## RAFFLES INSTITUTION YEAR 5 H1 ECONOMICS

## PRICE MECHANISM AND ITS APPLICATIONS

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- 6.6 Quantity Controls Quotas
- 6.7 Consequences of Government Intervention: Intended and Unintended

## Reference:

Gillespie, Andrew. <u>Foundations of Economics</u>, 2nd Edition, New York: Oxford University Press

## Lecture Objectives:

After this series of lectures and tutorials, students should understand how the demand and supply model can be applied in the real world context. They should be able to apply demand and supply analysis to various markets such as primary products, manufactured goods, housing, healthcare, education, and labour market (wages).

## 1. DEMAND-SUPPLY MODEL

## 1.1 The Market System

In the free market system (free of government intervention), resources are allocated according to the market forces of demand and supply. It is the level of demand and supply of each factor of production or final good or service that determine their respective prices and quantities traded. A market is present wherever and whenever buyers and sellers interact.

## 1.2 The Price Mechanism

 According to Adam Smith (1776) The Wealth of Nations, the price mechanism is the *invisible hand* that allocates resources, based on the self-interest of consumers and producers, which results in the right mix of goods and services for society.

## What are the main functions of the price mechanism?

- It has 2 main functions which are
  - i. Signalling (the allocative function)
  - ii. Rationing (the distributive function)





## i. Signalling function:

When the market price of a product or resource changes, it sends a contrasting message to consumers and producers about whether to enter or leave a market. Prices rise and fall to reflect scarcity and surpluses. Rising prices give a signal to consumers to cut back on the buying or even withdraw from a market completely. However, the higher price gives a signal to potential producers to enter a market. Resources move or reallocate to different industries due to this signalling function. The signalling function is associated with shifts in demand and supply curves.

Raffles Institution Economics Department Recall: The price

mechanism was

as the system of allocating

resources using

price adjustments

caused by market

market economy.

forces in a free

previously defined

For example, if there is a bumper harvest for durians, then there is an increase in its supply and the **price falls**. This tells consumers that durian is relatively cheaper due to the **surplus** and the consumers will respond and increase their quantity of durian demanded.

If wearable technology becomes more popular, the **price of powerful computer chips will go up** due to an increase in demand for faster devices. This tells chip producers there is a **shortage** in the market and profit motivated firms will put in more workers and increase the output of these chips. In terms of the labour market, a rise in the wage rate, which is the price of labour, provides a signal to the unemployed to join the labour market.

### ii. Rationing function:

In a free market, prices will ration the good or resource to consumers or producers who are willing and able to pay for it. In other words, whenever there is a shortage, the market price will be higher and the effect is to discourage consumption and conserve resources. The greater the shortage, the higher the price and the more the good or resource is rationed to only those who wants it and can afford it at that higher price. This can be seen in the market for oil. As oil slowly runs out, its price will rise, and this discourages consumption and leads to more oil being conserved than at lower prices.

### 1.3 Market Equilibrium

#### The meaning of "market"

A market is a medium that allows buyers and sellers of a specific good, service or resource to interact in order to **facilitate an exchange**. It may either be a physical marketplace where people or resource owners and buyers come together to exchange goods and services in person, as in a bazaar or shopping centre or office workspace. It can also be a virtual market where buyers and sellers do not interact face to face, as in an online market. Note that markets for resources are just as important as goods markets in the study of economics.

#### The meaning of "equilibrium":

A situation when quantity demanded and supplied are equal at a particular price level and there is **no inherent tendency to change**.

## Equilibrium Price and Output

- The equilibrium price is the price at which the quantity demanded of a good is equal to the quantity supplied, i.e., the price at which the equilibrium quantity is traded.
- Equilibrium price can therefore be referred to as the **market clearing price**.
- At any other price where quantity demanded and quantity supplied are not the same, the market is said to be in **disequilibrium**. There will be shortages or surpluses of the good in the market.

Point to ponder: Which markets are you most familiar with?

Point to ponder:
What assumptions
have to be made
for equilibrium to
exist?

## Lecture Exercise 1

- i. Complete the rightmost column in the Table 1 by indicating whether there is a shortage or surplus.
- ii. Identify the equilibrium price and quantity.
- iii. What do you notice about the relationship between price and quantity demanded?
- iv. What do you notice about the relationship between price and quantity supplied?

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Price (\$)	Quantity Demanded	Quantity Supplied	Surplus or Shortage	Price will… ↑ or ↓
1.25	8	28		
1.00	14	24		
0.75	20	20		
0.50	26	16		
0.25	32	12		



- At prices above OP<sub>e</sub>, e.g. OP<sub>2</sub>, the quantity supplied OQ<sub>2</sub> exceeds the quantity demanded OQ<sub>1</sub>. There is a surplus (WX) in the market and a downward pressure on the price is expected. This is because producers will find that they are unable to sell all their output at that price. They will begin to compete against each other to sell their excess supply, thus asking for lower prices. Consumers will also recognize the excess supply and begin to offer lower prices. The market price will fall until the equilibrium price OP<sub>e</sub> is reached where quantity demanded equals to quantity supplied.
- At prices below OP<sub>e</sub>, e.g. OP<sub>1</sub>, quantity demanded OQ<sub>2</sub> exceeds quantity supplied OQ<sub>1</sub>; the resulting shortage (YZ) exerts an upward pressure on the price. Competition among consumers will drive up the market price. Consumers who do not succeed in purchasing all they want of the good at the current price would offer higher prices. At the same time, producers would be willing to increase the quantity supplied at the higher prices. The market price will rise until the equilibrium price OP<sub>e</sub> is reached.

 For a stable equilibrium position, any movement of prices away from equilibrium price will put into play market forces that will cause the price to move towards the equilibrium price. Such price changes are mutually beneficial to both buyers and sellers.

Economists do not believe that all markets are always in equilibrium nor that all prices are always at equilibrium levels. They believe that in dynamic markets, quantity and price levels will always **tend towards equilibrium** but are not actually in equilibrium: markets tending towards a balance in a **dynamic equilibrium**. This process of prices responding to situations of shortages and surpluses in the market to restore equilibrium is termed the price or market adjustment process.

#### 1.4 Changes in Demand and Supply:

The equilibrium price and quantity is stable and does not change until demand and/or supply conditions changes. When that happens, the market is said to be in market disequilibrium, which is a situation of having shortages or surpluses since quantity demanded does not equal to quantity supplied. The **price adjustment process** occurs. A change in price would result in a change in equilibrium quantity, and therefore the amount of resources allocated to the production of a good in a market. This is why price is the invisible hand that allocates resources.

#### Effect of an Increase in Demand on Equilibrium Price and Quantity

During Valentine's Day, there is greater inclination to buy roses as gifts, leading to an increase in demand for roses. This results in a rightward shift in the demand curve from  $D_0$  to  $D_1$  as seen in figure 3.

Assuming supply remains constant, given a higher demand  $D_1$ , quantity supplied is less than quantity demanded at the initial price  $OP_0$ . This results in a shortage represented by AB. There will be an upward pressure exerted on the price. As the price rises, the quantity supplied increases and the quantity demanded falls until the shortage is eliminated. The new equilibrium price is reached at  $OP_1$  and equilibrium quantity will increase to  $0Q_1$ .



Point to ponder: Why, in the real world, are markets hardly ever in equilibrium?



## Figure 4: Effect of a decrease in supply on equilibrium Price and Quantity

Suppose the harvest for vegetables falls due to floods in Malaysia, the supply of vegetables to the market decreases, leading to a leftward shift in the supply curve from S0 to S1. Assuming demand remains constant, given a lower supply S1, quantity supplied is less than quantity demanded at the initial price of OP0. This results in a shortage represented by AB. There will be an upward pressure exerted on the price. As the price rises, the quantity supplied increases and the quantity demanded falls until the shortage is eliminated. The new equilibrium price is reached at 0P1 and the equilibrium quantity will decrease to 0Q1.

#### 2. Economic Efficiency and the Price Mechanism

Economic efficiency broadly means the best possible use of resources and it exists when both allocative and productive efficiencies are achieved in an economy.

## 2.1 Allocative Efficiency

Allocative efficiency is the situation in which the society produces and consumes a combination of goods and services that maximises its welfare (*consumers' and producers' surplus*). It is achieved when the goods and services that are wanted by the economy are produced in the right quantities.

The price mechanism achieves allocative efficiency by clearing shortages or surpluses in markets through signalling.

Suppose consumers decide they would like to eat more strawberries because of their health benefits (a change in taste and preferences), demand increases and the demand curve shifts to the right from  $D_0$  to  $D_1$  in Figure 5. At the initial price, 0P0, there is a shortage (AB). The price of strawberries therefore begins to rise which signals to producers that a shortage in the strawberry market has emerged.

The increase in price is also an incentive for producers to increase the quantity of strawberries supplied. At the higher price, strawberry production is more profitable, so producers move upward along the supply curve from point A to point C, increasing quantity supplied. But the new, higher price is a disincentive to consumers. It signals

Note: Knowledge of consumers and producers' surplus is not required in your syllabus, but it is a useful concept to understand as they help provide clarity for future concepts. that strawberries are now more expensive and being utility maximisers, they would buy fewer strawberries. They therefore move upward along the new demand curve from point B to point C, buying fewer strawberries than at the original price  $0P_0$ . The process of adjustment will stop when quantity demanded is equal to quantity supplied at the new equilibrium  $0P_1$  and  $0Q_1$ . The increase in price of strawberries has resulted in a **reallocation of resources**. More resources are now allocated to strawberry production. The market is now in equilibrium again and allocative efficiency is achieved.

This addresses two of the 3 fundamental economic question which is on **"what** and how much to produce" as well as **'for whom to** produce'.





#### 2.2 Productive Efficiency

Productive efficiency is achieved when all resources are fully and efficiently utilized. From the firms' perspective, it occurs when they use the least cost method of production. When all industries achieve productive efficiency, the economy as a whole is able to produce the maximum amount of goods possible with the resources available. The price mechanism allows for productive efficiency to be achieved in competitive markets as the adjustment of prices act as a signal and incentive to producers to adjust their production methods and for factors of production to be channelled to their most valued use.

#### 2.3 How desirable is the free market equilibrium?

The success of the competitive market in achieving allocative and productive efficiency seems to suggest that there should not be government intervention in markets as the price mechanism works very well on its own. **Consumer sovereignty**, the concept of "consumer as the king" to influence market outcomes that are efficient is the basis of the success of the "invisible hands".

However, efficiency can only be achieved under a number of very strict conditions such as perfect competition and information that are unlikely to be met in the real world. In the real world, markets may fail with respect to achieving both allocative and productive efficiency. Market failure is an important justification for government intervention (to be taught in greater detail in the next topic). Moreover, the competitive market is unable to provide a satisfactory answer to the 'for whom to produce question'. This is because those with more purchasing power (**dollar votes**) will be able to consume more of the goods produced, resulting in an unfair distribution of goods with the wealthy consuming a disproportionately large share of what is produced. This thus invites some government intervention.

This addresses one of the 3 fundamental economic question which is on **"how** to produce".

Points to Ponder: Should all goods be distributed based on ability to pay? Why or why not?

## Sectional Summary

- The price mechanism (invisible hand) allocates resources based on the selfinterest of consumers (demand) and producers (supply).
- Under certain assumptions of perfect competition and information, allocative and productive efficiency can be achieved.
- Allocative efficiency is the situation in which the society produces and consumes a combination of goods and services that maximises its welfare (consumers' and producers' surplus).

## 3. DEMAND THEORY

## 3.1 Definition of Demand

- The demand for a commodity refers to the amount that consumers are willing and able to purchase at each given price over a given period of time.
- Demand does NOT refer to consumers' wishes but rather the actual intention to buy the good at a given price.
- For demand to be effective, willingness to pay must be supported by the ability to pay (effective demand).

**3.2 The Law of Demand:** The quantity demanded of a good or service is inversely related to its price, ceteris paribus

• Empirical evidence shows the purchasing behaviour of consumers to be as follows:



## The law of demand is based on the following assumptions:

- A specific time period is involved. The quantity demanded is expressed in terms of number of units per period of time. It refers to the flow of goods/services demanded per period of time.
- Except for price, all other factors that can affect demand such as real income, size of population, tastes and preferences of consumers and the prices of the interrelated goods are assumed to be held constant. This assumption, known as 'ceteris paribus' in Latin, means "other things being equal".
- Consumers are assumed to behave rationally. That is, they will allocate their incomes among purchases in such a way so as to maximise their satisfaction.

#### Demand Schedule and Curve

 A demand schedule is a <u>table</u> which indicates the various quantities of a commodity that will be demanded by consumers at various prices, assuming that all other things are equal.

Price (\$)	Quantity demanded
1.25	8
1.00	14
0.75	20
0.50	26
0.25	32

- A demand <u>curve</u> shows the relationship between the price of the good and the <u>quantity demanded</u> of the same good, holding other factors constant. It is a diagrammatic illustration of a demand schedule.
- The demand curve represents the maximum price that consumers are willing and able to pay for an additional unit of the good. Since the maximum price that consumers are willing to pay for a good is directly related to the good's value, then the demand curve indicates the marginal utility (or benefit/satisfaction) that consumers derive from the marginal units (or additional units) of the good.
- The **demand curve is downward sloping**, indicating the **inverse relationship** between price of the good and its quantity demanded.

The law of diminishing marginal utility (LDMU) is used by economists to explain why the demand curve is downwards sloping and how consumers make economic decisions.

When making consumption decisions, consumers consider the perceived satisfaction they derive from consuming the good or service, which is referred to as "utility". Other things remaining the same, when a person consumes successive units of a particular good, the marginal utility diminishes. Marginal utility is the change in satisfaction from consuming an extra unit of a good or service.

For example, Mr Jones consumes 4 cans of soft drink, one after another. As he was very thirsty initially, the first can gives him e.g. 20 units of satisfaction. When he consumes the second can, the marginal satisfaction of that second can is only 12 units of satisfaction (lower than the first) as his thirst is partially satisfied. Each additional can will give him lower and lower satisfaction (diminishing marginal utility). This is because with an increase in the consumption of cans of soft drink, his thirst wanes and his desire to consume more soft drinks falls even though total utility increases. The utility goes on diminishing with the consumption of every successive can of soft drink till it drops down to zero. This is the point of satisfaction.

LDMU states that beyond a certain point of consumption, as more and more units of a good or service are consumed, the additional utility a consumer derives from successive units decreases. In short, the more we have of a thing, ceteris paribus, the less we want more of the same good. LDMU describes a familiar and fundamental tendency of human behavior.

#### 3.3 Factors influencing market demand (The Conditions of Demand)

The conditions of demand determine the **position of the demand curve**. A change in any of the non-price determinants of demand, holding the price of the good or service constant, will cause a <u>shift</u> of the existing demand curve either to the left or to the right. These **non-price determinants of demand** include:

#### a. Tastes and Preferences

- Taste is significant in influencing consumers' desired purchases.
- Factors affecting taste include the effects of advertisements, education, culture and age group.

Raffles Institution Economics Department Important! The Law of Diminishing Marginal Utility is important in making rational decisions.

#### Points to Ponder: Should you consume till Marginal Utility = 0?

 A change in taste in favour of a particular good is likely to increase the demand for that good and hence will cause the demand curve to shift to the right.

#### For example

(i) Temporary increases in demand due to fads, latest craze like K-pop, Korean dramas

#### Figure 7: Market for Korean Drama Serials



The demand for Korean drama serials increases represented by a rightward shift of demand curve from  $D_0$  to  $D_1$  because it appeals. At the original price  $0P_0$  there is a shortage. This puts upward pressure on the price, resulting in a new higher equilibrium price of  $0P_1$  and quantity  $0Q_1$  ceteris paribus.

#### (ii) Seasonal changes (a sub-set of *taste & preferences*)

Climatic conditions

*For example,* during the hot season, the demand for air conditioners and fans increase while during winter, the demand for winter clothes would increase.

Festivals

*For example,* just before Chinese New Year and Hari Raya, the demand for eggs, flour and new clothes increase. Similarly, Valentine's Day would see increases in demand for flowers and restaurant meals.

#### b. Expectations of future price changes

 Demand can also change as a result of people's expectations of future changes in price.

If people expect the price of a good/service to increase (e.g. house prices), they will increase their demand in the current market even when prices have not increased yet, ceteris paribus (assuming no change in people's income, the rate of interest charged by banks for housing loans, etc.).

#### c. Income

#### In the case of normal goods

 A good is a normal good when the demand for it increases in response to an increase in consumer income and vice versa (demand for the good varies directly

hanges in ). they will

When the term ceteris paribus is applied in analysis, it means we are just focussing on the effects of the subject, leaving all other factors constant. with income). Most goods are normal goods. Therefore, an increase in income leads to a rightward shift of the demand curve, and a decrease in income leads to a leftward shift of the demand curve.

#### In the case of inferior goods

- An inferior good is one where the demand will fall as incomes increase. They are often regarded as cheap but inferior substitutes for other goods. Examples of inferior goods are second-hand clothes, second-hand cars. As incomes increase above some critical level, consumers switch to more expensive substitutes instead (new clothes, branded clothes, new cars), resulting in a decrease in the demand for inferior goods.
- There is a **negative relationship** between income and demand for inferior goods.
- Note: inferior does NOT refer to "poor quality". It is about the two economic variables having an inverse relationship.



Figure 8: Market for second hand electronics (Inferior Good)

An increase in income will decrease the demand for second-hand electronics.

The demand curve will shift to the left from  $D_1$  to  $D_2$  as consumers switch to brand new electronics. At the original price 0P<sub>0</sub>, there is a surplus which puts downward pressure on the price. The new equilibrium price  $0P_1$  and quantity exchanged  $0Q_1$ is lower.

## d. Prices of Related Goods

The demand for a commodity may change as a result of a change in the price of a related good. Related goods can either be substitutes or complements.

#### Prices of substitute goods

- A substitute is a commodity that can be used in place of another. It satisfies the same want. Substitute goods are thus in competitive demand.
- Eg. Coca-Cola & Pepsi, MRT & taxi services, Cadbury and Nestle chocolate, milk and yoghurt.

Points to Ponder: Can vou give me some examples of inferior goods?

- An increase in the price of Coca-Cola results in a rise in the demand for its substitute, Pepsi and vice versa.
- As the price of Coca-Cola rises, some consumers switch from Coca-Cola to Pepsi.
   This leads to a rise in demand for Pepsi.
- With reference to the diagrams below, suppose the rise in price of Coca-Cola is due to a rise in the cost of production, leading to a fall in the supply of Coca-Cola. The supply curve for Coca-Cola shifts left from S<sub>0</sub> to S<sub>1</sub> and the quantity traded falls from 0Q<sub>0</sub> to 0Q<sub>1</sub>. Since Coca-Cola is now relatively more expensive as compared to Pepsi, people will now shift their consumption to Pepsi. Hence the demand for Pepsi increases and the demand curve for Pepsi shifts right from D<sub>0</sub> to D<sub>1</sub>. The equilibrium price and quantity of Pepsi will increase to 0P<sub>1</sub> and 0Q<sub>1</sub>, ceteris paribus.

## Figure 9: Increase in the Price of a Substitute



#### Prices of complementary goods

- A complement is a good that is used in conjunction with another. They are jointly demanded to satisfy the same want. Complements are thus in joint demand.
- E.g. tea & sugar, car & petrol, digital camera & memory card, DVD and DVD players, computers and computer software.
- A fall in the price of DVD players leads to an increase in the demand for DVDs. This
  is because the fall in the price of DVD players results in a bigger quantity of DVD
  players being purchased. This leads to an increase in demand for DVDs.



Points to Ponder: Would an increase in price of a good have the same effect on its substitutes?

*Example:* MRT vs Taxi service Coca-cola vs Pepsi With reference to the diagrams above, suppose the price of DVD players fall from 0Po to 0P1 due a reduction in the cost of producing DVD players arising from technological advancement. As a result, the supply of DVD players increases and the supply curve shifts to the right from So to S1. With the decreases in price from  $0P_0$  to  $0P_1$ , the quantity demanded for DVD players increases from  $0Q_0$  to  $0Q_1$ . As more DVD players are consumed, the demand for DVDs (the complementary good) will increase. The demand curve for DVDs shifts right from D<sub>0</sub> to D<sub>1</sub>. The equilibrium price and quantity of DVDs will increase to 0P1 and 0Q1, ceteris paribus.

#### **Government Policies** e.

## **Interest Rates**

- The rate of interest is the price of borrowing or using money.
- Changes in the rate of interest affect the level of demand by consumers, especially those which rely on loans or hire purchase.
- For example, an increase in the rate of interest will reduce the demand for cars as the cost of purchase (in terms of monthly payments) increases even though the prices of cars stay the same. The demand curve for cars shifts leftwards.
- Note: Interest rates may change due to other factors which are not part of government policies.

## Direct Tax Policy

- Direct tax is a tax on people's incomes. Changes in direct tax rates affect people's disposable income (the income available for spending after payment of income tax).
- An increase in the income tax rate will reduce people's disposable income. This reduces purchasing power, leading to a decrease in demand for (normal) goods and services, and vice versa.

## **Direct Subsidy Policy**

- Direct subsidies are payments made by the government to the consumers. For example, housing grants for married couples who stay near their parents.
- Such direct subsidies increase the purchasing power of consumers and hence demand. For instance, the housing grants encourage married couples to stay near their parents and result in an increase in demand for housing in areas near to where their parents are staying.

## f. Population

This affects the number of potential consumers or the size of the market. Changes in population can be due to an absolute increase or decrease in the total population or a change in the composition/demographic of the population

For example: a change in age distribution due to

- Baby boom
- increase in demand for baby products (short-run effect)
- increase in demand for schools,
- housing, etc (longer term effect)



h. Exchange Rates

This refers to the rate at which a country's currency (e.g. S\$) exchanges for another currency (e.g. US\$)

OR

Changes in the rate of exchange will affect foreign demand for a country's goods and services. For example, if the S\$ appreciates (strengthens) against the US\$,

Raffles Institution Economics Department Singapore goods which are sold to the USA (i.e., exports) may experience a fall in demand (leftward shift in demand curve), ceteris paribus, as they become relatively more expensive in US\$ compared to similar US substitutes.

#### 3.4 Distinction between changes in Quantity Demanded and Changes in Demand

#### a. A change in quantity demanded

- Quantity demanded = the quantity that consumers are willing and able to buy at a given price (a <u>point</u> on the demand curve) over a period of time.
- A movement along a demand curve occurs when the price changes and all other factors remain unchanged. A change in quantity demanded involves a <u>movement</u> <u>along</u> the same demand curve.



When the price of the commodity falls from  $0P_0$  to  $0P_1$ , the quantity demanded increases from  $0Q_0$  to  $0Q_1$ . This involves a **downward movement** along the demand curve DD from point A to point B.

When the price of the commodity rises from  $0P_0$  to  $0P_2$ , the quantity demanded decreases from  $0Q_0$  to  $0Q_2$ . This involves an **upward movement** along the demand curve DD from point A to point C.

## b. A change in demand

- A change in demand, on the other hand, refers to either an increase or decrease in demand which is brought about by a change in the conditions or non-price determinants of demand (refer to section 3.3).
- Demand = the quantities that consumers are willing & able to buy over a range of prices (the <u>entire</u> demand curve) over a period of time.
- A change in DD involves a **shift in the demand curve** either to the right or the left.
- An increase in demand causes the demand curve to shift rightward
- A decrease in demand causes the demand curve to shift leftward



## 4. SUPPLY THEORY

## 4.1 Definition of Supply

 The supply of a good refers to the quantity of a good or service that producers are willing and able to offer for sale at each given price over a given period of time.

## 4.2 The Law of Supply

• The quantity supplied is **directly related** to the price of a product. The higher the price of a good, the greater the quantity supplied and vice versa, ceteris paribus.

The law of supply is based on the following assumptions:

- A specific period of time is involved. The quantity supplied is expressed in terms of number of units per period of time.
- Except for price, all other factors affecting supply are held constant.
- Producers are rational and they aim to maximise profits (profits = total revenue total cost).

## Supply Schedule and Curve

- A supply schedule shows the different quantities of a good that all the producers in the industry are willing and able to supply at various prices over a given period of time, assuming other non-price determinants of supply are constant.
- The supply curve is a graph which shows the relationship between the price of a good and the quantity supplied over a given period of time, holding other factors constant.
- The supply curve represents the minimum price which producers are willing to accept for every additional unit of the good or service produced. For the price which they will receive, producers' decision to supply will depend on the additional cost (marginal cost) of producing each marginal (additional) unit.

## Why does the supply curve slope upwards?

A higher price is needed to induce firms to supply more of the good because increasing the quantity supplied will result in a higher **marginal cost** of supplying the additional unit. The supplier thus needs a higher price received from the sale of the good to cover this higher marginal cost.



Key idea: Under certain assumptions, the supply curve is also the marginal cost curve.

## 4.3 Factors influencing Market Supply (The Conditions of Supply)

Apart from the price of the good, there are many factors influencing supply. A change in any one of these **non-price determinants**, holding the price of the

good or service constant, will cause a shift of the supply curve either to the right or left.

#### a. Costs of production / Prices of factors of production

 Changes in the price of factor inputs such as raw materials, fuel and power, cost of labour (wage rates) and the cost of capital will change the cost of production, causing changes in the level of profits. This in turn affects the supply of the good.

For example, if the price of steel increases, the cost of producing cars will rise and production becomes less profitable. Firms will supply fewer cars at each and every price. The supply of cars will fall and the supply curve shifts upwards from  $S_0$  to  $S_1$ .



b. Innovation / State of Technology

- The state of technology represents the economy's stock of knowledge about how resources can be combined most efficiently.
- Over time, technology changes as a result of new discoveries and innovations. Therefore, the supply of a good changes with technological change.
- Improvements in the techniques of production, resulting from new inventions or technological advances within the industry, will increase the productivity of the factors of production. Each unit of a factor will be able to produce more now. With the same factor price, cost per unit of output will be lower.
- Producers are willing to increase the quantity supplied of the good at a given price. This will increase the supply of the good and cause the supply curve to shift down from S<sub>0</sub> to S<sub>2</sub>



#### c. Natural Factors

 Favourable climatic conditions such as abundant and reliable rainfall as well as absence of pests increase the supply of agricultural products. This will shift the supply curve to the right (we are assuming no change in cost of production but output has increased at every price level).

 On the other hand, the occurrence of natural disasters such as droughts, floods, earthquakes, severe haze will reduce the supply of agricultural produce and other goods. That is, shift supply curve to the left.

## d. Government Policies

- Government policies on indirect taxation and subsidies affect the cost of production of firms and therefore the supply of a good.
- Indirect taxes are taxes imposed on expenditure of goods and service. An example is the Goods & Services Tax (GST). Such a tax is levied on the firms and added to their cost of production, leading to a fall in supply and an upward shift of the supply curve.
- Indirect subsidy, on the other hand, is a payment made to producers by the government and is equivalent to a decrease in the cost of production. This leads to a rise in supply and a downward shift of the supply curve.

e. Prices of Related Goods

Changes in the prices of related goods also affect the supply of that good, depending on the nature of the relationship with the other good.

### o Joint Supply

- Joint supply of two or more products refers to the production of goods that are derived from a single product, so that it is not possible to produce more of one without producing more of the other.
- For example, beef and leather from cattle.
- This means that an increase in the price of one leads to not just an increase in its quantity supplied but also an increase in supply of the other joint product.



With reference to the diagrams, an increase in the demand for beef (demand curve shifts right from D<sub>0</sub> to D<sub>1</sub>), ceteris paribus, will result in an increase in its price. Producers will be encouraged to increase quantity supplied to Q<sub>1</sub>. The increased in quantity supplied of beef results in more leather being offered for sale on the market. This is because the quantity of skin available for tanning into leather increases automatically as the quantity of beef increases. Hence the supply of leather increases and the supply curve for leather shifts right from S<sub>0</sub> to S<sub>1</sub>.

Contrast this with the effects of **direct** taxes and subsidies as covered in later section.

## • Competitive Supply

- Competitive supply of two or more products refers to production of one <u>OR</u> the other good by a firm. The goods compete for the use of the same resources, and producing more of one good means producing less of the other.
- For example, a farmer who can grow wheat or corn on a given area of land chooses to grow wheat. If the price of corn increases, the farmer may switch to corn production as this is now more profitable. This results in a fall in wheat supply and a leftward shift of the supply curve for wheat.
- Another example would be corn which can be used as food for consumption or for the production of biofuel. They are thus in competitive supply.
- An increase in the demand for biofuel (demand curve shifts right from D<sub>0</sub> to D<sub>1</sub>) causes the price of biofuel to increase from P<sub>0</sub> to P<sub>1</sub>, and farmers will choose to produce corn for biofuel production as this is more profitable. As a result, the supply of corn for consumption will decrease and the supply curve for corn as food shifts to the left from S<sub>0</sub> to S<sub>1</sub>.



## f. Expectations of future price changes

- If price is expected to rise, producers may temporarily reduce the amount they sell in the market. They are likely to build up stocks and only release them on to the market when the price does rise.
- At current prices, producers are willing to supply less than they otherwise would. This is represented by a leftward shift of the supply curve.
- The opposite would be true if producers expect prices to fall.

## g. Number of firms

- An increase in the number of firms producing the good increases supply and gives rise to a rightward shift in the market supply curve and vice versa.
- This follows from the fact that market supply is the sum of all individual supply curves.



#### 4.4 Distinction between Changes in Quantity Supplied and Changes in Supply

A change in the **quantity supplied** results from a **change in price**, holding all other determinants of supply constant. In the diagram above, an increase in quantity supplied from  $Q_1$  to  $Q_2$  due to an increase in price from  $P_1$  to  $P_2$  is represented by an upward movement along supply curve SS<sub>0</sub> from point A to point B.



A change in supply refers to either an increase or decrease in supply **as a result of a change in** the supply conditions or **non-price determinants of supply** (refer to Section 4.3).

An **increase in supply** causes a **shift in the entire supply curve** from  $SS_0$  to  $SS_1$ . When there is an increase in supply, the quantity supplied increases at every price level.

	Increase in Demand (↑Price, ↑Quantity)	<b>Decrease in Demand</b> (↓Price, ↓Quantity)
<b>Increase in Supply</b> (↓Price, ↑Quantity)		
<b>Decrease in Supply</b> (↑Price, ↓Quantity)		

#### Lecture Exercise 2: Simultaneous Shifts in Demand & Supply Curves



- Law of Diminishing Marginal Offity explains why the demand curve is downward sloping.
   Non-price determinants of Demand: Taste & Preferences, Expectations of future prices, Income, Prices of related goods (subs & complements), Govt policies (i/r, direct taxes &
- subsidies), population, exchange rates.
- Increasing marginal cost explains why the supply curve is upward sloping.
- Non-price determinants of Supply: Cost of production (changes in factors cost), Innovation, Natural factors, Govt policies (indirect taxes & subsidies), prices of related goods (joint supply, competitive supply), expectation of future prices and number of firms.
- Change in Price causes <u>movement</u> along the curve. Described as **quantity demanded** (or supply) to change.
- Change in Non-Price determinants cause <u>shift</u> of the entire curve. Described as **Demand** (or Supply) to change.

## 5 The Labour Market: Application of Theory of Demand and Supply

The market for labour is a market for a factor of production. It is similar to any other market. In the labour market, buyers and sellers transact labour for wages.

### 5.1 Wage determination

As in all markets, wage rate (price) is determined by the interaction of the market demand and supply of labour.

Demand for Labour

- Is a derived demand firms employ labour to produce goods and services desired by consumers.
- In a competitive market, the demand for labour is downward sloping the higher the wage rate that employers have to pay, the less labour they will want to employ.

Supply of Labour (to a particular market)

- Made up of the individuals who are able and willing to work for a given wage rate i.e the total number of hours that labour is willing and able to supply at a particular wage rate.
- The supply curve for labour to any particular industry or market is upward sloping the higher the wage rate in the industry, the more people will want to take up the job.

#### Wage determination in a competitive labour market

The wage rate is defined as the price of labour. In a competitive labour market, wage rates are determined by the interaction of the demand and supply of labour. The wage and quantity of labour adjust to balance demand and supply. With reference to the figure below, the labour market clears at the equilibrium wage rate,  $W_E$ , when the quantity demanded for workers equals to the quantity supplied.



At wage rates **above**  $W_E$ , the quantity supplied of labour exceeds the quantity demanded for labour; at these wage rates, there is a **surplus** and thus a **downward pressure** on wage rate.

- Market forces automatically act to reduce wage rate to eliminate the excess supply.
- Competition for jobs amongst workers forces wages down.

At wage rates **below**  $W_E$ , quantity demanded for labour exceeds quantity supplied of labour; the resulting **shortage** exerts an **upward pressure** on the wage rate.

- Market forces automatically act to raise wage rate to eliminate the excess demand.
- Competition amongst firms forces wages upward: Employers are willing to offer higher wages to attract job applicants in the face of labour shortage.

## 5.2 Non-Wage Determinants of Demand & Supply of Labour

Apart from wages, there are other factors influencing the demand and the supply of labour. A change in any of these **non-wage determinants** will cause a shift in the demand and supply curve of labour and in turn changes the equilibrium wage rate.

### Non-Wage Determinants of Demand (Shifts the demand curve)

- a. Changes in the price of the final product it produces
- The demand for labour is dependent upon the demand of the goods and services that it produces.
- Any changes in the demand (and thus price) of the final product will affect the demand for labour. For example if the price of computers increase due to increased demand, the demand for workers who can produce computers will rise.
- b. Changes in the physical output each unit of labour is able to produce (productivity of labour)
- May be due to advancements in production technology or better education and retraining or more capital stock so that each worker has more machinery to work with.
  - For example, workers who undergo education and retraining programs are deemed more attractive to employers. The higher output per worker encourages firms to employ more of such workers at the same wage rate. Hence, with better education and more skills acquired, ceteris paribus, demand curve for labour shifts to the right.
- c. Changes in prices of other factors of production used in production
- Capital *can* be seen as a **substitute** for labour in certain production processes. A
  decline in the price of machinery may prompt the firm to substitute machinery in
  place of labour. Smaller quantities of labour will now be employed at existing
  wage rates, shifting demand to the left.
- Resources may also be complementary to labour. The increase or decrease in the quantity of one of them employed in production will require an increase or decrease in the amount of the other used as well.

## Non-Wage Determinants of Supply (Shifts the supply curve)

- a. Changes in size of population
- Foreign labour policy
- Birth Rates / Death Rates
   With falling birth rates and life expectancy rising, there will be relatively fewer people of working age in a country. This affects the supply of labour in an economy, causing supply curve of labour in an economy to shift to the left.
- b. Labour Force Participation Rate
- Refers to the percentage of economically active people out of the population who are of working age.
- If many workers choose to leave the labour market by taking retirement before the normal age for retirement, this will reduce the labour force participation rate and supply of labour in the economy.
- By making changes to the retirement age, the government can affect the labour force participation rate and hence the supply of labour in the economy.

#### Sectional Summary

- The labour market is an application of Demand and Supply in the factor market.
- Non-wage determinants of demand include price of final product, productivity of the workforce and substitutes/complements to labour.
- Non-wage determinants of supply include population size, migration policies and labour force participation rate.

Points to Ponder:

## 6 PRICE ELASTICITIES OF DEMAND AND SUPPLY

In analysing how changes in demand and supply affect the equilibrium market price and quantity, it is important to know *how much* quantities supplied or demanded of a good will respond to changes in variables such as its price, incomes and prices of other goods. This quantitative relationship between the variables and quantity purchased / supplied is analysed using the concept of elasticity.

Price elasticity of demand (supply) is a measure used to show the degree of responsiveness of *quantity demanded* (*quantity supplied*) of a good to a change in its price, *ceteris paribus*.

There are two main concepts of elasticity in common use:

- Price-elasticity of demand
- Price-elasticity of supply

Price elasticity of demand is an indicator of **consumer responsiveness** to changes in the price of the product, while price-elasticity of supply is an indicator of **producer responsiveness** to changes in its price. Price elasticities of demand or supply are expressed as coefficients.

### 6.1 Price Elasticity of Demand (PED)

#### 6.1.1 Definition and Formula

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

#### Formula

Or

$$PED = \frac{\% change in quantity demanded}{\% change in price of gd itself}$$
$$= \frac{\Delta Q}{Q_0} \div \frac{\Delta P}{P_0}$$
$$= \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

#### Numerical Example

Suppose there is a fall in the market price of lemons, this will cause the cost of production of iced lemon tea to fall and hence the market supply of iced lemon tea to increase. As a result of this increase in market supply, the price of iced lemon tea sold in the canteen falls from \$2.00 to \$1.00, causing the quantity demanded to increase from 100 to 250 cups, then:

$$PED = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price of gd itself}} = \frac{+150\%}{-50\%} = -3$$

$$Or \qquad \Delta Q = 150$$

$$\Delta P = (-)\$1$$

$$= \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

$$= \left(\frac{150}{-1}\right) \times \left(\frac{2}{100}\right) = -3$$

#### How to interpret this?

From this example, given that the PED value for lemon tea is <u>-3</u>, it means that a <u>1% fall</u> in <u>price</u> of lemon tea will lead to a <u>3% increase</u> in the <u>quantity demanded</u> for lemon tea.

Ponder: Is this beneficial to the firm?

## 6.1.2 Interpretation of the magnitude of price elasticity of demand

The coefficient of PED is normally negative because of the inverse relationship between price and quantity demanded (law of demand). In practice, the **negative sign is thus ignored** and only the absolute value is considered.

The PED coefficient shows the sensitivity of consumers to price changes. The larger the coefficient, the greater the sensitivity of quantity demanded to a price change.

PED  > 1	Price elastic demand	
		P <sub>x</sub>
	This means that a change in <b>price</b> will lead to a <u>more than</u> <u>proportionate change</u> in <b>quantity demanded</b> . For example a 1% fall in price will cause a 3% rise in quantity demanded ceteris paribus. D <sub>1</sub> illustrates price elastic demand. The demand curve is relatively flat. When price falls from P <sub>1</sub> to P <sub>2</sub> , Q <sub>d</sub> increases more than proportionately from Q <sub>1</sub> to Q <sub>2</sub> Ponder: What is the impact on Revenue (Price X Qty)?	$P_1$ $P_2$ $D_1$ $D_1$ $D_1$
	Price inclustic demand	$Q_1 \qquad Q_2 \qquad \qquad$
PED  < 1		
	A change in <b>price</b> leads to a <u>less than proportionate</u> <u>change</u> in <b>quantity demanded</b> . D <sub>2</sub> illustrates price inelastic demand. The demand curve is relative steeper. When price falls from P <sub>1</sub> to P <sub>2</sub> , Q <sub>d</sub> increases less than proportionately from Q <sub>1</sub> to Q <sub>2</sub> .	P <sub>1</sub> P <sub>2</sub>
	Ponder: What is the impact on Revenue (Price X Qty)?	$Q_1 Q_2 \rightarrow Q_x$
* PED  = ∞	<ul> <li>Infinitely price elastic demand</li> <li>A change in price leads to an infinitely large change in quantity demanded. An infinitely small increase in price will cause quantity demanded to fall infinitely to zero.</li> </ul>	Px Dd
* PED  = 0	<ul> <li>Perfectly price inelastic demand</li> <li>No change in quantity demanded in response to a change in price. Same quantity is demanded regardless of the price of good.</li> <li>For example, a heroin addict's quantity of heroin demanded is unresponsive to changes in the price of heroin.</li> </ul>	P <sub>x</sub> Dd Q <sub>x</sub>
* PED  = 1	<ul> <li>Unitary (unit) price elastic demand</li> <li>A change in price leads to a proportional change in quantity demanded. The curve is a rectangular hyperbola.</li> </ul>	Px

## 6.1.3 Determinants of Price Elasticity of Demand

The price elasticity of demand varies from one product to another. PED is determined by the following factors:

## (a) Number and closeness of substitutes

The number and closeness of substitutes that are available is one of the most important determinant of PED. This is because the more close substitutes there are for a good, the more consumers are likely to switch to these alternatives when the price of the good increases. Hence, the greater the number of close substitutes available for a good, the more price elastic is the demand.

For example, two products: oil and cauliflowers. If the price of oil rises, there will only be a slight fall in quantity demanded as there are little substitutes available if people wish to continue driving. However, if the price of cauliflowers rise, it may lead to a significant fall in quantity demanded as there are many alternative vegetables that people can buy.

The availability of substitutes is, in turn, dependent on the way the good is defined.

A good can be defined broadly or narrowly. For example, 'fruits' is a broad definition If a good is defined in a broad sense, the number of substitutes are few and demand is likely to be price inelastic. Thus we would expect the demand for 'fruits' as a whole to be price inelastic. However, if we look at a specific type of fruit such as apples, the demand for apples is likely to be more price elastic because of the availability of oranges or other fruits that are close substitutes for apples. If price of apples rises, quantity demanded of apples would fall more than proportionately as consumers are highly likely to switch to other close substitutes of apples.

In addition, consider that certain goods have very few or no close substitutes. For instance, the demand for insulin tends to be highly price inelastic for diabetic patients. This is primarily due to the lack of substitutes for insulin for the consumer.

## (b) **Proportion of income spent on the good**

The higher the proportion of income spent on a good, the more people will be forced to reduce their consumption when price increases; hence the more price elastic will be the demand. This is because small increases in the price will take up more of the consumer's available income. For example, demand for cars is relatively price elastic as the price of a car constitutes a significant proportion of a household's income. An increase in the price of car will significantly affect a household's ability and decision to purchase a car. For instance, if price of a car is \$100,000, a 10% rise in price means a hefty extra expenditure of \$10,000.

In contrast, some goods such as sugar, candles and salt take up only a very small percentage of the income of most households. For example, if a packet of salt is \$2, the same 10% rise in price has much less impact on the household's decision to purchase the good.

Hence, consumers are much more sensitive to a price change of big-ticket items and quantity demanded is likely to fall more significantly for big-ticket items for a given rise in the price.

## (c) Habitual consumption

Demand tends to be price inelastic if the good is bought habitually. Quantity demanded is therefore not very responsive to changes in price. For example, demand

Understanding the determinants of PED allow you to justify why a good is considered price elastic or price inelastic in

Important:

for rice in many Asian societies is relatively price inelastic compared to other Western countries because rice is a staple food in Asian societies.

A special case of habitual consumption relates to a consumer's addiction to a particular good. The greater the degree of addiction to a substance (alcohol, cigarettes and drugs), the more price inelastic is the demand. A price increase, ceteris paribus, will not bring forth a significant reduction in quantity demanded if one is severely addicted.

## (d) Time period

When the price of a good rises, consumers will take time to respond to the price change, adjust their consumption pattern and find alternatives. Time is required to develop or discover substitutes. The longer the time period, the more likely consumers can switch to other substitutes and hence demand will be more price elastic.

For example, if there is an increase in the price of heating oil, ceteris paribus, consumers can do little to switch to other forms of heating in a short period of time. Thus, demand for heating oil tends to be price inelastic over short time periods. As time goes by, they are able to switch to other heating systems, such as gas, or they can install better insulation, and demand for heating oil becomes more price elastic.



The short-run demand curve describes the initial response of buyers to a change in the price of the good while the long run demand curve shows the relationship between the price and quantity demanded after all possible adjustments have been made in looking for alternative fuels. It can be seen that in the short-run, demand tends to be more price inelastic than in the long-run. (The formal definitions of short-run vs long-run time period will be covered in section 6.2.3e)

#### 6.1.4 PED and Total Revenue

Since we are now aware of the <u>extent of change</u> in quantity demanded to a change in price based on different price elasticity of demand, we can look at how this can be of greater significance in assessing the impact on the market or the firm.

#### The relationship between PED and Total Revenue

Total revenue (TR) received by firms is equivalent to total expenditure/spending by the consumers. TR = Price × Quantity (P x Q). A change in prices has an impact on

the total revenue. An increase in price does not necessarily mean an increase in total revenue, nor does a fall in price always lead to a decline in total revenue. The effect of the price change on TR depends on the price elasticity of demand.

Consider the previous example of the market for oil and cauliflowers. When the cost of production falls in both goods, this will be reflected as a downward shift of the supply curve. The impact on total revenue of the 2 markets will differ due to the different PED values.



Figure 22: Price elastic demand and total revenue

With reference to the above diagram, a fall in price from  $P_0$  to  $P_1$  will lead to a more than proportionate increase in quantity demanded from  $Q_0$  to  $Q_1$ . This means that  $P_0Q_0 < P_1Q_1$ . The decrease in revenue due to the lower price (area A) is less than the increase in revenue resulting from the increase in quantity demanded (area B). Hence, when demand is price elastic, a decrease in price will lead to an increase in total revenue and vice versa.

Thus **if demand is price elastic**, then price and TR move in **opposite** directions; a decrease in price leads to an increase in total revenue and vice versa.



With reference to the diagram above, a fall in price from  $P_0$  to  $P_1$  will lead to a less than proportionate increase in quantity demanded from  $Q_0$  to  $Q_1$ . This means that  $P_0Q_0 > P_1Q_1$ . The increase in revenue **due to the increase in quantity demanded** (area B) is less than the decrease in revenue resulting **from the lower price** (area A). Hence, when demand is price inelastic, a decrease in price will lead to an overall decrease in total revenue and vice versa.

Thus <u>If demand is price inelastic</u>, then price and TR move in the **same** direction; an increase in price leads to an increase in total revenue and vice versa.

Important: It is critical to know

the effect of PED

on Total Revenue

as many A Levels questions ask

about the outcome

which requires you

to assess what has happened to price,

quantity and total

revenue.

on the market:

## 6.1.5 Strategies of Firms (Firm Analysis)

Now that we are aware of the impact of PED on Total Revenue, how does that information help firms with their strategies?

## a. Pricing Policies of an Individual Firm

Pricing policies refer to the adjustment to price in order to achieve the objective of the firm which will be assumed to be to maximise total revenue.

From the earlier analysis, we know that price and total revenue goes in the <u>same</u> <u>direction</u> if the demand if price inelastic. **Thus, if demand for the product is price inelastic**, *ceteris paribus,* firms should **raise its price** to increase total revenue. This is because the increase in price will lead to a less than proportionate fall in quantity demanded and thus a rise in total revenue.

We are also aware that price and total revenue goes in <u>opposite direction</u> if the demand is price elastic. Thus, **if demand for the product is price elastic**, *ceteris paribus*, then the firm should **lower its price** so as to increase total revenue. This is because a fall in price will lead to a more than proportionate rise in quantity demanded and thus a rise in total revenue.

### b. Use of Marketing Strategies

A firm may seek to make the demand for its good less price elastic in order to increase total revenue through a price increase. As the degree of elasticity is determined by the availability of close substitutes, the firm will seek to **reduce the substitutability with other products**. The firm can do so by creating real or perceived differences between its product and its substitutes. These would include:

- introducing different features in his products (product differentiation)
- innovation & advertising

## Sectional Summary

- Price Elasticity of Demand measures the degree of responsiveness of quantity demand of a good to a change in its price, ceteris paribus.
- The determinants of PED are 1) number and closeness of Substitutes, 2) proportion of Income spent on the good, 3) Habitual consumption and 4) Time period.
- When the demand for a good is <u>price elastic</u>, a rise in price will lead to a more than proportionate fall in quantity demanded and thus a fall in total revenue. Price and Total Revenue thus go in <u>opposite directions</u>.
- When the demand for a good is <u>price inelastic</u>, a rise in price will lead to a less than proportionate fall in quantity demanded and thus a rise in total revenue. Price and Total Revenue thus go in the <u>same direction</u>.
- Usefulness of PED to a firm:
  - Pricing strategy & marketing strategy

## 6.2 Price Elasticity of Supply (PES)

## 6.2.1 Definition and Formula

Price elasticity of supply (PES) is defined as a measure of the degree of responsiveness of **quantity supplied** to a change in the commodity's own **price**, *ceteris paribus*.

PES gives us an indication of the ease at which a firm's production can be expanded or reduced when price changes.

PES = (%  $\triangle$  in quantity supplied) / (%  $\triangle$  in price)

$$= \Delta Q/Q_0 \div \Delta P/P_0$$

$$= \Delta Q / \Delta P \times P_0 / Q_0$$

## Example

If the price of a good falls from \$2 to \$1, causing quantity supplied to decrease from 40 units to 30 units, then: PES =  $(-10/-1) \times (2/40)$ 

$$5 = (-10/-1) \times (2)$$
  
= +0.5

In the above example, given that PES = +0.5, a 1% fall in the price of the good will lead to a 0.5% fall in the quantity supplied of the good.

## 6.2.2 Interpretation of Coefficient

The **value of PES is usually positive** due to the direct relationship between price and quantity supplied (law of supply). The coefficient of PES ranges from zero to infinity.

<b>Coefficients of Price Elasticity</b>	y of Supply	y for linear suppl	y curves

Coefficient	Interpretation	Diagram
	Common Cases (Focus of Stud	y)
PES > 1	<ul> <li>Price elastic supply</li> <li>A given percentage change in the price of a good will lead to a greater percentage change in quantity supplied. All straight line supply curves passing through the positive y-axis are price elastic.</li> <li>When price increases from P<sub>1</sub> to P<sub>2</sub>, qty increases more than proportionately from Q<sub>1</sub> to Q<sub>2</sub>.</li> <li>Ponder: What is the impact on Revenue (P<sub>x</sub> x Qty)?</li> </ul>	$P_2$ $P_1$ $Q_1$ $Q_2$ $Q_x$
PES < 1	<ul> <li>Price inelastic supply</li> <li>A given percentage change in the price of a good will lead to a smaller percentage change in quantity supplied. All straight line supply curves passing through the x-axis are price inelastic.</li> <li>When price increases from P<sub>1</sub> to P<sub>2</sub>, qty increases less than proportionately from Q<sub>1</sub> to Q<sub>2</sub>.</li> <li>Ponder: What is the impact on Revenue (P<sub>x</sub> x Qty)?</li> </ul>	$P_{x}$ $P_{2}$ $P_{1}$ $Q_{1}$ $Q_{x}$ $Q_{x}$
PES = 0	<ul> <li>Perfectly price inelastic supply</li> <li>No change in quantity supplied in response to a change in price. Same quantity is supplied regardless of the price of good.</li> <li>E.g. supply of Picasso paintings</li> </ul>	$ \begin{array}{c} P_x \\ P_2 \\ P_1 \\ 0 \\ \end{array} $ $ \begin{array}{c} SS \\ SS \\ Q_x \\ \end{array} $

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ι		1

Seldom Observed in Reality					
PES = ∞	<ul> <li>Perfectly price elastic supply</li> <li>Producers are willing to produce any quantity at the prevailing price. Any infinitely small decrease in price will cause quantity supplied to fall infinitely to zero.</li> </ul>	P <sub>x</sub> SS			
PES = 1	<ul> <li>Unitary price elastic supply</li> <li>A given percentage change in the price of the good will bring about an equal percentage change in quantity supplied. All straight line supply curves from the origin are unitary price elastic.</li> </ul>				

## 6.2.3 Determinants of Price Elasticity of Supply

### a. Level of stocks or inventories

The availability of stocks depends on the ease of storing the stocks. E.g. Fresh/ perishable food such as vegetables may not be easy to store while processed products such as canned food has longer shelf-life and are easier to stock. If the price of canned food increases, the firm can increase quantity supplied readily by drawing upon these stocks, hence this explains why the supply of processed products is more price elastic than fresh food.

## b. Availability of factors of production / Spare capacity

If firms hold sufficient stock of raw materials and at the same time it has the physical spare capacity (for example, factories or equipment may be idle for some hours each day), production can be increased readily in response to price increases. But if the firm's capacity is fully used, it will be more difficult to respond to a price rise. For example, if all factory space is occupied and operating round the clock, any price increase will not be met with an increase in quantity supplied. Hence, the greater the availability of factors of production, the more price elastic the supply.

#### c. Mobility of factors of production

Factor mobility refers to the ease and speed at which factors of production can move from one industry to another. The more easily and quickly resources can be shifted from one industry to another (where price is increasing), the greater the responsiveness of quantity supplied to changes in price, and hence the higher the value of PES. E.g. if a printing machine can be easily switched from printing newspaper to magazines or farmers and the land used can be switched from planting corn to coffee.

In this regard, it matters whether the firm produces goods that require mainly skilled or unskilled labour. Expanding output in a production process that relies predominantly on highly skilled labour may be more difficult than if mostly unskilled labour were required.

#### d. Length and complexity of the production process

The shorter the time needed and the less complex the process for producers to convert input into output, the more price elastic is the supply for the good. For example, in agriculture, there is a minimum time required before crops can be harvested. Hence, the supply of agricultural and primary products tends to be price inelastic. In contrast, the length of the production period for most manufacturing

goods is relatively shorter. Hence the supply of manufactured goods tends to be price elastic.

### e. Time horizon

As with demand, the longer the time period, the more price elastic will be the market supply. This is because:

## 1. Short-Run

The short-run is a period where production is restricted by at <u>least one factor of production</u>; usually capital (machinery). In the short-run, supply is relatively price inelastic because the quantity supplied can be increased to some extent in response to an increase in price as some inputs can be varied whilst others remain fixed. For example, the producer of manufactured goods can increase his supply by placing orders for more raw materials and getting workers to work harder or even overtime. However the change in quantity supplied is limited as he is unable to expand the number of machines or increase the size of his factory floor space at that point in time.

### 2. Long-Run

Supply eventually becomes highly price elastic in the long run because this is a time period where all factors of production are variable as there is sufficient time for inputs to increase, production capacity to expand and new firms to enter the industry. Using the above example; in the long run, that same firm may shift production to a larger factory (increase capital goods) and thus have the capability to produce at a much higher output.

#### Sectional Summary

- Price Elasticity of Supply measures the degree of responsiveness of quantity supplied of a good to a change in its price, ceteris paribus.
- The determinants of PES are 1) Level of Stocks/Inventory, 2) availability of factors of production, 3) mobility of factors of production, 4) length & complexity of production process and 4) time period.

#### Lecture Exercise 3

The price of abalone has skyrocketed during Chinese New Year (CNY) as consumers enjoy eating this delicacy over the festive period. At the same time, unusually hot weather has depleted stocks of the mollusc.

Using economic analysis, analyse why the price of abalone increased during CNY.

Q: Prices determined by? (what is the theoretical framework to use?)	Which diagram(s) should I use?
Q: Is it a price or non-price determinant which has changed?	
Q: How do I explain the process to reach that outcome?	

\* In the momentary period, supply is perfectly price inelastic because it is impossible for the firm to change output in response to changes in price.

E.g. the fishmonger will not be able to increase the amount of fish available for sale on that day.

## 7. Government Intervention in the Market (Market Level Analysis)

#### 7.1 Government Intervention: Taxes

Knowing the elasticity concepts will help the government in implementing the appropriate policies to achieve its various objectives. These objectives may be:

- To raise revenue through taxation
- To discourage / encourage the consumption of certain goods
- To redistribute income and help certain groups of people in society

This section will examine the two types of government intervention in markets: indirect taxes and indirect subsidies and their impact on market outcomes.

#### 7.1.1 Indirect Taxes

Indirect taxes are compulsory taxes levied by the government on expenditure/ spending. They can be classified into 3 types: general expenditure taxes (eg. GST), excise duties (e.g. specific/ad valorem taxes on goods produced for sale within the country) and customs duties (taxes on goods imported into the country). These taxes are paid to the tax authorities by the producers of the good or service. However, producers may pass on some if not all of the tax burden onto the consumers, depending on the **relative** price elasticity of demand **and** supply of the good.

Indirect taxes will lead to an <u>upward shift</u> of the supply curve. This is because the price needed to induce firms to sell a given unit is increased by the amount of the tax that they must pay to the tax authorities.

An indirect tax can either be a specific tax or an ad valorem tax. A **specific** tax, or a per unit tax, is a <u>constant sum</u> levied on each unit of the good sold. It will shift the supply curve vertically upwards by the amount of the tax. Since the amount of tax is the same at all prices, it is a **parallel shift** of the supply curve vertically upwards. For example, if the government imposes a \$1 tax on chewing gum, the supply curve will shift upwards by \$1. At every point of the supply curve, it will now cost the producers an additional \$1 to produce (as payment to the government).

In contrast, an **ad valorem tax**, or a percentage tax, is a tax pegged at a <u>certain</u> <u>percentage</u> of the price of the good. As price rises, the amount of tax to be paid rises (even though % remains unchanged). An example of an ad valorem tax is GST. This results in an **upward anti-clockwise pivot** of the supply curve. For example, a 10% tax on a pen which cost \$10 will see a tax amount of 10% x \$10 = \$1. But the same 10% tax on a pen which cost \$15 will see a tax amount of 10% x \$15 = \$1.50. Same 10% tax rate, but as the selling price is higher, the tax paid is higher as well.



### 7.1.2 Impact and Incidence of indirect taxation

The impact of the indirect tax refers to the party on whom the tax is first levied. The impact of the indirect tax is always on the producer. However, the incidence of the indirect tax refers to the <u>sharing or distribution of the tax</u> <u>burden</u> between the producer and the consumer. Often, the tax incidence (burden) can be shifted to the consumer through an increase in the selling price. This is illustrated below:



With reference to the diagram above, assuming that the government imposes a specific tax of \$3 per unit on cigarettes, the supply curve is shifted vertically upwards by amount of the tax. This is because the tax works in a similar fashion to an increase in cost of production. The imposition of an indirect tax will result in a lower equilibrium quantity and a higher price. *However, price will not rise by the full amount of the tax because the demand curve is downward sloping*. Thus, the burden or incidence of such a tax is distributed between the consumer and the producer.

The consumers' share of the tax is reflected by **the extent of the increase in price** they pay for the good (i.e. **\$2** as equilibrium price increased from \$16 to \$18). The producers' share of the tax is the extent to which the price received by producers falls after the tax is paid to the government. (Initially before the tax, producers received \$16. However, by subtracting the tax \$3/unit which is paid to the government from the new equilibrium price of \$18, producers effectively receives only a post-tax price of \$15. Hence the tax burden on the producer is \$16-\$15=\$1).

In this case out of the \$3 tax per unit imposed, consumers bear a bigger burden of the tax (\$2) as compared to producers (\$1). Although the impact of the indirect tax was on the producers, producers by increasing the price were able to shift part of the tax incidence onto the consumers.

#### Note: Total tax per unit of good

= tax incidence (burden) on consumer + tax incidence (burden) on producer.



#### 7.1.3 Price Elasticity of Demand & Supply and Tax Incidence



Figure 25 shows the effect of an indirect (specific) tax in a market with a price inelastic demand and relatively price elastic supply. That is, the sellers are more responsive to changes in the price of the good (so the supply curve is relatively gentle) than the buyers.

When the tax per unit (represented by the vertical distance AC) is imposed, the supply curve shifts upwards by the amount of the tax. The market clearing price increases from  $P_0$  to  $P_1$ . The increase in price for buyers ( $P_1P_0$ ) is less than the tax per unit. The producers bear tax incidence of  $P_0P_2$ , which is lower than that consumers' incidence.





Figure 26 shows a tax in a market with a price inelastic supply and relatively price elastic demand. That is, the buyers are more responsive to changes in the price of the good than the seller (the demand curve is relatively flat).

The tax per unit imposed is represented by the distance AC. As a result, supply curve shifts up by the amount of the tax. The market clearing price increases from  $0P_0$  to  $0P_1$ . However, the incidence of the tax on the consumers  $(P_1P_0)$  is less than the producers' incidence  $(P_0P_2)$ .

#### Implication:

As seen from Figs 25 and 26, whichever party (consumer or producer) has the more inelastic curve (demand/supply); he will bear a greater burden of the tax. Why is this so? In the case of a relatively more price inelastic demand, consumers have a lower ability to reduce their quantity demanded in response to the increase in price, as a result, they end up bearing a bigger burden of the tax.

Below are other examples where demand or supply are in the extreme case (perfectly price elastic or inelastic). They are less common but it is still good for you to know them.



With reference to Figure 27, consumers will bear the full incidence of the tax if demand is perfectly price-inelastic. The change in price ( $P_0P_1$ ) is equal to the amount of per unit tax (ab). Consumers are unable to adjust their consumption (no change in equilibrium quantity) and are willing to pay any price for the good or service

With reference to Figure 28, *producers will bear the full incidence of the tax* if demand is perfectly price-elastic. There is <u>no change in equilibrium price</u> as seen in the diagram above.



With reference to Figure 29, producers will bear the full incidence of the tax if supply is perfectly price-inelastic as there is no change in equilibrium price. Producers are

*unable to adjust their output/production* (no change in equilibrium quantity). Producers have to accept a lower price  $P_1$  and bear the full tax  $P_0P_1$  per unit. With reference to Figure 30, *consumers will bear the full incidence of the tax* (price increases by  $P_0 P_1$  which is equal to the per unit tax) if supply is perfectly price-elastic. Producers, however, will lose revenue as quantity consumed has fallen.

#### Lecture Exercise 4

Using demand and supply analysis determine which party (consumers or producers) would bear a higher incidence of a specific tax when it is applied to

i. Alcohol ii. Cars

## Sectional Summary

- Incidence/burden of tax examines how much the producer and the consumers are affected by the imposition of an indirect tax. This is dependent on the **relative** price elasticity of demand and supply
- The general principle is that the more inelastic the curve (demand consumer, supply producer), the larger burden of the tax will fall on that group.

## 7.2 Government Intervention: Subsidies

An indirect subsidy is a payment to the producers by the government. The purpose of an indirect subsidy is to encourage firms to increase production by lowering the firms' cost of production. It has the same effect as a negative tax. The effect of an indirect subsidy is to lower the cost of production, thereby shifting the supply curve downwards by the amount of the subsidy since the minimum price needed to induce the firm to produce each unit is reduced by the amount of the subsidy.

## Price Elasticity of Demand & Supply and Indirect Subsidy Benefit

Like taxation, the <u>benefit</u> of an indirect subsidy is shared between consumers and producers depending on the price elasticity of demand and supply. Consumers benefit by paying a lower price while producers benefit from a lower cost of production.

# Benefit of subsidy when demand is relatively more price inelastic compared to supply

With reference to Figure 31, in a market with a very price elastic supply and relatively price inelastic demand, consumers receive a larger share of the subsidy.



@dream



#### Fig 32: Share of subsidy when demand is relatively more price elastic

With reference to Figure 32, when demand is more price elastic than supply, producers receive a larger share of the subsidy. This is because a subsidy is intended to stimulate consumption by lowering prices to consumers while stimulating production by raising prices to producers. A greater incentive must be provided to the party that is less responsive to price changes.

Subsidy per unit = ac

Consumers' share of benefit per unit:  $\Delta P = P_0 - P_1 = bc$ 

Producers' share of benefit per unit: ab

<u>Producers receive a greater share of the subsidy</u> when demand is relatively more price-elastic than supply.

Similarly, below are more extreme cases where supply is perfectly price elastic/inelastic.



With reference to Figure 33, there is **no change** in equilibrium price. *Producers enjoy the full subsidy* given a price inelastic supply.

With reference to Figure 34, equilibrium price falls by the full amount of the per unit subsidy from  $P_0$  to  $P_1$ . *Consumers enjoy the full subsidy* given a perfectly price elastic supply.

#### 7.3 Applications of Elasticity to Primary Commodities and Manufactured Products

#### a. PED in relation to primary commodities and manufactured products

Many primary commodities have a lower PED compared with the PED of manufactured products. Primary commodities are goods arising directly from the use of natural resources. Primary commodities therefore include agricultural, fishing and forestry products, as well as products of extractive industries (oil, coal, minerals and so on). Agricultural products include food, and other non-edible commodities (such as cotton and rubber).

Many primary commodities have a low PED, which is usually lower than the PED of manufactured products. Food has a highly price inelastic demand as it is a necessity and it has no substitutes. The same applies to a variety of other primary products such as oil and minerals.

By contrast, the demand for manufactured products tends to be more price elastic, as they usually do have substitutes. Therefore, for any price change, quantity demanded is generally more responsive in the case of manufactured products compared with primary commodities.

Low price elasticity of demand, together with fluctuations in supply over short periods of time, creates serious problems for primary commodity producers due to large fluctuations in primary commodity prices which in turn affects their incomes.

With reference to the diagram below, for a given decrease in supply from S to  $S_1$ , there is a larger price fluctuation (from P to  $P_2$ ) when demand is price inelastic (primary commodities) as compared to a milder price fluctuation (from P to  $P_1$ ) when demand is relatively more price elastic (manufactured products).



#### b. PES in relation to primary commodities and manufactured products

In general, primary commodities usually have a lower PES than manufactured products. The main reason is the time needed for quantity supplied to respond to price changes. In the case of agriculture, it takes a long time for resources to be shifted in and out of agriculture. Rice farmers need at least a planting season to be able to respond to higher prices. In most areas, there is a limited amount of new land that can be brought into cultivation. Technological change in agriculture to increase output per unit of land cultivated also takes a great deal of time. In the

case of other primary products, such as oil, natural gas and minerals, time is needed to make purchase extraction machinery and to begin production.

With reference to the diagram below, given an increase in demand, supply is relatively price inelastic for primary products, leading to greater fluctuations in price from P to P<sub>1</sub>. In the case of manufactured products where supply is price elastic, the same given change in demand will only result in slight fluctuations in price from P to P<sub>2</sub>.

Large price fluctuations mean unstable profits (revenue – cost) for producers of primary commodities and thus adversely affecting their livelihood.



#### Figure 36

#### 7.4 Problems with the use and application of elasticity concepts

#### 7.4.1 Computation Issues

When applying the concepts of elasticity, economists may face difficulties in calculating or determining exact elasticity values. There are many reasons for this, one of which is that the elasticity values for various consumer groups may differ, due to factors such as income differences or other social and cultural differences. For example, the economic activity of eating out at a fancy restaurant may be demand price-elastic for low to middle income consumers but demand might be relatively price inelastic for high income consumers.

In addition, estimates based on past data may not be relevant for current use – the more outdated the data, the less relevant it becomes. Given the nature of our present dynamic economy, such estimates may become outdated quickly in the world of technological based consumer products.

#### 7.4.2 Ceteris paribus assumption

The statement "all other things being equal" is a very strict assumption that cannot hold in reality. The results that are calculated from the static analysis are inaccurate because in the dynamic real world, the effects of changes occur and interact together instead of separately.

For example, in the application of PED concept, only the price of the good is allowed to change while other factors of demand are assumed to remain constant. This is not likely in the real world where other factors of demand such as income levels, population size and tastes and preferences are always changing. As such, the ceteris paribus assumption is unrealistic in the prediction of effects of price changes on market equilibrium level of outputs. This is because the accuracy of the value of |PED| may be compromised when estimation is made based on these simplifying assumptions.

Note: The limitations of the elasticity concepts given here are generic. You need to apply and elaborate these limitations according to the scenario given in tests/examinations.

#### Sectional Summary

- PED and PES are useful in explaining the changes in prices and quantities in specific markets.
- In spite of its usefulness, a major limitation of elasticity analysis is the ceteris paribus assumption.

### 7.5 Government Intervention: Price Controls

Earlier, we have examined how the price mechanism works with the premise that consumers and producers behave rationally to maximize their self-interest. However, in reality, from time to time, governments may intervene in the market to achieve certain objectives. The forms of intervention can be in the form of taxes or subsidies as discussed earlier or in the form of price controls as well as setting a quota which we will discuss now in this section.

### 7.5.1. Price Controls – Maximum Price (Price Ceiling)

A price ceiling is a legally established **maximum price** to **prevent prices from rising above a certain level**. The price that can be legally charged by sellers of the good cannot exceed the price ceiling or the maximum price. To be effective, the price ceiling must be set below the market equilibrium price. The main rationale for a price ceiling is that from the perspective of the government, the market equilibrium price is deemed to be too high thus resulting in a <u>lack of equity</u> for consumers who are excluded from the market due a lack of ability to pay. However, an unintended consequence is that a price ceiling results in a market dis-equilibrium – a shortage is created which is an allocative inefficient outcome.

A maximum price is usually imposed with the aim of achieving some form of equity. For example, rent controls to make housing more affordable to low-income earners or food price controls to make certain goods like necessities more affordable to low-income earners, especially during times when food prices are rising rapidly. Another example was Singapore's imposition of a cap on data roaming charges to safeguard mobile subscribers from inadvertently incurring high data roaming charges when they use their smartphones overseas.



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With reference to Figure 37a:Initially (before the imposition of a maximum price),Equilibrium price $= 0P_e$ Equilibrium quantity $= 0Q_e$ With the imposition of the maximum price of  $P_{max}$ ,Price $= 0P_{max}$ Quantity demanded $= 0Q_d$ Quantity supplied $= 0Q_s$ 

Thus, there will be a shortage of  $Q_dQ_s$  as a result of the imposition of maximum price.

### Consequences of price ceiling for the economy

#### Shortages

When a price ceiling is established below the equilibrium price  $OP_e$ , this results in shortages as the quantity demanded exceeds the quantity supplied as seen in Figure 37a. The amount actually traded in the market is  $OQ_s$  and prices are not allowed to rise to eliminate the shortages.

### Non-price rationing

Rationing refers to a method of dividing something among possible users. In a free market, this is achieved by the price mechanism. However, once a shortage arises due to a price ceiling, the price mechanism is no longer able to achieve its rationing function. Shortages due to price ceiling will thus result in queues, distribution of coupons to all interested buyers to purchase a fixed amount of the good in a given time period or restriction of sales selected customers. This may hurt the group of people the policy is intended to help.

#### Underground or black markets

The emergence of a black market results in people selling the goods illegally at prices above the maximum price.

As seen from Figure 37b, due to the shortage of  $Q_dQ_s$  at the maximum price of  $P_{max}$ , some consumers will be willing to pay a price above  $P_{max}$  to get hold of the good. If the seller in the black market can get hold of the good and buy up all the supply of  $Q_s$ , they will be able to charge a black market price of  $P_b$  (the highest possible price consumers are willing to pay) where quantity demanded is  $0Q_s$ . The seller in the black market gain extra revenue represented by area  $P_{max}P_bab$ .

To minimise these problems, the government can encourage supply through drawing on past surpluses, or engage in direct production or give subsidies or tax relief to producers. Alternatively, it can reduce demand by controlling income or producing more alternatives for the good in question.

#### Under-allocation of resources to the good and allocative inefficiency

Since a lower than equilibrium price results in a smaller quantity supplied  $(Q_s)$  than the amount determined at the free market equilibrium  $(Q_e)$  in Figure 37a, there are too few resources allocated to the production of the good. This results in underproduction relative to the social optimum quantity  $(Q_e)$ . Society is worse off due to under-allocation of resources, leading to allocative inefficiency.

## 7.5.2 Price Controls - Minimum Price (Price Floor)

A price floor is a **legally established minimum price** to prevent prices from falling below a certain level. The price that can be legally charged by sellers of the good

must not be lower than the price floor or minimum price. To be effective, the *price floor must be set above the market equilibrium price*.

#### Reasons why the government may want to impose a price floor:

- To protect income of producers by stabilising prices. This has been applied mostly to agricultural products when their supply is subject to fluctuations (due to uncertain weather) and when the market demand is price-inelastic. This results in significant fluctuations in the farmers' income and market prices respectively.
- To protect the low-skilled and low-wage workers by offering them a wage that is above the level determined by the market. (Equity reason)

Note that the first of these involves price control in product markets, while the second concerns price controls in a resource/factor market. We will be examining each of them separately.



With reference to Figure 38,

Initially (before the imposition of a minimum price),

Equilibrium	price	$= 0 P_e$
Equilibrium	quantity	= 0Qe

With the imposition of the minimum price of  $P_{min}$ ,

Price $= 0P_{min}$ Quantity demanded $= 0Q_d$ Quantity supplied $= 0Q_s$ 

Thus, there will be a surplus of  $Q_sQ_d$  as a result of the imposition of minimum price.

When the minimum price  $0P_{min}$  is set above the market equilibrium  $0P_e$ , there will be a direct effect of a **surplus** and continuous accumulation of stocks as the **quantity supplied exceeds the quantity demanded**.

#### Consequences of price floor for the economy

The following unintended consequences of a price floor assume the case where its main purpose is to protect income of producers, with the government guaranteeing the price paid to the producers.

#### Surpluses

The effect of a price floor set above the equilibrium price of a good is to create a surplus (excess supply) equal to  $Q_sQ_d$ , since the quantity demanded by consumers is given by 0Qd, while the quantity supplied by farmers is given by 0Qs.

Can you try to explain the possible tradeoffs arising from the government's decision to implement a price floor?

@dream

To deal with the surpluses, the government will have to buy up the surplus and store it or destroy it or sell it abroad in other markets. Storing gives rise to additional storage costs for the government while exporting the surplus often requires granting a subsidy to lower the price of the good and make it competitive in world markets. Subsidies involve additional costs for the government.

# Over-allocation of resources to the production of the good (allocative inefficiency)

Due to the guaranteed higher price, new producers may also be attracted, creating even greater surpluses. Too many resources will thus be allocated to the production of the good. This results in larger than social optimum quantity produced. The social optimum quantity is 0Qe but 0Qs is actually produced as a result of the price floor, resulting in allocative inefficiency whereby too much scarce resources are allocated to producing the good.

## 7.5.3 Application to Factor Market:

### Consequences of imposition of a minimum wage for an economy

### Labour surplus (excess supply) and unemployment

Just as in the product market, a price floor in the form of a minimum wage can also be observed in the resource/factor market for labour.

The imposition of a minimum wage  $W_{min}$  in the labour market creates a surplus of labour  $Q_sQ_d$  in Figure 39, which denotes the level of unemployment.

Take the case for the labour market for cleaners in a country. The market equilibrium wage rate is determined at  $W_e$ . The government may deem this too low and impose  $W_{min}$  to ensure a minimum level of income for this group of workers. Recall that wages are now not permitted to fall below  $W_{min}$ .



Figure 39: Effect of imposition of minimum wage on the market for labour (eg. cleaners)

Since the wage rate has risen, firms' quantity demanded for labour falls from  $0Q_e$  to  $0Q_d$ . Note that this represents the workers who lost their jobs as a result of the implementation of a minimum wage. The full amount of unemployment created by the minimum wage is higher at  $Q_sQ_d$ . This is because, at a higher wage rate, the number of workers willing to supply their labour services would rise. As such quantity supplied for labour rises from  $0Q_e$  to  $0Q_s$ .

Hence, at  $W_{min}$ , a surplus of labour arises, given by  $Q_s Q_d$ . This also indicates the level of unemployment created by the imposition of the minimum wage.

Generally, the degree of unemployment in the affected industry will depend on the relative price elasticities of demand for and supply of labour in the industry.

In addition, with a higher wage rate imposed, firms would face higher labour costs. In the long run, firms might develop and switch to labour-saving techniques of production which encourages higher productivity which helps lower costs per unit of output. Technological unemployment might arise as high-tech production methods displace the need for labour.

Unlike in the product market where the government can buy up the surplus products, the government does not "buy" the excess supply of labour that results from the minimum wage by offering them jobs.

### Illegal workers at wages below the minimum wage

Illegal employment of some workers at wages below the legal minimum wage may result. This often involves illegal immigrants who may be willing to supply their labour at very low wages.

### 7.6 Quantity Controls - Quotas

A quota is a limit on the quantity produced imposed by the government through legislation and regulation. To be effective, the **quota must be set below the market equilibrium quantity**. The government may decide to employ quotas as a measure to control the goods and services exchanged in the free market when they deem it to be too high.

An example of quantity control or quota is Singapore's Certificate of Entitlement (COE) Scheme which limits car ownership and the number of cars on the road. In order to purchase a car, buyers have to purchase a COE from the government. The number of COEs released each year is determined by the targeted vehicle growth rate. Other examples include limits to the work-week to 35 hours in France, catch limits in fisheries and maximum carbon emission limits. An extreme case of a quantity control is a total ban on the good (eg. chewing gum ban in Singapore)



#### Consequences of quota for the economy

Quantity controls (quotas) may however lead to encouragement of illegal activities e.g. in the case of catch limits in fisheries and maximum emission limits, there could be incentive for the firms to flout the law. We will examine the limitation of quotas in Theme 2.3 Market Failure.

## 7.7 Consequences of Government Intervention – Intended and Unintended

The manner in which a government chooses to intervene in the free market results in various consequences – some are intended e.g. using an indirect tax to lower the

consumption of harmful goods such as tobacco while some unintended e.g. tobacco smuggling to avoid high taxes. This will result in varying degrees of effectiveness of government policies. Hence, sometimes the most intuitive solution may not always be the best.

Another example is the case of a maximum price (rent control) implemented with the intention of ensuring affordable housing to low-income earners. When limits are set on the rent that landlords can charge, this prompts them to withdraw their houses from the rental market as well as encourage redevelopment into other uses. Instead of making housing accessible to the lower-income, an unintended consequence is the creation of shortages.

Thus, when governments decide to intervene in the free market, they must deliberate on the various choices that are available to them and be mindful of the consequences (both intended and unintended) on the market in order to make better decisions.

In summary, price elasticity of demand and supply concepts are useful tools of analysis for examining the effects of government intervention for the market as well as formulating competitive strategies for the firm as follows:



## Sectional Summary

- Price controls refer to the setting of minimum or maximum prices by the government so that prices are unable to adjust to their equilibrium level determined by demand and supply.
- If a <u>minimum price</u> (price floor) is set above the equilibrium, a surplus will result. Minimum prices are set as a means of protecting the incomes of producers.
- If a <u>maximum price</u> (price ceiling) is set below the equilibrium price, a shortage will result. Maximum prices are set as a means of keeping prices down to protect consumers' welfare. The resulting shortage will cause queues and black markets are likely to arise.
- Price controls differ from indirect taxes and subsidies in that it results in shortages (excess demand) or surpluses (excess supply), i.e. persisting market disequilibrium.
- Quotas aim to limit the production quantity and in that process, help the government achieve certain goals.

Microeconomics Lecture Notes Price Mechanism and its applications