ST ANDREW'S JUNIOR COLLEGE
JC1 H2 ECONOMICS 2023

The theme on Price Mechanism and its Applications provides an introduction on how markets deal with the Central Problem of Economics, and how decisions are made by self-interested consumers and producers in markets. You will learn how market forces of demand and supply interact to bring about market equilibrium, allocating resources via the price mechanism to maximise social welfare. You will also be able to apply this knowledge to analyse market outcomes in different situations.

PRICE MECHANISM AND ITS APPLICATIONS PART 1: DEMAND, SUPPLY AND PRICE DETERMINATION

Reading List and References

1. Colander, David. C (2006) "Supply and Demand" in *Economics*. 6th Edition, New York: McGraw Hill p 102-108
2. Colander, David. C (2006) "Using Supply and Demand" in *Economics*. 6th Edition, New York: McGraw Hill p 114-128
3. Sloman, John "Supply and Demand" in *Economics*. 6th Edition, UK: Prentice Hall
4. Colander, David. C (2006) "Using Supply and Demand" in Economics. 6th Edition, New York: McGraw Hill p 114-128
5. Economic Review, Volume 27 No. 1 September 2009 p.15-17
6. Mankiw, N. Gregory, Quah, Euston and Wilson, Peter (2008) "In the News" in Principles of Economics. An Asian Edition, Cengage Learning Asia Pte Ltd p 79

Learning Objectives

By the end of this series of lectures and tutorials, you should be able to:

- Define demand and state the law of demand.
- Explain why the demand curve is downward sloping.
- Explain the relationship between individual demand and market demand.
- Explain the price and non-price determinants of demand.
- Distinguish the effects of a change in price and non-price factors of demand.
- Define consumer surplus.
- Illustrate and explain changes in consumer surplus diagrammatically.
- Define supply and state the law of supply.
- Explain why the supply curve is upward sloping.
- Explain the relationship between individual supply and market supply.
- State and explain the price and non-price determinants of supply.
- Distinguish the effects of a change in price and non-price factors of supply.
- Define producer surplus.
- Illustrate and explain changes in producer surplus diagrammatically.
- Define market equilibrium.
- Explain how market equilibrium is determined via the price mechanism diagrammatically.
- Explain how equilibrium price and quantity adjusts with changes in demand and/or supply.
- Explain the rationale for (i) price ceilings, (ii) price floors, (iii) indirect taxes, (iv) subsidies, and (v) quotas, and explain how they affect the market equilibrium.

Concepts and Tools of Analysis

- Price mechanism
- Ceteris paribus

- Demand and its determinants
- Change in demand vs. change in quantity demanded
- Supply and its determinants
- Change in supply vs. change in quantity supplied
- Market equilibrium – equilibrium price and quantity
- Market disequilibrium – shortage and surplus
- Consumer expenditure and producer revenue
- Consumer and producer surplus
- Taxes and subsidies
- Price controls – maximum and minimum prices
- Quantity controls – quotas

INTRODUCTION

In the previous chapter, we were introduced to the Central Economic Problem and why economic agents need to make choices and incur opportunity costs. We also learnt how economic agents make decisions using the decision-making framework. In this chapter, we will examine in greater detail how markets deal with the Central Economic Problem and how decisions are made by economic agents in markets.

1. PRICE MECHANISM AND ITS FUNCTION

In any economic system, scarce resources have to be allocated among competing uses. In the free economy, **the price mechanism allocates scarce resources through signaling, incentive and rationing functions.**

- **Signaling function**. Changes in the forces of demand and supply determine the changes in the prices of an economy's goods and services. Changes in prices provide information to producers and consumers about changes in market conditions. For example, if prices are rising due to higher demand, this is a signal to producers to expand production.
- **Incentive function:** Changes in prices provide incentives for producers to reallocate their scare resources. For example, rising prices act as an incentive for producers to allocate more resources to earn more profits.
- **Rationing function:** Changes in prices enable scarce resources to be rationed to the parties who are most willing to pay. For example, when there is a shortage, those with greater willingness and ability to pay will bid up the price of the good, thus enabling the goods to be rationed to these buyers.

Before looking at how the price mechanism works in the free market, we need to understand the factors that affect the forces of both demand and supply. Then we will be able to recognise how prices of goods and services are determined and explain how prices change through demand and supply analysis.

Introduction to Demand and Supply

How does Economics help us to understand the world around us? Read the short extract below:

Rising food prices

International food prices soared to around two-year highs in June, fuelled by higher prices for wheat, meats and dairy products such as butter. In fact, global meat prices have risen every month so far this year, and the gains have outpaced most other major food commodity groups, according to data released Thursday by a United Nations agency.

Analysts say stronger global demand for meat is helping to keep prices strong. Beef is one of the fastest-growing meat categories in Asia, and the U.S. last month returned to shipping supplies to the Chinese market for the first time in 13 years.

According to the U.N. Food and Agriculture Organization's Food Price Index, global food prices are up 7 percent from a year ago and ahead 17 percent from a low set in early 2016. The monthly index, which in June was up 1.3 percent from May, is a trade-weighted index which tracks prices of meats, dairy, sugar, cereals and vegetable oil in more than 80 countries.

Have you wondered how prices of food are determined? What led to the increase in food prices observed? How may a government intervene to prevent the prices from rising further?

To answer these questions, we need to understand the interplay of demand and supply in the market.

The price mechanism explains how the price and quantity of a good or service are being determined or influenced in the market.

Every market has two sides – a demand (buying) side from the consumers and a supply (selling) side from the producers.

Buyers and sellers in a market are led by an *invisible hand* (as characterised by Adam Smith) to determine the equilibrium price and quantity in the market. The *invisible hand* is a metaphor used to describe the self-regulating behaviour of the marketplace (through the interaction of the forces of demand and supply) to reach market equilibrium automatically. As illustrated in Figure 1 below, the equilibrium price (P_e) and equilibrium quantity (Q_e) of a good are determined by the intersection of both the demand (D) and supply (S) curves. Changes in demand for and/or supply of a good will cause the demand and/or supply curves to shift. This will lead to a change in the market equilibrium price and quantity.

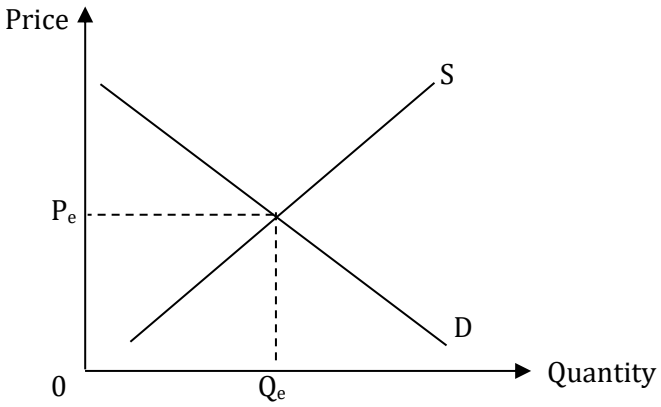


Figure 1: Determination of equilibrium price and quantity

We will first look the demand side of the market, followed by the supply side before we learn how a market achieves a state of equilibrium.

2. THEORY OF DEMAND

2.1 Definition of Demand

Demand is the quantity of a good or service that a consumer is **willing and able** to buy at various prices in a given period of time (e.g., a day, a month, a year, etc.), ceteris paribus.

Demand is a function showing the relationship between the price and quantity demanded for a good or service, at all prices. In contrast to demand, **quantity demanded** is the total amount of a good or service demanded **at a given price**.

"Ceteris paribus" is a latin phrase that means "all other things being unchanged or constant' – in the above case, it is assumed that none of the other determinants of demand, other than price, changes.

2.2 Demand Curve

Consumers, through the market, have an influence over what and how much of a good or service is to be produced. This is what we call **consumer sovereignty** in economics.

Consumer demand – the quantity of a good or service consumers are willing and able to purchase at each price – is shown graphically as a demand curve, which shows a graphical representation of the inverse relationship between price of a good or service and its quantity demanded. A hypothetical market demand curve for corn is shown in Figure 2.

TIPS

To remember that the demand curve slopes downwards, and not upwards, remember: D is for Demand, and D is for Downward sloping!

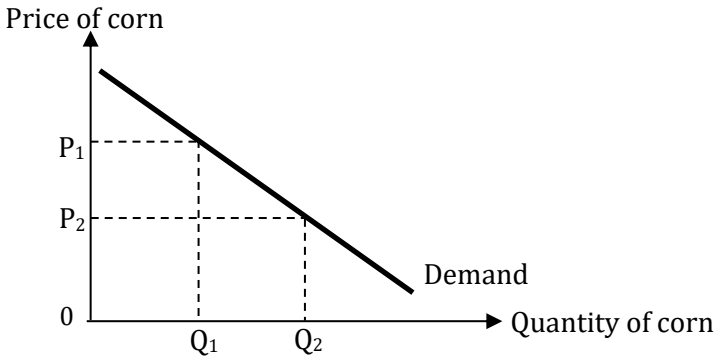


Figure 2: Market demand curve of corn

Since there is an inverse relationship between price and quantity demanded, the demand curve, therefore, reflects the law of demand and slopes downwards from left to right.

Why is the demand curve downward sloping?

Consumers will only choose to buy more goods and services at lower prices rather than at higher prices, ceteris paribus. This is due to the **Law of Diminishing Marginal Utility (LDMU)**:

The Law of Diminishing Marginal Utility (LDMU)

When making consumption decisions, consumers consider the perceived satisfaction they derive from consuming the good or service. This perceived satisfaction is referred to as 'utility'.

The **Law of Diminishing Marginal Utility** states that beyond a certain point of consumption, as more and more units of a good or service are consumed in a given period of time, the additional utility a consumer derives from the consumption of each additional unit decreases.

The increase in utility from the consumption of each additional unit of the good or service (marginal utility) is less than previous units, even though total utility increases.

For example, a second ice cream cone will yield less satisfaction than the first one, a third ice cream cone will yield less satisfaction than the second one, and so on.

It follows from the law of diminishing marginal utility that if consumers are deriving less satisfaction from additional units, they will buy these additional units only if the prices were reduced. This is because the price of a good is indicative of the amount of utility derived from the consumption of the good. This results in a downward sloping demand curve which shows the inverse relationship between price and quantity demanded. This brings us to the law of demand.

2.3 The Law of Demand

The **law of demand** states that there is an inverse relationship between price and quantity demanded for a good or service, ceteris paribus.

That is, when the price of the good or service increases, its quantity demanded falls. Conversely, when the price of the good or service falls, its quantity demanded increases, ceteris paribus.

2.4 Individual vs. Market Demand

Individual demand refers to the quantity of a good or service an individual is willing and able to buy at each and every price in a given period of time, ceteris paribus.

Market demand refers to the total quantity of a good or service that all individuals in a market would be willing and able to buy at each and every price in a given period of time, ceteris paribus. Market demand is thus the summation of individual demand.

The individual demand curve is a graphical representation of the relationship between the price and quantity demanded by that individual. It therefore shows the quantity of a good or service (such as corn) demanded by the individual at *each* price, with other factors that affect quantity demanded held constant.

Since a market consists of many individual buyers, the market demand curve of a good or service can thus be obtained by a horizontal summation of all the individual demand curves for the good or service at each and every price.

For example, assuming there are only two consumers in the market for corn with their respective quantity demanded at various prices (see Figure 3a and 3b). The market quantity demanded would be 7 units at $10 and 15 units at $6. (See Figure 3c).

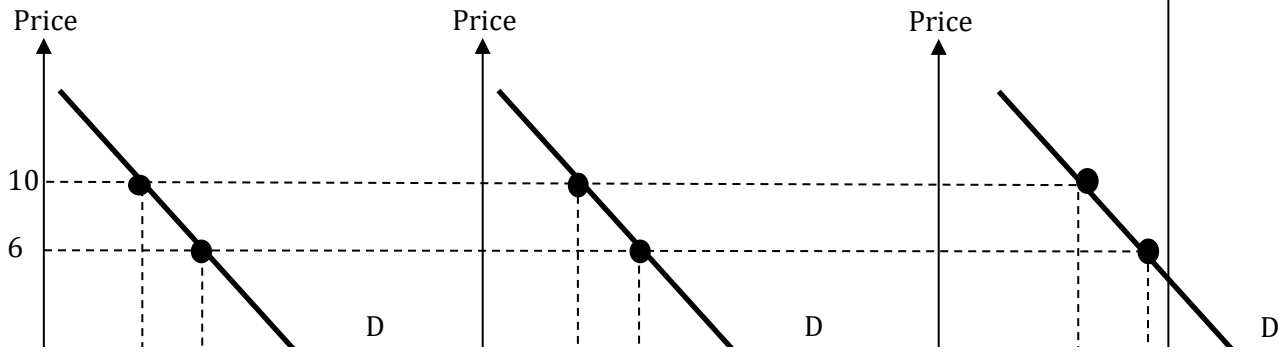


Figure 3a: Individual A's demand for corn

Figure 3b: Individual B's demand for corn

Figure 3c: Market demand for corn

2.5 Price and Non-Price Determinants of Demand

(A) Price Determinant of Demand – Price of the good

Recall the Law of Demand: there is an inverse relationship between price and quantity demanded for a good or service, ceteris paribus.

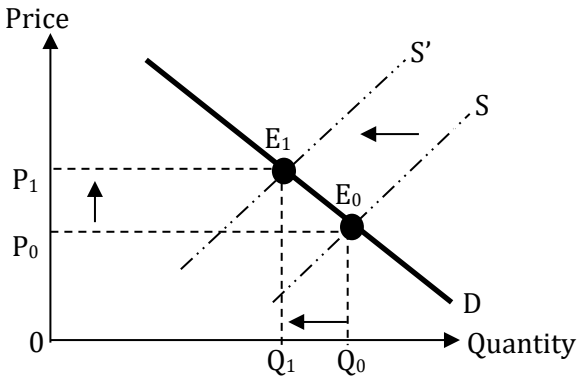


Figure 4: Effect of a change in price of a good (Movement along the demand curve)

According to the Law of Demand, if the price of corn increases, ceteris paribus, the quantity demanded for corn decreases as consumers are now less willing and able to purchase as many units of corn as before.

With reference to Figure 4, the initial price is at P_0, where the quantity demanded for corn is Q_0. When its price increases from P_0 to P_1, the quantity demanded for corn falls from Q_0 to Q_1.

The change in price of corn brings about a change in quantity demanded for corn and this is represented by a movement along the demand curve, from initial equilibrium point E_0 to new equilibrium point E_1.

Take note that the price of the corn did not change arbitrarily but was due to changes in the supply of corn. We will learn more about how prices change in section 4.

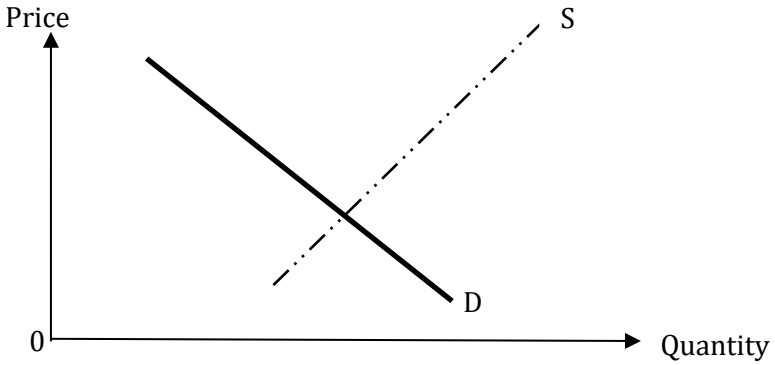
(B) Non-Price Determinants of Demand

Do you still remember the difference between **demand** and **quantity demanded**?

While a change in the price of a good or service is said to lead to a change in its quantity demanded (a movement along the demand curve), other non-price factors that influence the demand for a good or service, will cause a shift of the demand curve as illustrated in Figure 5.

Any factor which causes a change in the ***quantity demanded for a good at each and every price***, will ***shift the entire demand curve***. When this happens, there is a change in the demand for the good or service.

To have a better idea of how the demand curve shifts, let's draw this out together on a diagram.



An increase in demand is denoted by a rightward shift of the demand curve, e.g., from D to D' in Figure 5 below. Conversely, a decrease in demand is denoted by a leftward shift of the demand curve.

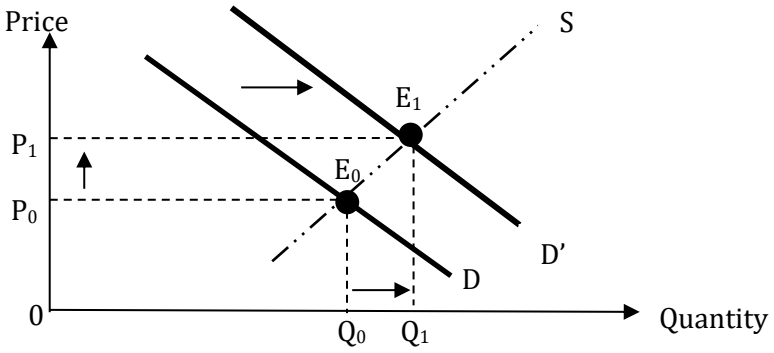


Figure 5: Shift of demand curve

In the next section, we will look at some factors (also known as non-price determinants of demand) that may result in a shift in the demand curve.

(i) Consumers' Income

Effect of changes in consumers' income on demand

When income[1] increases, consumers' purchasing power increases, this implies that their ability and willingness to buy more goods and services has increased. Thus, the demand for ***most*** goods and services will increase. These goods are known as *normal goods*. Most goods you see around you are normal goods.

Examples: Smart phones, iPad, designer clothes.

> **Normal goods** are goods or services which consumers will demand more of when their income increases.

For example, when the country experiences economic growth, consumers generally will receive more income, increasing their purchasing power which is the ability to buy more goods and services.

An increase in income will lead to an increase in the demand for normal goods, ceteris paribus. This is reflected by a rightward shift of the demand curve from D to D' in Figure 6(i). At any given price, quantity demanded has increased.

For example, at P_1, quantity demanded has increased from Q_1 on the original demand curve, D, to Q_1' on the new demand curve D'. Eventually, equilibrium price will rise to P_2, and equilibrium quantity will rise to Q_2.

On the other hand, rising income may also cause the demand for some goods and services to decrease. During an economic boom, most consumers may experience a rise in income, making second-hand items less popular as consumers may prefer brand new products now that they are better able to afford them. Hence, items such as second-hand clothing can be considered as inferior goods as its demand will decrease as income increases.

These goods are known as *inferior* goods.

Examples: Canned food, instant noodles, etc.

> **Inferior goods** are goods or services which consumers will demand less of when their income increases and demand more when income falls.

An increase in income will lead to a fall in the demand for inferior goods. This is illustrated by the leftward shift of the demand curve from D to D' in Figure 6(ii). At any given price, quantity demanded has decreased.

For example, at P_1, quantity demanded has decreased from Q_1 on the original demand curve, D to Q_1' on the new demand curve D'. Eventually, equilibrium

[1] The abbreviation for income in Economics is 'Y'.

price will fall to P_2, and equilibrium quantity will fall to Q_2. You will learn how this occurs in Section 4 on Price Determination.

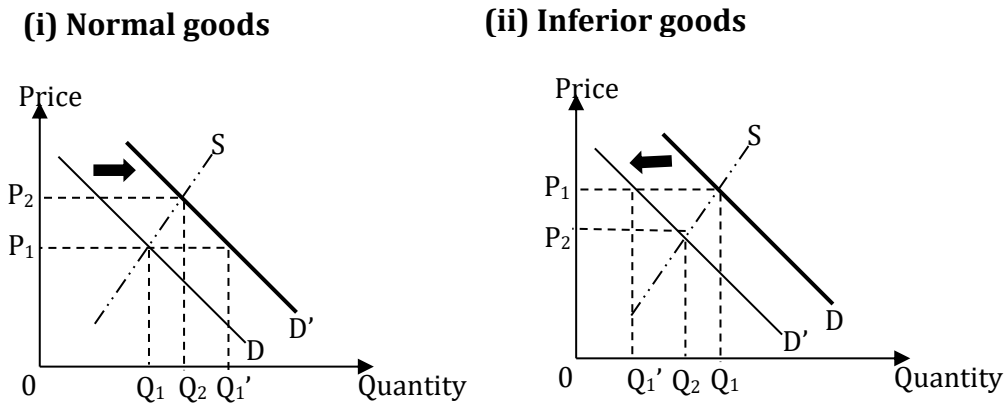


Figure 6: Effect of a rise in income on the demand curve for normal and inferior goods

With the use of a diagram, explain the effect of a fall in income on the demand for (i) smart phones and (ii) second hand clothing.

(ii) Price of Related Goods

a) Substitutes

Two goods are said to be **substitutes** when they are in competitive demand i.e., they can be used to satisfy the same want.

In such a case, there is a *positive* relationship between the demand for Good X and the price of Good Y, its substitute. When the price of Good Y falls (cause), the demand for Good X falls (effect). Conversely, an increase in price of Good Y (cause) leads to an increase in demand for Good X (effect).

Example: Butter and Margarine

When the price of margarine decreases from P_1 to P_2 (due to a rightward shift of the supply curve S_1 to S_2), the quantity demanded for margarine will increase from Q_1 to Q_2. Thus, the demand for butter, which is a substitute for margarine, will decrease from D_1 to D_2, as some consumers switch from consumption of butter to the cheaper margarine.

(i) Market for Margarine **(ii) Market for Butter**

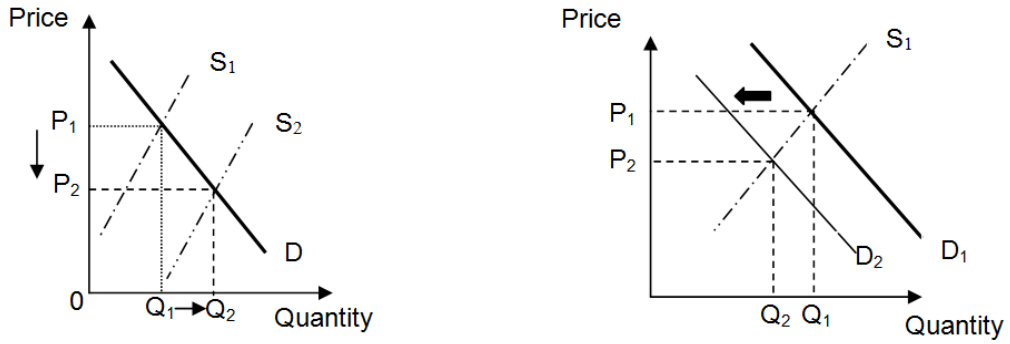


Figure 7: Effect on demand curve for butter when the price of margarine decreases due to increase in supply

- ***What could be a substitute for tea?***

- ***How will the rise in the price of a substitute for tea affect the demand for tea?***

b) Complements

Goods are **complements** when they are jointly demanded i.e., the use of one to satisfy a want requires the use of the other.

In such a case, there is an inverse relationship between the demand for Good X and the price of Good Y, its complement. When the price of Good Y falls (cause), the demand for Good X increases (effect). Conversely, an increase in the price of Good Y (cause) leads to a decrease in demand for Good X (effect).

Example: Motor Cars and Petrol

If the price of motor cars decreases from P_1 to P_2 (due to a rightward shift of the supply curve S_1 to S_2), the quantity demanded for motor cars will increase from Q_1 to Q_2. Since petrol is essential for the use of motor cars, the demand for petrol is likely to increase from D_1 to D_2, ceteris paribus.

(i) Market for Motor Cars **(ii) Market for Petrol**

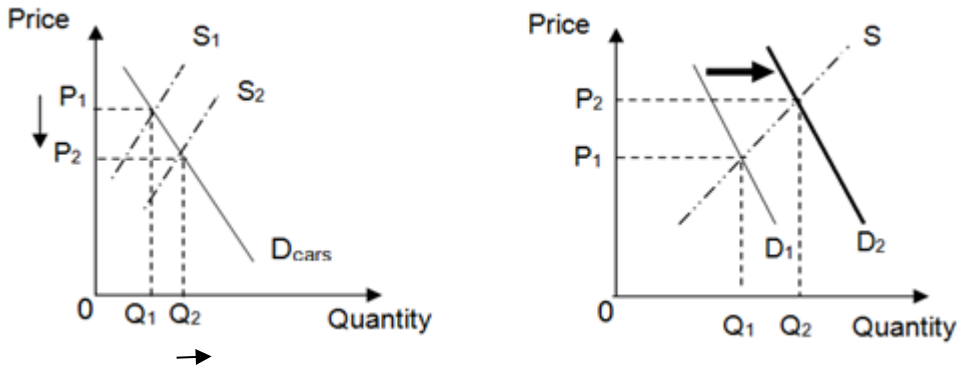


Figure 8: Effect on the demand curve for petrol when the price of cars decreases

(iii) Derived Demand for Factors of Production

Recall from the previous topic that factors of production are resources used to produce goods and services. The demand for a factor of production is **derived from the demand for a final good or service** that uses the factor of production in the production process.

Example: Motor cars and steel

When the demand for motor cars rises, the manufacturers of motor cars (e.g., BMW, Mercedes Benz, Toyota, etc.) will need to increase their demand for steel to produce more motor cars. Hence, when the demand for motor car rises, the **derived demand** for steel rises as well. This will lead to an increase in price of steel.

Using demand and supply diagrams, illustrate what happens in the market for the final good (motor cars) and the market for the factor of production (steel).

You need to clearly differentiate between complements (joint demand) and factors of production (derived demand). Complements are consumed **together**, while factors of production are used in the production of the final good or service, but not consumed together with it.

(iv) Expectation of Price or Income Changes

- If consumers expect the price of a given good or service to change in the near future, they are likely to adjust their demand in the present accordingly.

  For example, if consumers expect iPhones to be cheaper in the future, they tend to withhold their purchase, causing the **current demand** for iPhones to **decrease**. Hence, at each and every price, quantity demanded decreases, illustrated by a leftward shift of the demand curve.

- Likewise, if consumers expect their income to change in the near future, they are likely to adjust their demand for a good in the present accordingly.

  For example, if consumers expect their income to decrease in the future due to an impending recession, they will tend to save some money now, causing the **current demand** for goods and services to **decrease**. Hence, at each and every price, quantity demanded decreases. This is illustrated by a leftward shift of the demand curve.

(v) Tastes and Preferences

Since market demand is affected by consumers' willingness to purchase different goods and services, the tastes and preferences of consumers play an important role in influencing the market demand for goods and services.

For example, a change in tastes and preferences from personal computers to laptops would shift the demand curve for personal computers to the left and the demand curve for laptops to the right.

- ***Advertising***

The aim of an advertisement is to influence consumers' tastes and preferences. In highly competitive markets, a successful advertising campaign will increase the demand for a good or service.

Advertisements do not refer only to those on the television and radio. Print advertisements, advertisements on social media, product placements and celebrity endorsements (e.g., David Beckham for Pepsi) are also important in influencing the demand for many goods in the world today.

What other factors can change consumers' tastes and preferences?

(vi) Government Regulation

Changes in government regulation can result in a change in the quantity demanded of a good or service at each and every price. For example, the government ruling on the compulsory use of child safety seats for all children under the age of 8, when travelling in vehicles will lead to an increase in the demand for child safety seats.

(vii) Population (Size and Composition)

Changes in population must be relevant to the product. E.g., if there was an increase in the population size, due to migration, it doesn't mean that the demand for diapers will increase.

Size, composition, age and gender distribution, culture and religion are some aspects of the population that will affect the demand for certain goods. For example, an increase in birth rate will increase the demand for baby products (e.g., diapers and prams), and shift the demand curve for such products to the right. An ageing population, on the other hand, may lead to an increase in demand for healthcare and wheelchairs.

(viii) The Availability and Cost of Hire-Purchase Financing or Credit Facilities

Hire-purchase financing involves the purchase of a good or service now and payments are through instalments spread over a period (e.g., payment of a small sum every month until the full price of the good is paid for). This is prevalent especially for more expensive consumer durables (e.g., refrigerators and cars). Examples of firms that provide such hire-purchase financing schemes include Courts, Best Denki, Harvey Norman.

If firms are more stringent in hire-purchase terms or credit facilities e.g., higher down payments required, it can curb the demand for consumer durables because consumers who do not have the ability to pay for the goods and services in full will not form part of the market demand. However, if hire purchase/loans are relaxed, then the demand for these items will increase as more consumers will be able to purchase these goods and services.

Banks provide credit facilities (loans) for the purchase of "big ticket items" such as houses, cars and other consumer durables such as computers, refrigerators, furniture.

Changes in interest rates could affect the demand for goods and services. Interest payments are the cost of borrowing money. Changes in interest rates can change the amount of interest payable for the same amount of loan obtained.

If the interest rate increases, it becomes more expensive to borrow money to buy the good. Hence, the demand for these goods decreases. On the other hand, if interest rate decreases, it is cheaper to borrow money. Consumers will be more willing to borrow money to purchase such goods and the demand for the good increases.

Section Check

Can you distinguish between:

i) a change in quantity demanded for a good and a change in the demand for a good?

ii) a movement along the demand curve for a good and a shift in the demand curve for a good?

One easy way to remember most of the non-price determinants of demand is **EGYPT**.

E: Expectations of price changes
G: Government regulations
Y: Income, income distribution
P: Price of related goods (complements, substitutes), population
T: Tastes and preferences

3. THEORY OF SUPPLY

3.1 Definition of Supply

Supply is the quantity of a good or service that a producer is willing and able to produce and sell at various prices in a given period of time, ceteris paribus.

3.2 Law of Supply

The **law of supply** states that there is a direct relationship between price and quantity supplied of a good or service, ceteris paribus.

3.3 Supply Curve

The supply curve is a graphical representation of the relationship between price and quantity supplied of a good or service. Since there is a direct relationship between price and quantity supplied of corn, the supply curve slopes upwards from left to right. A hypothetical supply curve of corn is shown below.

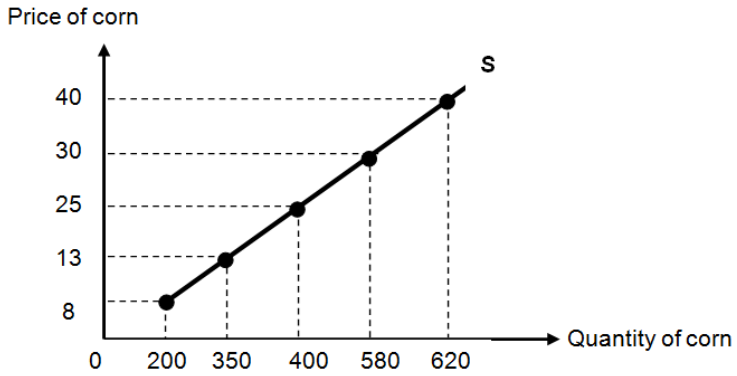


Figure 11: Supply curve for corn

In Figure 11, the supply curve shows the direct relationship between price and quantity supplied of corn. For example, when the price of corn is $25, the quantity supplied is 400 units. When the price increases to $30, the quantity supplied increases to 580 units. On the other hand, when the price falls to $13, the quantity supplied falls to 350 units.

Hence, when the price of corn increases, the quantity supplied of the corn will also increase and when the price of corn decreases, the quantity supplied will also decrease.

Why is the supply curve upward sloping?

This is due to the **law of supply.** There are three reasons:

1. **Profit motive**. When there is an increase in the price of a good or service, producers will increase quantity supplied of the good or service. This is because the higher the price of the good or service, the more profitable it becomes to produce, *assuming that the unit cost of producing the good or service does not change.* Producers will thus be encouraged to produce more of it by allocating more resources by switching from producing less profitable goods and services.

   When there is a fall in price of a good or service, producers will decrease quantity supplied of the good or service. This is because the lower the price of the good or service, the less profitable it becomes to produce. Producers will thus produce less of it and switch to produce more profitable goods and services.

2. **Production costs**. As firms produce more, the *marginal cost*[2] of producing an additional unit of the good or service increases. Beyond a certain level of output, costs are likely to increase rapidly as workers have to work more hours and more machines have to be purchased, to increase the amount of goods that can be produced per unit time, as existing machines approach full capacity. If higher output involves higher costs of producing each unit, producers will need to get higher price if they are to be persuaded to produce extra output. Hence, there is a direct relationship between price and quantity supplied.

3. **New entrants into the market**. When there is an increase in price of a good or service, new firms may enter the market, leading to an increase in quantity supplied.

[2] Marginal cost refers to the additional cost borne by the producer in producing an additional unit of a given good.

3.4 Individual Supply vs. Market Supply

Individual supply refers to the quantity of a good or service supplied at various prices by one producer or firm in the industry in a given period of time, ceteris paribus. It represents the set of lowest prices that will induce an individual seller to supply the various quantities of a good or service.

Market supply refers to the quantity of a good or service supplied at various prices by all the producers or firms in the industry in a given period of time, ceteris paribus. At each price, the total quantity supplied of a good or service in the market is the total amount of goods or services supplied by all the producers of that good or service.

The market supply curve is the horizontal summation of all individual supply curves. For example, assuming there are only two producers in the market for corn with their respective quantity supplied at various prices (see Figure 12a and 12b). The market quantity supplied would be 5 units at $6 and 9 units at $10 (see Figure 12c).

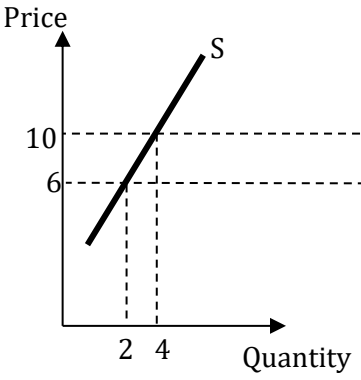


Figure 12a: Producer A's supply of corn

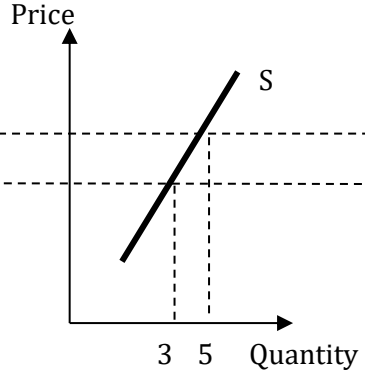


Figure 12b: Producer B's supply of corn

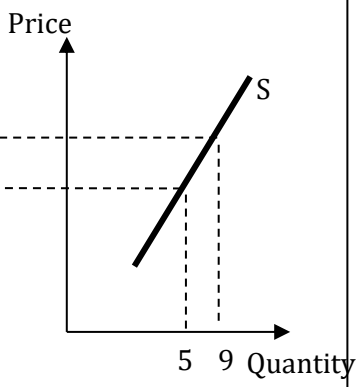


Figure 12c: Market supply of corn

3.5 Price and Non-Price Determinants of Supply

(A) Price Determinant of Supply – Price of the good

The Law of Supply states that there is a direct relationship between price and quantity supplied of the good or service, ceteris paribus.

A change in the price of the good or service leads to a change in the quantity supplied of a good or service. This is denoted by a movement along the supply curve.

For example, in Figure 13, if the price of corn increases from P_1 to P_2, the quantity supplied of corn increases from Q_1 to Q_2 units. The increase in the price of corn brings about a movement from point A to point B along the supply curve.

Take note that the price of the corn did not change arbitrarily but was due to changes in the demand for corn. We will learn more about how prices change in section 4.

You should refer to the section on non-price determinants of demand for possible reasons for the change in demand for corn.

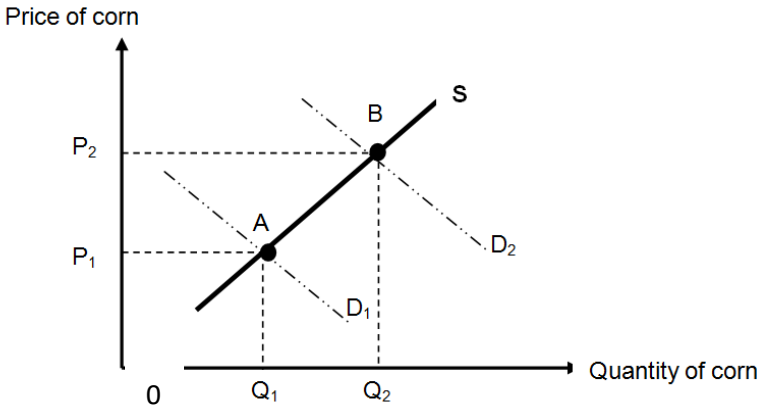


Figure 13: Effect of a change in price of a corn (Movement along the supply curve)

<u>Movement Along vs. Shift in Supply Curve</u>

A change in the price of a good or service is said to lead to a change in quantity supplied (movement along the supply curve). Any factor which causes a change in the quantity supplied of a good or service at *each and every* price, will shift the entire supply curve. When this happens, there is a change in the supply of the good or service.

A *change in supply* is denoted by a *shift in the entire supply curve* either to the right (increase) or the left (decrease).

B) Non-Price Determinants of Supply

The supply curve of a good or service may change if a factor in the decision-making process changes. Below, we will look at some factors (also known as non-price determinants of supply) that may result in a shift in the supply curve.

The factors affecting supply are:

(i) Prices of related goods

a. Competitive Supply

Two goods are considered to be competitive in supply when an increased production of one means diverting resources away from producing another.

Example: A piece of arable land can be used to produce either wheat or corn. If more land is used to produce wheat, this means that less land will be available for the cultivation of corn.

Thus, wheat and corn are said to be in competitive supply as the same piece of land can only be used to produce either wheat or corn at any one time.

Referring to Figure 14, suppose there was a decrease in the price of corn from P_1 to P_2, ceteris paribus, producers will find it relatively more profitable to produce wheat.

A decrease in the price of corn from P_1 to P_2 will lead to a decrease in quantity supplied of corn from Q_1 to Q_2 as farmers switch from corn to wheat cultivation. This results in an increase in the supply of wheat from S_w to S'_w.

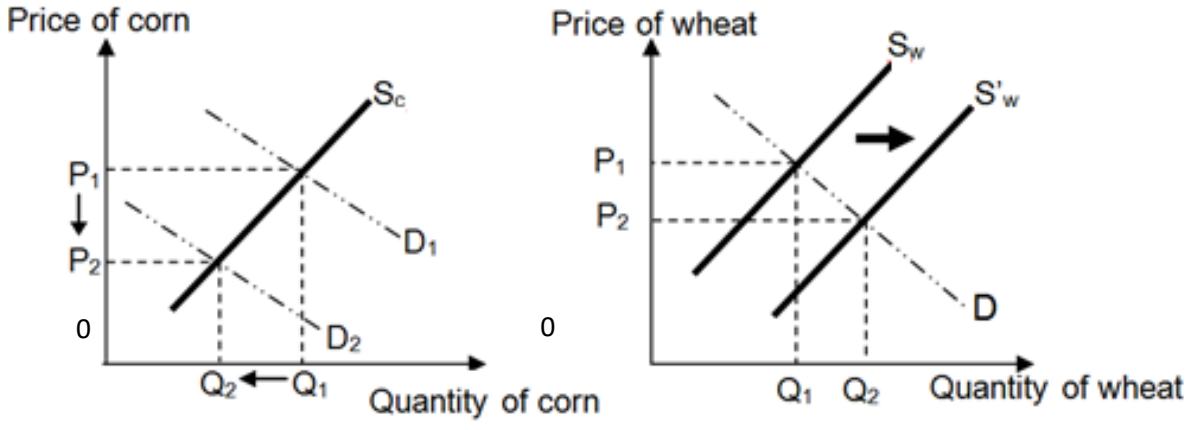


Figure 14: Corn and wheat are in competitive supply

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Sometimes goods that are competitive in supply are also termed as "substitutes in production".

b. Joint Supply

Goods are said to be in joint supply when an increase in the production of one good concurrently leads to an increase in the production of another good.

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Sometimes goods that are in joint supply are termed as "complements in production".

Example: Beef and hide

In Figure 15, when the price of beef decreases from P_1 to P_2 due to a fall in demand, ceteris paribus, the quantity supplied of beef decreases from Q_1 to Q_2. As fewer cows are slaughtered, there is a decrease in the supply of hide. The supply curve of hide will shift to the left from S_X to S'_X.

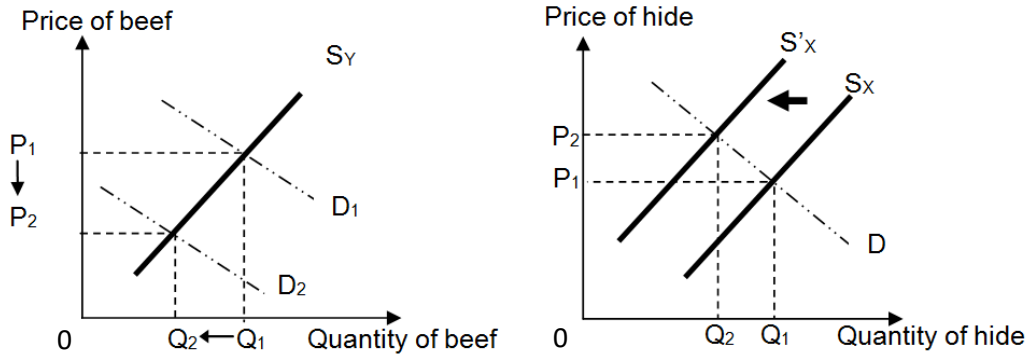

Figure 15: Joint supply - Beef and hide

Are wool and mutton in joint supply? Explain your answer.

(ii) Cost of Production (Prices of Factors of Production)

Factors of production are the resources employed to produce goods and services. These include all the inputs required for production e.g., labour, raw materials, fuel, capital goods such as machines and factories, etc.

The prices of all the factors of production or inputs required to produce a good or service constitute the costs of production for that good or service.

When costs of production increases, ceteris paribus, the supply of the good or service decreases. For example, an increase in the price of fertilisers will cause the cost of producing corn to increase. Ceteris paribus, producers will be less willing and able to produce corn because it has become less profitable to do so, leading to a decrease in supply of corn, from S_1 to S_2 in Figure 16.

However, when wages (price of labour) of farmers fall, the cost of producing corn will decrease. Producers will be more willing and able to produce corn because it is more profitable to do so, and the supply of corn will increase from S_1 to S_3 in Figure 16.

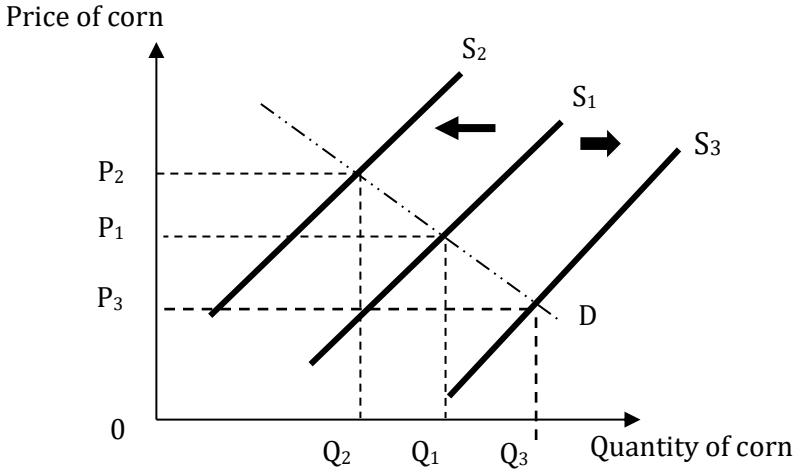

Figure 16: Effect of changes in the costs of production on supply of corn

(iii) Government Policies *(Refer to Section 5.3 and 5.4 for more details on how indirect taxes and subsidies will affect supply)*

a. Indirect Taxes

Indirect taxes are taxes imposed on goods and services and are paid indirectly (by producers) to the government. The imposition of an indirect tax on goods and services (intermediate and final) will have an effect similar to an increase in the cost of producing the good, thus decreasing the profitability and therefore the willingness and ability to produce. Supply falls, ceteris paribus.

On the other hand, the removal/reduction of a sales tax (an indirect tax) will have an effect similar to a reduction in the costs of producing the good or service, increasing profitability and thus encouraging production. Therefore, supply increases.

b. Subsidies

This is a form of financial support provided by the government to assist in the production of certain goods to keep prices low for consumers. The provision or increase of a subsidy on the production of a good or service will have an effect similar to a reduction in the costs of production, increasing profitability and hence increasing the supply, ceteris paribus.

Conversely, the removal or reduction of a subsidy will have an effect similar to an increase in the cost of production, reducing profitability of producing the good or service and thus causing a fall in supply.

(iv) Technology

Technology is assumed to be constant for a given supply curve. Technological changes take place over time as a result of discoveries and innovation. An improvement in the state of technology increases the productivity of factors of production increases the amount of goods or services that can be produced in a given time period, increasing supply.

With improved production methods due to technological advancements, the costs of producing a given good or service will decrease. This may be because more units of a good or service can be produced for a given amount of factors of production. Hence, the unit cost of production falls, increasing the profitability of producing a good or service. Supply of the good or service will increase and the supply curve shifts to the right.

(v) Weather and Natural Conditions

Examples of weather and natural conditions include droughts, floods, earthquakes, diseases and fire. These natural conditions are beyond the control of the producers and are especially relevant to the supply of agricultural products. Supply of agricultural products such as fruit, wheat and rice are likely to decrease during adverse weather conditions like floods. In contrast, favourable weather conditions can bring about a bumper harvest of crops which leads to an increase in its supply.

Vegetables to cost more due to Malaysia floods

Vegetable prices are increasing due to damage to crops by the floods. With many roads also cut off by the floods, produce has become scarce. Checks by The Star here showed prices of vegetables increasing by between 20 per cent and 50 per cent with many vegetable traders saying they were struggling to obtain supplies.

Johor Fama director Faridulatrash Md Mokri said vegetable supply started getting low about a week ago with prices rising by 40 per cent to 50 per cent. Tomatoes had risen from RM3 (S$1.15) to RM4.50 per kg while cucumber and French beans had shot up from RM0.80 to RM3 per kg and RM6 to RM9 per kg respectively.

Adapted from AsiaOne News. 5 Jan 2015

(vi) Expectations of Future Price Changes

If producers expect the price of a given good or service to change in the future, and have the option of stockpiling the good or service, they may adjust their supply in the current time period accordingly.

If coal producers expect coal to be more expensive in the future, they may stockpile coal for sale in the future because it will be more profitable to sell coal in the future than in the current time period. Conversely, if coal producers expect coal to be cheaper in the future, they will release their stockpiles of coal for sale in the current period, increasing current supply. When deciding to stockpile, one of the factors that producers consider is the cost of stockpiling as the high cost of stockpiling may outweigh the potential increase in revenue due to the higher expected prices.

One easy way to remember most of the non-price determinants of supply is **WETPIGS**.

W: Weather and natural conditions
E: Expectations of price changes
T: Technology
P: Price of related goods (competitive supply, joint supply)
I: Input prices (cost of factors of production)
G: Government policies (indirect taxes, subsidies, etc.)
S: Suppliers (number of)

4. PRICE DETERMINATION

4.1 The Interaction of Demand and Supply

After looking at both demand and supply of the market, we will now proceed to understand how the market/price mechanism works. It shows how supply and demand forces determine prices in a free market and how prices, in turn, allocate the economy's scarce resources.

4.2 Market Equilibrium

Market equilibrium refers to a situation where there is no further tendency for the transacted price or quantity of a good in the market to change, unless external forces disturb the situation.

Equilibrium is the point where conflicting interests among economic agents are balanced. Only at this point is the amount that consumers are willing to purchase the same as the amount that producers are willing to produce. *In other words, market equilibrium refers to a point where the market "clears" i.e., the quantity demanded is equal to the quantity supplied.*

The Determination of Market Equilibrium via the Price Mechanism

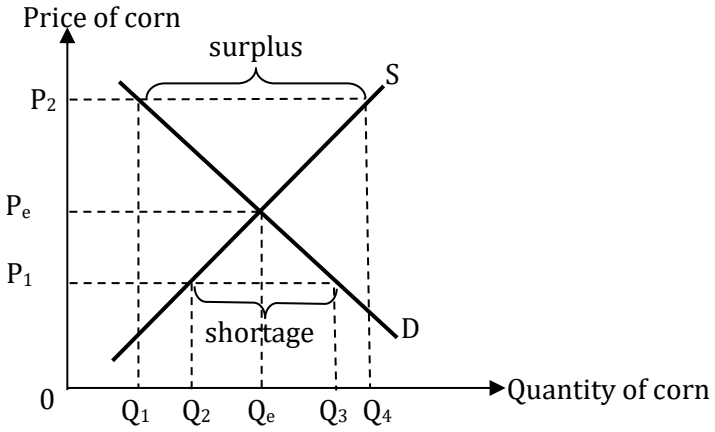

Figure 18: The Determination of Equilibrium in the market for corn

Explanation of the adjustment process:

a) What happens when the price is at P_1?

At price P_1, in Figure 18, there will be a shortage of Q_2Q_3 as the quantity supplied (Q_2) is less than quantity demanded (Q_3). The market is in disequilibrium. There is an upward pressure on price as consumers compete among themselves for the good by bidding up the price. As the price increases, the quantity demanded decreases (movement upwards along the demand curve). At the same time, the higher prices will signal to

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For shorter questions, the full price adjustment process is not necessary. Simply explain that (i) there is a shortage at original equilibrium price, and therefore there is an upward pressure on prices, or (b) there is a surplus at original equilibrium price, and therefore there is a downward pressure on prices.

producer to increase their quantity supplied (movement upwards along supply curve). This process of consumers bidding with higher prices and producers increasing their output will continue until the equilibrium is achieved at price P_e.

At the market equilibrium, quantity demanded is equal to quantity supplied at price P_e and quantity Q_e. This means that consumers who are willing and able to pay the price for the good can get the quantity they want. Similarly, producers who are willing and able to supply at that price can sell all the quantity that they produce.

There is thus no tendency for the price and quantity to change unless the equilibrium is upset by some external forces such as a change in either demand (e.g., a health scare) or supply condition (e.g., change in weather condition).

b) What happens when price is at P_2?

At P_2, in Figure 18, there is a surplus of Q_1Q_4 as quantity supplied (Q_4) exceeds quantity demanded (Q_1). The market is in disequilibrium. There is a downward pressure on prices as producers lower the price to clear their stocks of unsold goods. The lower prices will also signal to producers to reduce their quantity supplied. As the price decreases, consumers will increase their quantity demanded. This process of producer reducing their output and consumers increasing their quantity demanded will continue until market equilibrium is achieved at price P_e and quantity Q_e where quantity demanded is equal to quantity supplied.

c) What happens when price is at P_e?

When price is at P_e, there is no tendency for the market price and quantity to change as the quantity demanded (Q_e) equals to quantity supplied (Q_e). Q_e is the equilibrium quantity established by the price mechanism.

In summary, there are tendencies for prices to increase when the quantity demanded exceeds the quantity supplied (i.e., excess demand or shortage), and for prices to decrease when the quantity supplied exceeds the quantity demanded (i.e., excess supply or surplus).

This is how the price mechanism or the ***invisible hand*** works to bring about market equilibrium through the interaction of demand and supply forces in the free market.

4.3 Demand and Supply Analysis

What happens when there are changes in demand and/or supply conditions?

When there is an increase in income, ceteris paribus, consumers' purchasing power increases and thus the demand for a normal good will rise from D_1 to D_2 as shown in Figure 19 below.

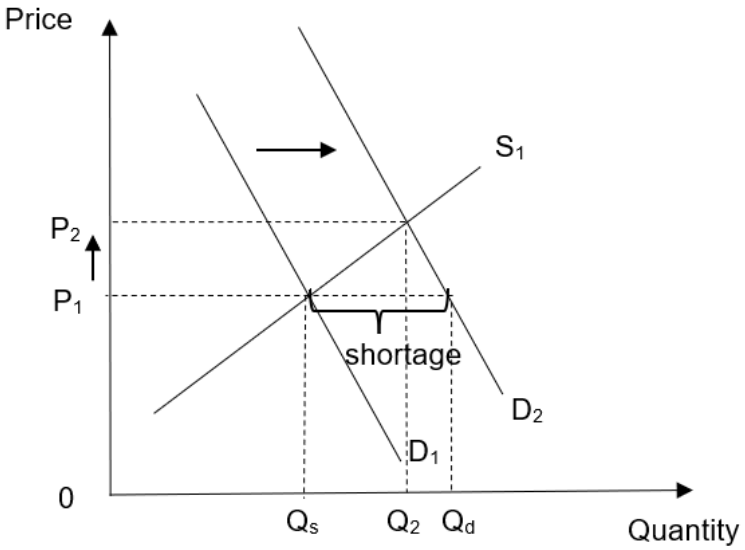


Figure 19: Effect of an increase in demand

As a result of the higher demand, there will be a **shortage** of Q_sQ_d ***at the original equilibrium price***, P_1, as quantity supplied (Q_s) is less than quantity demanded (Q_d). The market is in disequilibrium.

There is an upward pressure on prices as consumers compete for the good among themselves by bidding up the price. As the price increases, the quantity demanded decreases (movement upwards along demand curve). At the same time, producers will increase their quantity supplied (movement upwards along supply curve).

This process of consumers bidding with higher prices and producers increasing their output will continue until the new market equilibrium is achieved at a new equilibrium price of P_2 and equilibrium quantity of Q_2. At this new market equilibrium, quantity demanded is equal to quantity supplied. This increase in demand will thus result in a higher equilibrium price and quantity at P_2 and Q_2.

Explain the impact on the direction of change in the equilibrium price and quantity (with a diagram) for the following situations:

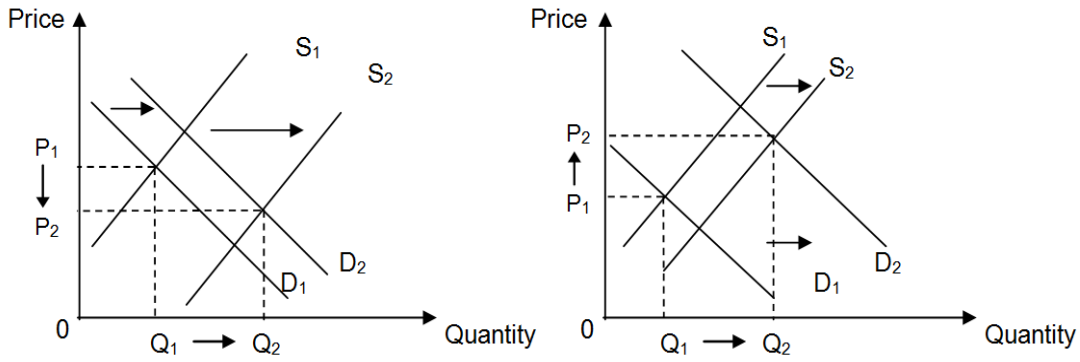
a. a decrease in demand, *ceteris paribus*
b. an increase in supply, *ceteris paribus*
c. a decrease in supply, *ceteris paribus*

Always begin by drawing a diagram showing the market in equilibrium first before introducing any changes.

4.4 Effect of Changes in Both Demand and Supply

There are situations when both demand and supply change at the same time.

When there is an increase in the demand and supply of a good or service, both the demand and supply curves shift to the right as illustrated in Figure 20 below. Under this situation, equilibrium quantity will increase but the new equilibrium price is dependent on the **relative magnitude of the increase in demand and supply**.



(i) Increase in supply is greater than the increase in demand

(ii) Increase in supply is less than the increase in demand

Figure 20: The effects of increase in both demand and supply of a good/service

Explanation:

Case (i): Increase in supply is greater than the increase in demand

When the increase in supply is greater than the increase in demand, as illustrated in Figure 20 (i), there is a **surplus at the original equilibrium price, P_1, as quantity supplied exceeds quantity demanded**. The market is in disequilibrium.

As a result, there is a downward pressure on prices as producers lower the price in order to clear their stocks. As the price decreases, consumers will increase their quantity demanded along D_2 and producers reduce their quantity supplied along S_2. This process of producer reducing their output and consumers increasing their quantity demanded will continue until the new market equilibrium is achieved with a new equilibrium price of P_2 and equilibrium quantity of Q_2.

Therefore, when the increase in supply is greater than the increase in demand, it will result in a lower equilibrium price and a higher equilibrium quantity.

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It is important to justify your assumption that the change of one curve (e.g., supply) is more than the change of the other curve (e.g., demand).

What happens when the increase in supply is less than the increase in demand? Explain using a diagram.

What happens when the increase in supply is less than the increase in demand? Explain using a diagram.

Summary for Simultaneous Shifts of Demand and Supply

With the aid of diagrams, explain the impact on the direction of change (increase/decrease/ambiguous) in the equilibrium price and quantity for the following simultaneous shifts.

	Demand *increases*	**Demand *decreases***
Supply *increases*	Price: _____ Quantity: _____	Price: _____ Quantity: _____
	Diagram:	***Diagram:***
Supply *decreases*	Price: _____ Quantity: _____	Price: _____ Quantity: _____
	Diagram:	***Diagram:***

Magnitude of change in equilibrium price and quantity

As explained in earlier sections, changes in demand and/or supply will result in changes in the equilibrium price and quantity. However, it is also important to note that changes in demand and supply will also have an impact on the magnitude (i.e., extent) of change in equilibrium price and quantity.

Referring to Figure 21 below, an increase in demand as depicted by a rightward shift of demand curve from D_1 to D_2, results in a shortage at the original price, P_1, and an upward pressure on prices until quantity demanded equals to quantity supplied. The equilibrium price and equilibrium quantity to increase to P_2 and Q_2 respectively . Due to the rightward shift of the demand curve, direction of change in both the equilibrium price and quantity is an increase.

However, the **magnitude/extent of the increase in both equilibrium price and quantity** can be affected by the magnitude/extent of the shift/change in the demand/supply curve.

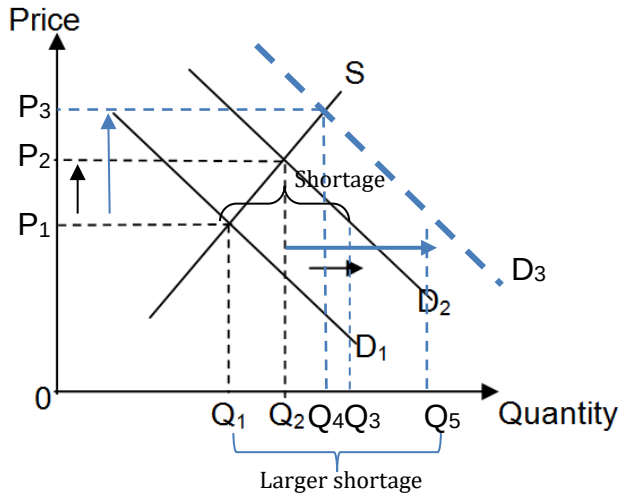


Figure 21: Effect of a larger extent in increase in demand

Referring back to Figure 21, if demand increased by a larger extent as shown by the rightward shift of demand curve from D_1 to D_3, there would be a larger shortage of Q_1Q_5, compared to a smaller shortage of Q_1Q_3 when demand only shifted to D_2.

As a result of the larger shortage (Q_1Q_5), equilibrium price and quantity increases by a larger extent to, P_3 and Q_3, as compared to P_2 and Q_2 Hence, the **magnitude** of change in the equilibrium price and quantity of a good or service can be affected by the magnitude of shift of the demand curve. Similarly, the magnitude of shift in supply curve could also affect the magnitude of change in equilibrium price and equilibrium quantity.

4.5 Effect of Changes in Demand for and Supply of labour

Labour is one of the factors of production employed to produce a good or service. The price of labour, known as the wage rate, is determined by the demand for and supply of labour. As shown in Figure 22, the price of labour, i.e., the market wage rate is determined at W_1 where demand for labour D_L intersects with supply of labour S_L.

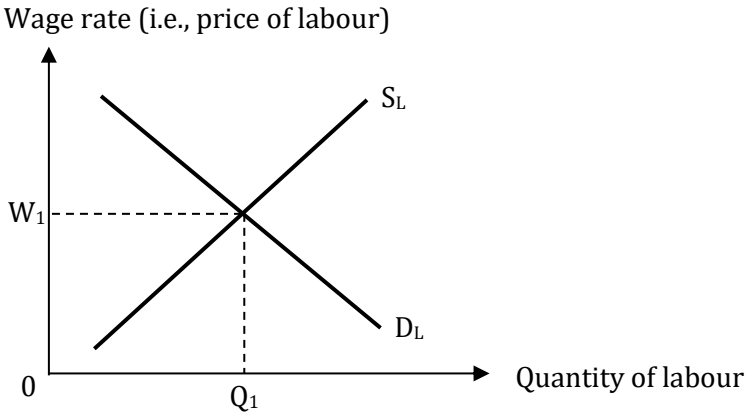
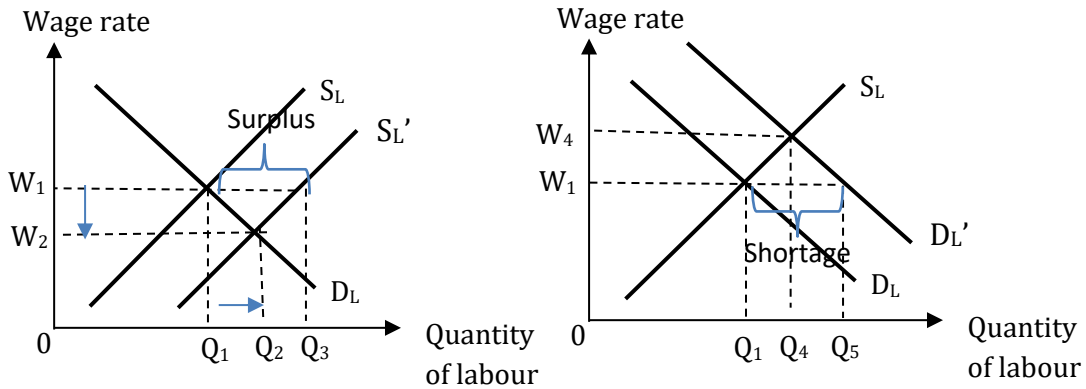


Figure 22: Effect of a larger extent in increase in demand

Demand for labour is downward sloping as wage rate decreases, employers would be more willing and able to employ or demand more labour. On the other hand, supply of labour is upward sloping as wage rate decreases, workers would be less willing and able to supply their labour services. Any changes in demand for and/or supply of labour, would result in changes in the wage rate and quantity of labour.

For example, due to an influx of foreign labour from overseas, the supply of labour increases and is shown by a rightward shift of the supply curve S_L to S_L' as shown in Figure 23(a). At the original wage rate W_1, there would be a surplus of labour, which would bid down the wage rate from W_1 to W_2. The equilibrium quantity of labour increases from Q_1 to Q_2. Hence, an increase in supply of labour would decrease the market wage rate and increase the number of workers employed in the labour market.



(a) Increase in supply of labour **(b) Increase in demand for labour**

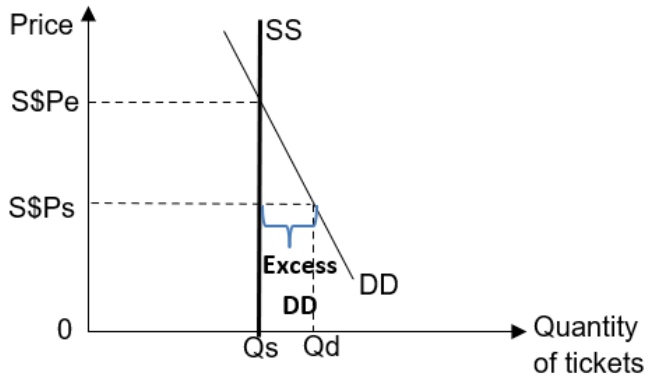
Figure 23: The effects of changes in demand for and supply of labour

Besides the change in supply of labour, changes in demand for labour could also play a part in affecting wage rate. For example, if there was an increase in demand for goods and services, there would be an increase in demand for labour as labour is a derived demand of goods and services.

The increase in demand for labour is represented by a rightward shift of demand curve from D_L to D_L' as shown in Figure 23(b). As a result, there would be a shortage of labour at the original wage rate W_1, which would bid up the wage rate from W_1 to W_4. Hence, an increase in demand for labour would increase the market wage rate and the equilibrium quantity of labour employed in the market from Q_1 to Q_4.

So far, the above demand and supply analysis assume that the selling price of the good or service is equivalent to the equilibrium price where the demand for the good intersects with the supply of the good. **However, do you think the selling price of a good or service is always set at the equilibrium price?**

No: In some situations, the selling price may be set below the equilibrium price, resulting in excess demand. Take for example, in the case of the concert tickets, the concert organiser may price its concert tickets lower than the equilibrium price. With reference to the diagram below, the concert ticket price i.e. Ps is set below the market clearing price i.e. the equilibrium price at Pe. Note that the supply curve is vertical here in this situation is vertical as the number of seats for the concert is fixed at Qs regardless of the the price.



At the price set by the organiser at Pe, the quantity demanded for the tickets i.e. Qd is greater than the quantity supplied of the tickets i.e. Qs. In other words, many consumers would like to buy the tickets at Pe but there is not enough seats to meet the overwhelming demand at the price Ps. As a result, there is an excess demand at price Ps. To clear the excess demand, the organiser should have set the ticket at the equilibrium price Pe, which is not easy to predict in the first place.

Hence, in reality, you would see the emergence of higher-priced concert tickets sold in the resale market due to the excess demand.

5. CONSUMER AND PRODUCER SURPLUS

5.1 Consumer Surplus

Consumer surplus is the difference between the amount that consumers are willing and able to pay and what they actually pay for a good or service.

In a competitive market, consumers and producers buy and sell at the market equilibrium price. However, some consumers are willing and able to pay more for the good (based on the satisfaction they derive from consuming the good) than the market price (what they actually pay for the good). In other words, what consumers actually pay for a unit of a good is less than the amount he/she is willing to pay. Under such circumstances, these consumers enjoy ***consumer surplus***.

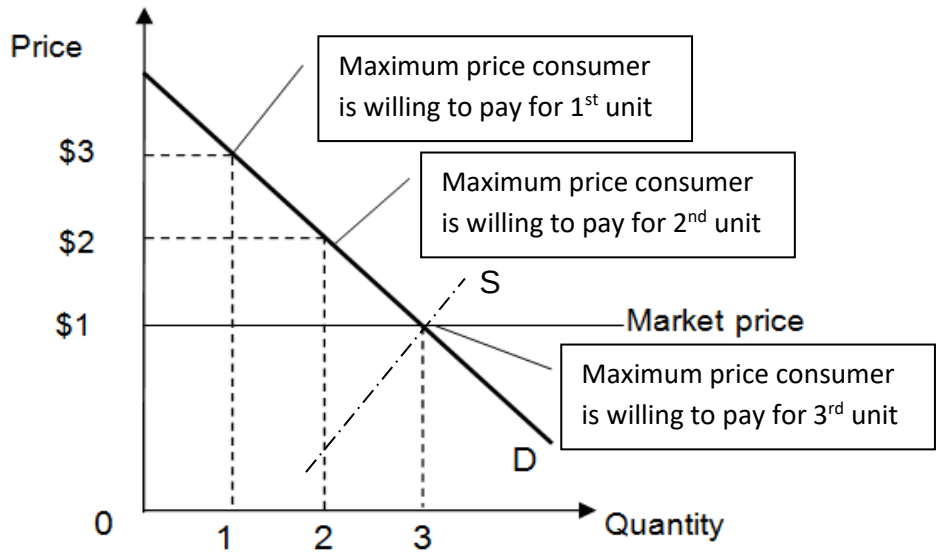


Figure 9: Consumer Surplus

From Figure 9, consumer surplus for the 1st unit is $2 as the consumer is willing to pay $3 for the first unit but only pays $1, $1 for the 2nd unit and $0 for the 3rd unit, giving a total of $3.

Consumer surplus for the whole market is the sum of all the individual consumer surpluses for those consumers who have purchased the good.

If we assume that the purchase of the good is perfectly divisible, the consumer surplus is the shaded area below the demand curve but above market price as shown in Figure 10.

Given that the market price is 0P, the consumer surplus is ABP.

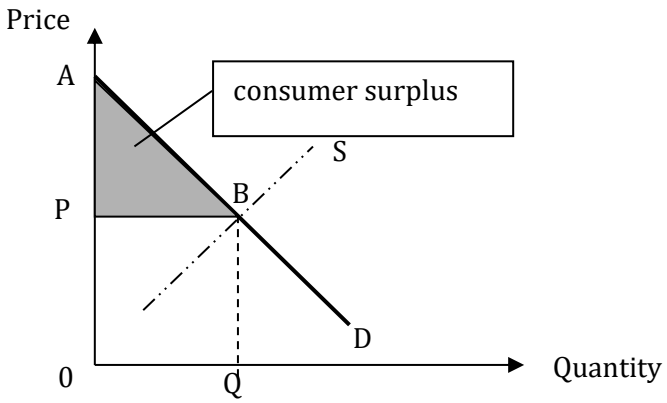


Figure 10: Consumer Surplus

What will happen to the consumer surplus when the price of a good increases due to a fall in supply?

5.2 Producer Surplus

Producer surplus is the difference between the amount at which the producer is willing and able to accept for selling his goods or services and what he/she receives from selling the good or service.

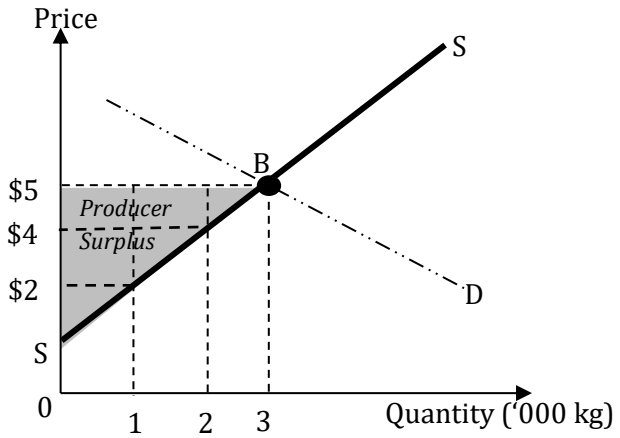


Figure 17: Producer Surplus in the market of oranges

The producer surplus is the area above the supply curve and below the market price as shown in Figure 17.

As explained earlier, the supply curve in Figure 17 reflects the marginal costs of producers in a market, showing the price that would be required by suppliers in order to be willing to produce any given quantity of a good.

In the market for oranges shown in Figure 17, the supply curve shows that in order for producers to be willing and able to cover their marginal costs of the first thousand kg of oranges, they would need to get a price of at least $2. As the price rises $2 to $4, growers can cover the additional costs of growing more oranges and the quantity supplied increases from one thousand kg to two thousand kg of oranges. For the thousandth kg of oranges, the producers are willing and able to produce at $2. However, the actual price that the producer receives from selling the one thousandth kg of oranges in the market is $5. Hence, the producers enjoyed additional welfare of $3, which is the producer surplus at one thousand kg of oranges. For the two thousandth kg of orange, the producers are willing and able to produce at $4. However, growers receive $5 for the two thousand kg of oranges. Hence, the growers enjoy an additional welfare of $1, which is the producer surplus at two thousand kg of oranges. If we add up the producer surplus of all quantities up to the actual quantity of oranges sold in the market i.e., 3 thousand kg of oranges, the total producer surplus in the market is the area below the equilibrium price and above the supply curve, as represented by the shaded triangle.

Is there a difference between producer surplus and total revenue (TR=PxQ)? Explain with reference to Figure 17.

Revisit this question after learning about total revenue in the next topic!

6. GOVERNMENT INTERVENTION IN THE FREE MARKET

As an economic agent, the government does not always welcome the market-determined price due to reasons related to equity considerations, concerns arising from the level of consumption or production of some goods and services, or even environmental effects.

For example, the government may deem the equilibrium price of essential goods and services (e.g., oil, water and food), as too high for low-income families to afford. Similarly, the government may deem the equilibrium wages in the labour market as too low. Undesirably low wages for many workers may perpetuate poverty. Hence, the government may decide to intervene to achieve equity in terms of a fair distribution of goods and services or fair wages.

In this section, we will focus on how ***governments intervene*** and the resulting impacts of the intervention.

6.1 Price Control: Maximum Price (Price Ceiling)

Price ceiling is the highest permissible price the producers can legally charge. This is done with the aim of:

i) Keeping prices down when there is inflation (sustained increase in general price level) – to protect low-income families & ensure that necessities are affordable (e.g., rent controls, caps on price of food). This is for equity reasons, to ensure fairness in the distribution of goods and services.

ii) Restricting production e.g., where restriction of production of certain goods in times of war, to release resources for alternative uses.

TIPS
Note that a price ceiling is ALWAYS set BELOW the equilibrium price.

An effective price ceiling (P_c) is set **<u>below</u>** the equilibrium price (P_e).

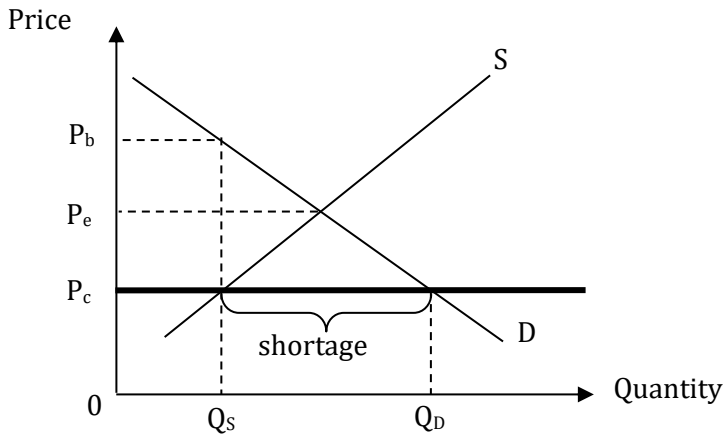


Figure 24: Effect of a price ceiling

The intended outcome of the price ceiling is to keep prices lower than what is established by the price mechanism ($P_c < P_e$).

However, price ceilings may give rise to the following **unintended consequences.**

i. The shortage created (Q_SQ_D) means that some consumers can consume Q_S units of the good at the lower price of P_C, but there are consumers who cannot enjoy the good.

ii. These consumers might consequently turn to the illegal black market to obtain the good by paying higher prices of P_b. A black market involves the sale of goods and services in violation of legal price controls or other publicly imposed regulations such as rationing laws. The creation of a shortage and the resultant black-market due to the price ceiling could actually deprive the low-income group of basic necessities and render the price ceiling ineffective in protecting low-income families.

iii. In the event of a shortage, an alternative mechanism for rationing the goods and services might be needed. This can take the form of coupons, or allocation based on a first-come-first-served basis. Suppliers might also allocate the scarce goods by distributing only to preferred customers. However, rationing goods might be considered as inequitable (unfair) – because it is likely that eventually those who might have the greatest need for a commodity are unlikely to have their needs met.

iv. The quality of products, in the long run, might worsen as producers are tempted to use cheaper factors or cut corners.

6.2 Price Control: Minimum Price (Price Floor)

A **price floor** is the lowest permissible price set by the government. The price is not allowed to fall below this level. This is done with the aim of:

i) Protecting producers' incomes
ii) Preventing exploitation e.g. minimum wage laws in labour market (factor market)

As shown in Figure 25, the effective price floor (P_f) is set **above** the equilibrium price (P_e).

TIPS
Note that a price floor is ALWAYS set ABOVE the equilibrium price.

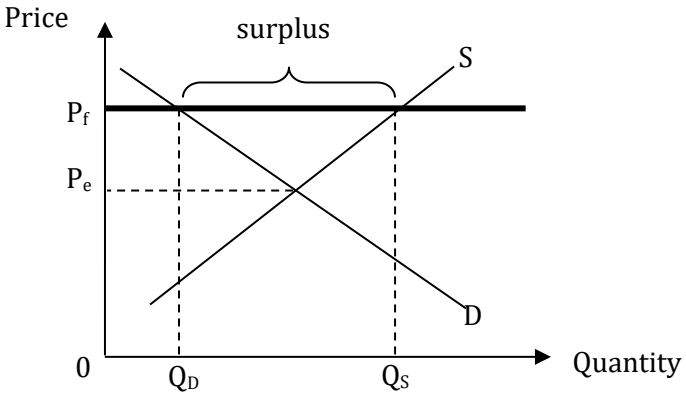


Figure 25: Effect of a price floor

At the minimum price (P_f), the quantity demanded (Q_D) is less than the quantity supplied (Q_S). The imposition of the price floor results in a surplus of Q_DQ_S. To deal with the surplus, the government can buy the surplus and either:

i) sell the good in the event of a future shortage (e.g., due to poor harvest), or
ii) sell it abroad.

Both instances require additional expenditure by the government (to purchase the goods and store them) which would incur opportunity cost.

In the case of protecting producers' incomes, the impact will depend on the price elasticity of demand*. Given an increase in price, if the demand for the good is price-elastic, total revenue will fall. On the other hand, if the demand for the good is price-inelastic, total revenue will rise.

**The concept of price elasticity of demand will be covered in more detail in your next set of lecture notes – Price Mechanism and its Applications Part 2.*

In the case of a minimum wage law, where a surplus of labour is created, the government will have to deal with the increased unemployment.

Some governments, such as the United States, deal with unemployment by providing unemployment benefits. Again, there is an opportunity cost that is incurred when the government uses its budget to fund unemployment benefits.

6.3 Indirect Taxes (Expenditure Taxes)

Indirect taxes are taxes imposed on the consumption of goods and services, and are paid indirectly (through producers) to the government. In contrast, direct taxes are levied on a person's income or wealth, and paid directly to the government.

i) Purpose of such taxes
- To earn or increase government tax revenue.
- To allocate resources efficiently by discouraging consumption of certain goods: prices will be raised and quantity demanded will decrease. We will learn more about this in the topic of Market Failure.

ii) Types of indirect taxes
- *Specific* tax – tax per unit. e.g., tax on wine: $7/bottle
- *Ad valorem* tax – tax as a percentage of the price of a good. e.g., goods and services tax (GST)

iii) Effect of a specific tax

When an indirect tax is imposed, it creates an effect similar to an increase in the costs of production, resulting in a decrease in supply from S_1 to S_2.

The tax per unit is indicated by the vertical distance between the supply curves (P_2P_3), which shows the "change" in the costs of production.

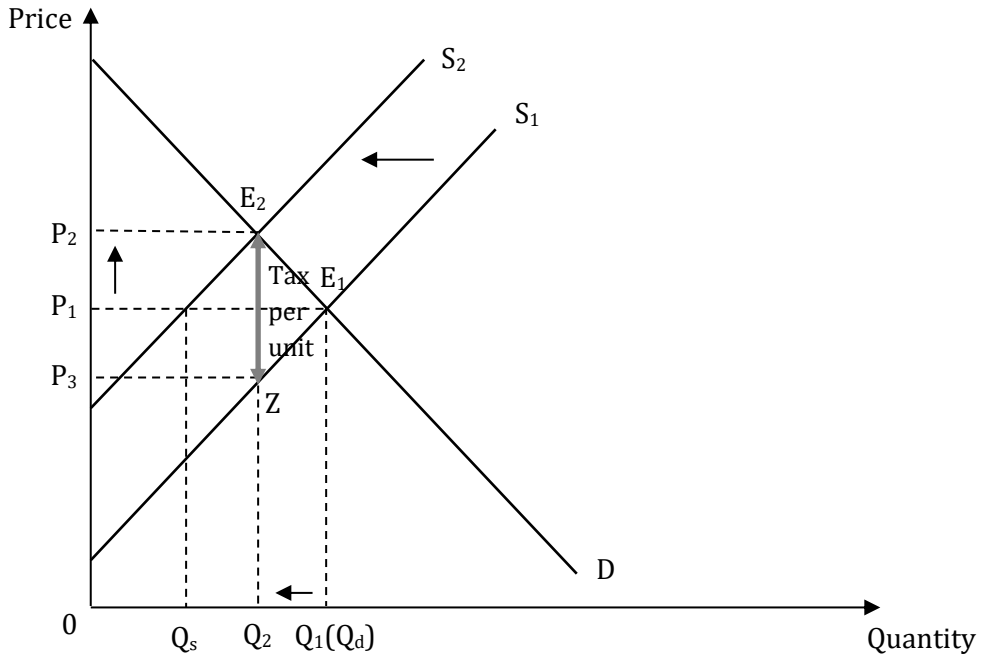


Figure 26: Effect of a specific tax

This decrease in supply will result in a shortage of Q_dQ_s at the original equilibrium price of P_1. Refer to Section 4 for detailed explanation of the price adjustment process. The effect of the imposition of an indirect tax on a good is an increase in equilibrium price from P_1 to P_2, and a decrease in equilibrium

quantity from Q_1 to Q_2. Total tax revenue collected by the government is indicated by area P_2P_3 x $0Q_2$.

Impact of indirect taxes on consumer and producer surplus

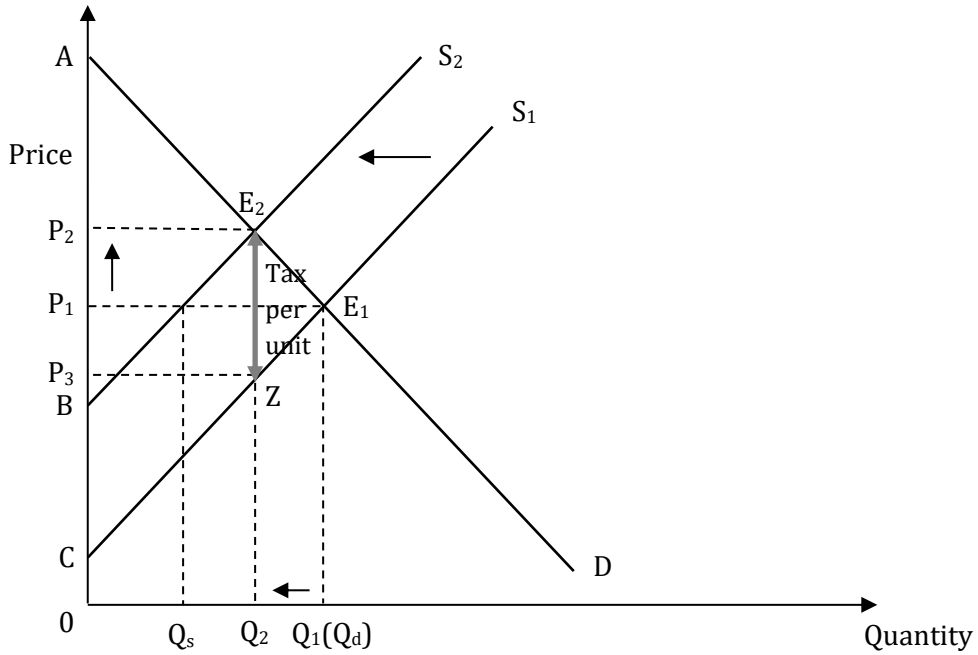


Figure 27: Changes in consumer and producer surplus

Before the imposition of the indirect tax
Consumer surplus: Area AE_1P_1
Producer surplus: Area P_1E_1C

After the imposition of the indirect tax
Consumer surplus: Area AE_2P_2
Producer surplus: Area P_2 E_2B (equivalent to Area P_3ZC)

Referring to Figure 27, an imposition of the tax has resulted in a fall in both consumer and producer surplus, as consumers are paying more for the item that is being taxed, and producers are receiving less for the item that is being taxed. The amount of tax revenue collected depends on the PED for the good/service. The lower the PED value, the larger the amount of tax revenue the government collects.

If you compare the total consumer surplus and producer surplus areas before the imposition of the indirect tax (Area AE_1P_1 + Area P_1E_1C) with the areas indicating the new consumer and producer surplus as well as the tax revenue after the imposition of the indirect tax (Area AE_2P_2 + Area P_3ZC + Area $P_3P_2E_2Z$) you will notice there is a deadweight loss area of E_2E_1Z. Deadweight loss refers to the loss of society's welfare as a result of market inefficiency (or not achieving allocative efficiency).

This deadweight loss occurs assuming that the price mechanism achieved the optimal amount of goods and services produced at Q1

**The concept of price elasticity of demand will be covered in more details in Price Mechanism and its Applications Part 2.*

6.4 Subsidies

i) Purpose of a subsidy

- To lower the price of some key commodities, for example, petrol via subsidies to make it more affordable for the public.
- To allocate resources more efficiently by encouraging the consumption of certain goods and services. For example, subsidies on healthcare, education, etc.

ii) The effect of a subsidy

When a subsidy is given to a producer of a good, it decreases the costs of production. This is because the producer receives monetary payments or grants for every unit of the good sold. This results in an increase in supply due to an increase in the willingness and ability of a producer to sell a good, as illustrated by a rightward shift in the supply curve from S_1 to S_2.

The subsidy per unit is indicated by the vertical distance between the supply curves (P_2P_3), which shows the "change" in the costs of production.

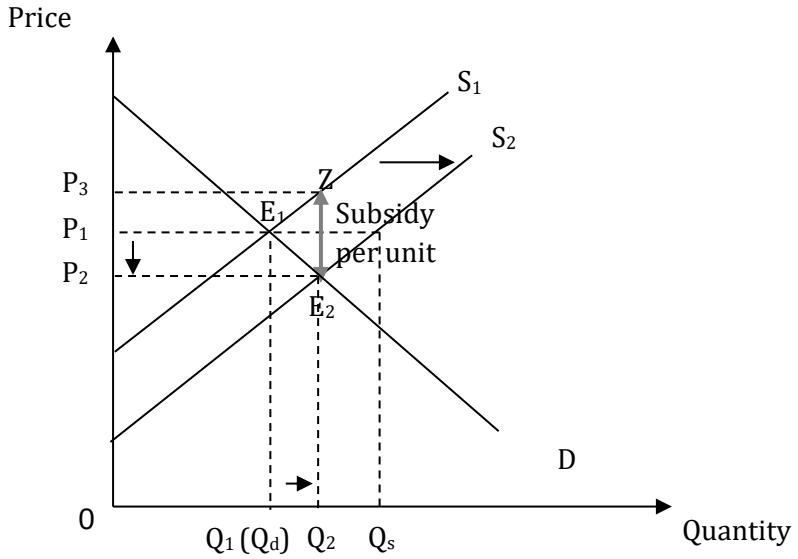


Figure 28: Effect of a subsidy

The increase in supply will result in a surplus of Q_dQ_s at the original equilibrium price of P_1. Refer to section 4 for a detailed explanation of the price adjustment process. Thus, the effects of a subsidy on the production of a good are a decrease in equilibrium price from P_1 to P_2 and an increase in equilibrium quantity from Q_1 to Q_2. The total subsidy provided by the government is indicated by area $P_2P_3ZE_2$.

Impact of subsidies on producer and consumer surplus

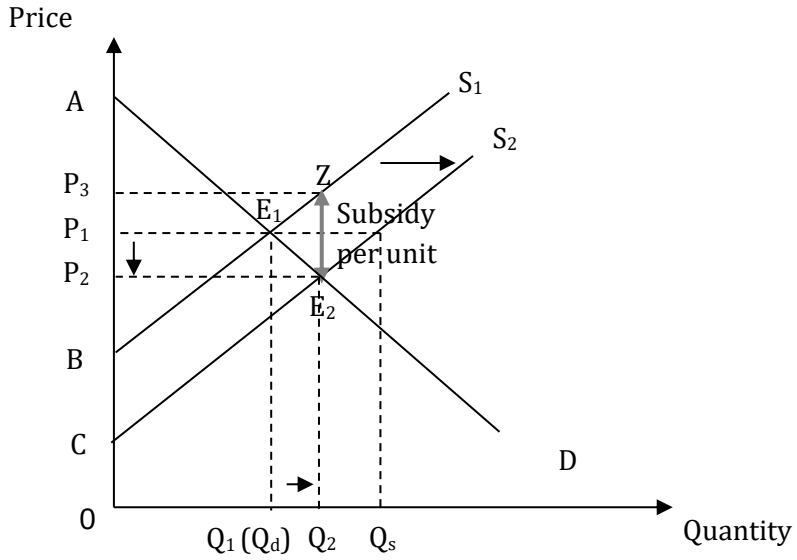


Figure 29: Changes in consumer and producer surplus

Before the imposition of the subsidy

Consumer surplus: Area AE_1P_1
Producer surplus: Area P_1E_1B

After the imposition of the subsidy

Consumer surplus: Area AE_2P_2
Producer surplus: Area P_2E_2C (equivalent to Area P_3ZB)

It can be seen that the imposition of the subsidy has resulted in an increase in both consumer and producer surplus, as consumers are paying less for the item that is being subsidised, and producers are receiving more for the item that is being subsidised. The amount of subsidy expenditure that a government incurs depends on the PED for that good/service. The lower the PED value, the smaller the amount of subsidy expenditure the government has to incur.

If you compare the total consumer surplus and producer surplus areas before the imposition of the subsidy (Area AE_1P_1 + Area P_1E_1B) with the areas indicating the new consumer and producer surplus as well as the subsidy after the imposition of the subsidy (Area AE_2P_2 + Area P_3ZB + Area $P_3P_2ZE_2$) you will notice there is a deadweight loss area of E_2E_1Z. This deadweight loss occurs assuming that the price mechanism achieved the optimal amount of goods and services produced at Q1

Economic inefficiency is created by a subsidy because it costs a government more to enact a subsidy (Area $P_3P_2ZE_2$) than the additional benefits to consumers (Area P_1P_2 E_2 E_1) and producers (Area P_1P_3Z E_1).

**The concept of price elasticity of demand will be covered in more detail in your next set of lecture notes – Price Mechanism and its Applications Part 2.*

6.5 Quantity Control: Quotas

A quota is a legal limit on the number of goods that can be produced by the producer in a market.

i) Purpose of a quota
- To limit production to control the equilibrium quantity of the good or service.
- To restrict supply to maintain a certain price level.

ii) Effect of a quota
When a quota is set by a government or an organisation, a legal limit is fixed on the production of a good or a service **below its equilibrium quantity**.

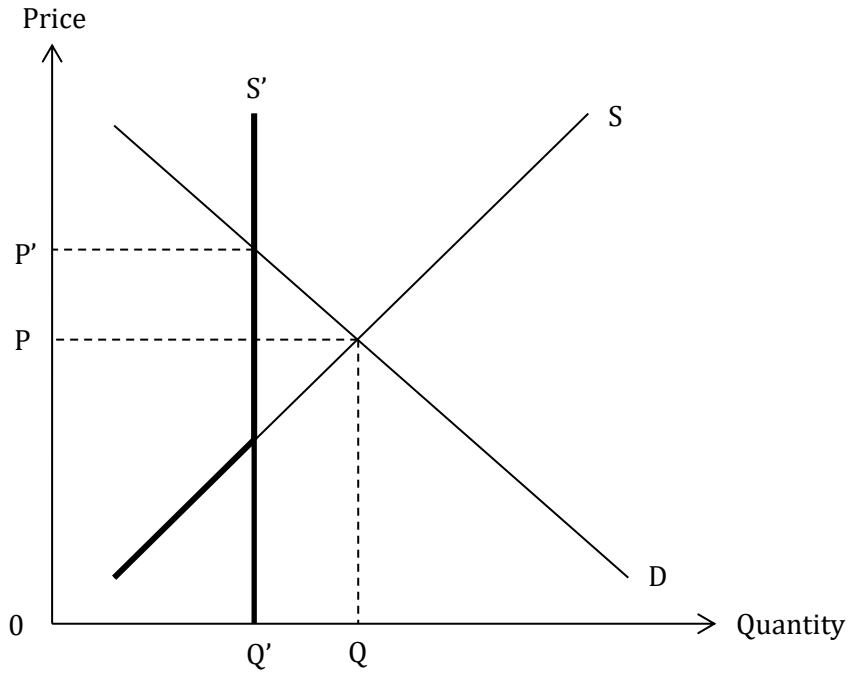


Figure 30: Effect of a quota

With reference to the diagram above, a quota is set at quantity Q', below the original equilibrium quantity, resulting in a vertical supply curve at the quantity of the quota (Q'). This means that the new supply curve is represented by the bolded line, S'.

Given the interaction between the demand and the new supply curve, S', there will be a shortage at the initial equilibrium price P, leading to an upward pressure on prices. The new equilibrium price and quantity would be P' and Q' respectively. This means that for any quantity above that of the quota demanded by consumers, prices will just continue to rise as producers will not be able to further increase their quantity supplied.

Check-out

Now that you have reached the end of this section, you should be able to:

- Define demand and state the law of demand. ☐
- Explain why the demand curve is downward sloping. ☐
- Explain the relationship between individual demand and market demand. ☐
- State and explain the price and non-price determinants of demand. ☐
- Distinguish the effects of a change in price and non-price factors of demand. ☐
- Define supply and state the law of supply. ☐
- Explain why the supply curve is upward sloping. ☐
- Explain the relationship between individual supply and market supply. ☐
- State and explain the price and non-price determinants of supply. ☐
- Distinguish the effects of a change in price and non-price factors of supply ☐
- Define market equilibrium. ☐
- Explain, with the help of a diagram, how market equilibrium is determined via the price mechanism. ☐
- Explain how equilibrium price and quantity adjust with changes in demand and/or supply. ☐
- Define consumer surplus and identify and explain consumer surplus using a diagram. ☐
- Define producer surplus and identify and explain producer surplus using a diagram. ☐
- Explain the rationale for (i) price ceilings, (ii) price floors, (iii) indirect taxes, (iv) subsidies, and (v) quotas, and explain how they affect the market equilibrium. ☐