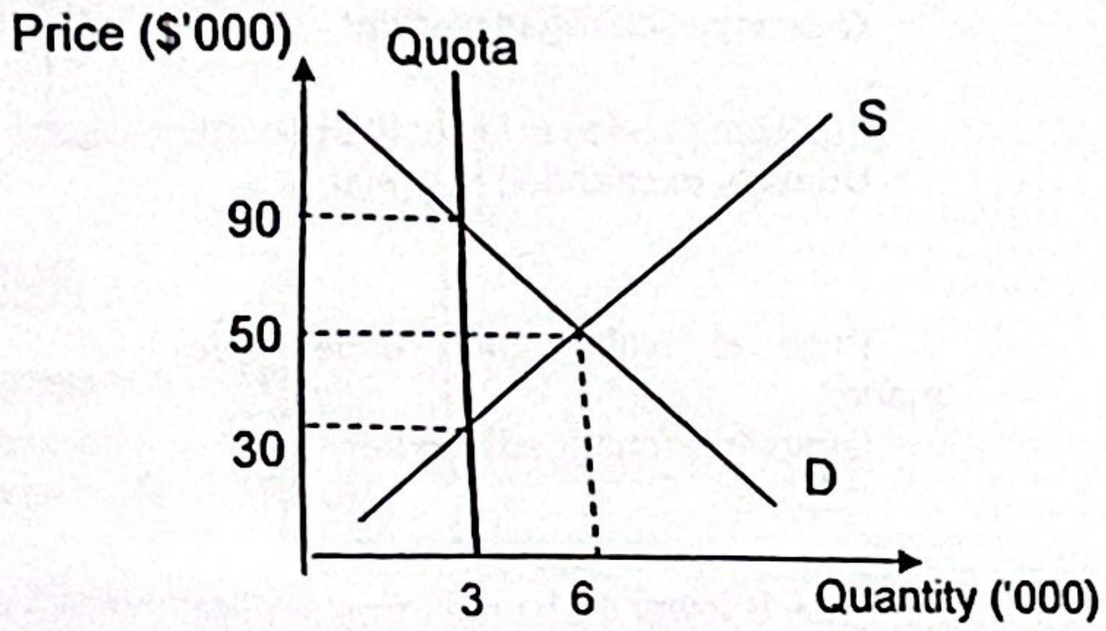
2.2.2.4 QUANTITY CONTROLS

Quota is a measure to control the quantity of goods and services exchanged in a market.

To analyse the effects of quotas, we will look at a market for Certificate of Entitlements (COE) in Singapore in Figure 9.

Figure 7: Effects of Quota



- With no quota, the price is at $50 000 and 6000 COEs per month are exchanged.
- Suppose government implements a quota of 3000 COEs a month, the market price rises to $90 000.
- **Intended consequences** of the quota is to limit car ownership to ensure a more optimal number of cars on the roads. However, limiting the quantity of COEs may have **unintended consequences** as it might lead to more intensive use of cars on the road. It makes car ownership more expensive thus creating the incentive for car owners to maximise the benefit from car ownership by using their cars more often, limiting the effectiveness of the quota in reducing road congestion.

SUMMARY

Our above discussion of government intervention is in the context of a free market economy where there is no **market failure** due to inefficient allocation of resources. The issues discussed focus mainly on how taxes, subsidies and price controls are used by the government for purposes other than to correct market failure. The general conclusion is that such government interventions have both pros and cons. As far as possible, governments should **refrain from too much intervention** to avoid the negative effects or backlash arising from such intervention. Moreover government intervention on grounds of equity and price stability may conflict with efficiency as generally, free markets are still considered the best mechanism for efficient allocation of resources.

In Chapter #3 *Market Failure and Government Intervention*, we will return to the theme of government intervention. However, it will be in a different context where government intervention will be seen as more helpful than harmful.

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OVERVIEW

Forms of government intervention	Intended Effects on Equilibrium Price and Quantity exchanged	
Tax	Equilibrium price is higher than before Quantity exchanged is lower	Analyse impact of tax and subsidy on consumers and producers
Subsidy	Equilibrium price is lower than before Quantity exchanged is higher	
Price Floor	Price is higher than under free market Quantity exchanged is lower	
Price Ceiling		
Quota	Price is lower than under free market Quantity exchanged is lower	

Recommended Readings

Sexton, Robert L (2005). "*Exploring Economics*". 3rd edition. Chapters 4,5, 6 and 7.

Sloman, J., Wride, A. and Garratt, D. (2012). "*Economics*". 8th edition. Chapters 2 and 3 (understanding of figures 3.25, 3.26 and 3.27 on pg 87 to 88 not required)

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2.2.2.5 APPLICATION TO REAL WORLD MARKETS: THE LABOUR MARKET

In this section, we will examine the **producers' demand for labour** (traditionally based on the Marginal Revenue Productivity Principle* – *Not in syllabus*) and the **households' supply of labour**. We will see how they both interact to determine the **market equilibrium wages** (or price of labour).

The market of labour consist of

- Producers that demand labour to produce goods and services to be offered for sale in the product or goods market.
- Households that supply labour services to firms for use in the production process.

DEMAND FOR LABOUR

DETERMINANTS OF DEMAND FOR LABOUR

The demand for labour can either increase or decrease, causing the demand curve to shift. The main factors that can cause the change in demand are:

a) Demand for the Final Product

DERIVED DEMAND – Note that the demand for labour is a derived demand. Labour is not demanded for its own sake, but it depends on the level of demand for the product or service which it is used to produce. For instance, the demand for bakers rises or falls with the changes in demand for confectionary goods. Thus, the greater is the demand for the finished/final product, the greater is the demand for the factor input, labour in this case.

b) Productivity of Labour

Productivity of labour is determined by the ability, skill, and experience, education level and training of the workers. When productivity of labour increases, the output per worker will rise. This is likely to lead to higher profits for the firm. This will cause the higher demand for labour.

c) Relative Prices of Factors

A rise in the price of substitute input will increase the demand for the input. For instance, if the price of dish-washing machine rises, the demand for labour is likely to rise when the firm substitutes capital for labour.
Note that a change in wages will cause a movement along the demand curve, while a change in non-wage determinants will shift the entire demand curve.

SUPPLY OF LABOUR

There is a direct relationship between the supply of labour and the wage rate paid in an industry. The higher the wage rate, the greater the supply of labour. At a higher wage rate, workers would be more willing to work longer hours in the form of overtime. Housewives, retirees and students may also consider working on a part-time basis or even rejoin the workforce if the wage rate is high enough. Thus, the supply curve of labour is generally upward-sloping.

DETERMINANTS OF SUPPLY FOR LABOUR

The position of the supply curve of labour depends on the number of people willing and able to do the job at each given wage rate. This depends on the a few factors:

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a) The Number of Qualified People

The greater the number of qualifies people for the job, the larger will be the supply for labour. This is determined by various factors, such as amount of training and education made available to this type of labour.

b) The Non-Monetary Benefits of the Job

Jobs with more non-monetary benefits would also attract a larger supply of labour compared to similar paying jobs. Non-monetary include pleasantness of the working environment, job satisfaction, job security, status and other fringe benefits.

Note that a change in wages will cause a movement along the supply curve, while a change in non-wage determinants will shift the entire supply curve.

WAGE DETERMINATION

The wage rate is determined by the intersection of the industry's demand and supply curves. In the Fig xx below, the equilibrium wage rate in the industry is OW1 which is given by the intersection of the demand (D1) and supply (S1) curves. Any change in demand and/or supply for labour will affect the wage rate. The price elasticity of demand and supply for labour will indicate the extent to which the wage rate and employment level will move for any given change in demand and supply conditions.

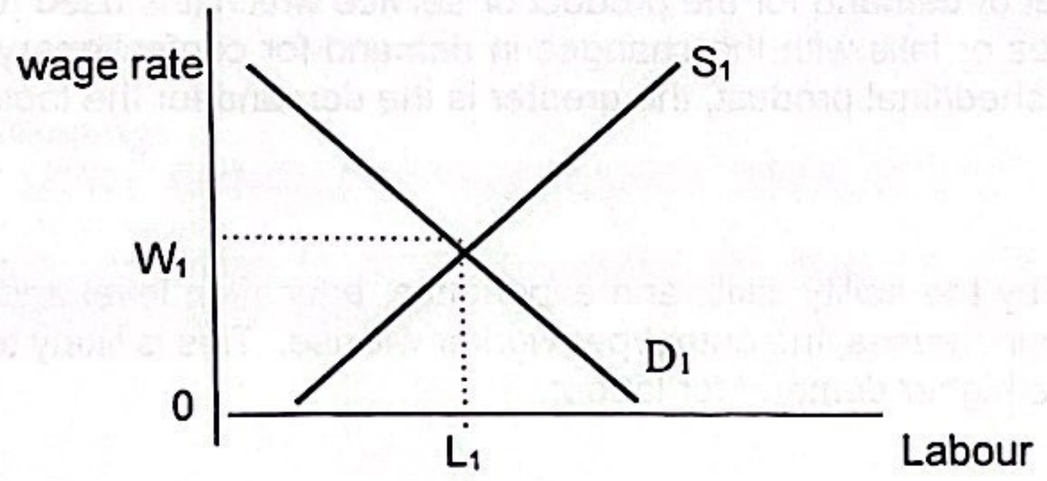

Figure 8: Wage Determination in an Industry

Extension - TRADE UNIONS

In the above analysis, it is assumed that wages are determined by demand and supply in a perfectly competitive labour market. However, labour markets are seldom perfect and there may be market imperfections such as existence of trade unions and government intervention.

A trade union is an organization of workers who come together for the purpose of maintaining and improving the wages and working conditions of its members. As an organized group, the union is able to enter into collective bargaining with employers. This strengthens the position of workers, who would otherwise have to bargain individually with their employers. When a single union bargains on behalf of a certain type of labour, it is acting like a monopolist.

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Tutorial 2.2

Question 1: TYS N2004 [Attempt only part (b)]

(a) Explain the concepts of price elasticity of demand and income elasticity of demand, indicating why elasticities are different for different products. [10]

(b) Discuss how a supplier of a product that is currently fashionable might use both of these concepts in making price and output decisions. [15]

Question 2: 2015 HCI C1 BT1 Q2

In Thailand, the rice program introduced in 2011 by the government sought to buy rice from local farmers at above-market price so as to help stabilise price and raise the income of farmers.

(a) Explain why the prices of primary products such as rice tend to fluctuate greatly. [10]

(b) Assess whether a subsidy would be better than Thailand's rice program to stabilise price and raise the income of farmers. [15]

Question 3: TYS 2009 CSQ1

- **COMPARING TRENDS** *Refer to the 'Case Study Skills' Pages 17-21*
- **WHAT ARE INDICES AND WEIGHTS** *Refer to the 'Case Study Skills' Pages 23-28*
- **ANNOTATION OF CASE MATERIAL**

When attempting case studies, always read through thoroughly all data and extracts and carefully make notes linking to economic concepts. This will help you answer the questions later.

The Impending Global Food Crisis

Table 1: Indices of selected primary commodity prices

Year \ Weights	All Primary Commodities	Food	Petroleum
	100.0	21.7	39.9
1995	100.0	100.0	100.0
2000	116.0	78.9	164.1
2001	105.6	79.1	141.4
2002	105.9	81.8	145.0
2003	119.7	86.0	167.9
2004	151.5	98.3	219.5
2005	195.7	97.9	310.1
2006	238.6	107.6	373.6
2007	273.2	126.5	427.6

Source: Various

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Case Study Table 1:
Think: What are possible questions that can be set from this table?

Extract 1: Global food crisis looms as climate change and fuel shortages bite	**What economic model can help explain the situation of fast increasing food prices?**
Empty shelves in Venezuela. Food riots in West Bengal and Mexico. Warnings of hunger in Jamaica, Nepal, the Philippines and sub-Saharan Africa. Soaring prices for basic foods are beginning to lead to political instability, with governments being forced to step in to control the price of bread, maize, rice and dairy products.	
According to the United Nations (UN) Food and Agricultural Organisation (FAO), record world prices for most staple foods have led to 18% food price inflation in China, 13% in Indonesia, and 10% or more in Russia and India. Wheat has doubled in price, maize is nearly 50% and rice 20% more expensive than a year ago, says the UN. Next week the FAO is expected to say that global food stocks are at their lowest in 25 years and that food prices will remain high for years.	**What is the likely method of governments' control on prices?**
Last week the Kremlin forced Russian companies to freeze the price of milk, bread and other foods. India, Yemen, Mexico and several other countries have had, or been close to, food riots in the last year, something not seen in decades of low global food prices. Meanwhile there are shortages of bread, chicken and milk in Venezuela and other countries as governments attempt to control food prices.	**What are the contributing factors to the increase in prices?**
'If you combine the increase in food prices and the increase in oil prices then you have the elements of a very serious crisis in the future,' said the head of the FAO.	
'The food price rises are a result of record oil prices, US farmers switching out of cereals to grow bio-fuel crops, extreme weather and increasing demand from India and China. World cereal stocks now stand at only 57 days, making global food supplies vulnerable to an international crisis, drought or flood which would cause prices to rise very quickly,' he warned.	
The head of the Washington-based Worldwatch Institute said, 'There is competition for grain between bio-fuel producers and food producers. The world's 800 million	

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motorists want to maintain their mobility while its 2 billion poorest people are simply trying to survive. This is emerging as a major issue.' Last year, US farmers affected the world market for cereals by growing 14 million tonnes of maize, or 20% of the whole crop, for bio-fuel production. This took millions of hectares of land out of food production and nearly doubled the price of maize.

President Bush this year called for steep rises in bio-fuel production as part of plans to reduce petrol consumption by 20% by 2017. Maize is a staple food in many countries which import from the US, including Japan, Egypt and Mexico. US exports are 70% of the world total, and are used widely for animal feed. The shortages have disrupted livestock and poultry industries worldwide. The outlook is expected to worsen as others prepare to switch to highly profitable bio-fuels. Brazil intends to grow 120 million hectares for bio-fuels and Africa as much as 400 million hectares in the next few years.

The food crisis is being made worse by growing populations and extreme weather, according to a number of recent reports. This week the UN Environment Programme said the planet's water, land, air, plants, animals and fish stocks were in 'continuous decline'. According to the UN's World Food Programme (WFP), 57 countries, including 29 in Africa, 19 in Asia, and 9 in Latin America, have been hit by catastrophic floods. Harvests have been affected by drought and heatwaves in South Asia, Europe, Australia, China, Sudan, Mozambique and Uruguay.

Why would low cereal stocks cause price to rise very quickly if there is drought or flood?

Source: *The Guardian*, 3 November 2007

Extract 2: Food or Fuel?

Vulnerable regions of the world face the risk of famine over the next three years as rising energy costs spill over into a food crisis.

Global oil output has been stagnant for four years, failing to keep up with rampant demand from Asia and the Middle East. China's oil imports, for example, rose 14% last year. Bio-fuels from grain, oil seed and sugar are satisfying the demand to some extent, but this is drawing away food supplies at a time when the world is adding more than 70 million extra mouths to feed a year.

'China is terrified of the current situation. It has serious shortages of food,' said a commodity trader. China still has painful memories of starvation in the 1960s. We are facing an entirely new situation because now changes in the prices of energy and food have 'converged' as resources can increasingly be switched from one use to another. Corn can be used for bio-fuel in cars and power plants, as well as in baking tortillas. Natural gas can be made into fertilizer for food output.

Land use for bio-fuels has shot up from 12 million to more than 80 million hectares worldwide over six years. Bio-fuel provides 3% of global energy needs, which will rise to an estimated 10.6% by 2030. The European Union (EU) has set itself only until 2010 to reach a 10% bio-fuel target. In a market without government intervention, sugar cane would be the only viable crop for making bio-fuel but government subsidies make other crops viable too. These include corn, wheat, rapeseed and soybean.

Source: *Daily Telegraph*, 9 February 2008

Why is oil price rising?

Why are the prices of energy and food related?

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HWA CHONG INSTITUTION
Year One H2 Economics 2022
Chapter #2: Microeconomics II – Markets
Price Mechanism and its Applications

Questions

(a)	Compare the change in food prices between 2000 and 2007 with the change in petroleum prices over the same period.	[2]
(b)	With the help of a diagram, explain the effect of the introduction of food price controls as described in Extract 1.	[2]
(c)	Explain why an increase of 70 million mouths to feed each year may cause food prices to rise, showing how low stocks of food would affect the extent of this rise in the short run.	[4]
(d)	Extract 2 describes the use of subsidies in the market for bio-fuels. With the use of diagrams, explain the way in which subsidies affect the allocation of resources between bio-fuels and food.	[4]
(e)	As a consultant economist, what options would you present to the world's governments as possible responses to the threat of food shortages, and what would you recommend? Justify your answer.	[10]

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