CHAPTER 2A

Markets: Price Mechanism and its Applications (Demand and Supply)

OVERVIEW OF CHAPTER

In his book The Wealth of Nations (1776), Adam Smith argued that economic agents in pursuit of their own self-interest invariably allocate resources in society's best interest. Smith argued that although the free market economy appears chaotic and unrestrained, it is actually guided to produce the right amount and variety of goods by a so-called "invisible hand". If a product shortage occurs, for instance, its price rises, thereby creating incentives for its production, and eventually resolving the resulting shortage. The market forces described here, working through the price mechanism, are the essence of Adam Smith's "invisible hand".

KEY DECISIONS RELATED TO THIS CHAPTER

- Consumers decide what goods and services to consume to meet their wants given their limited purchasing power.
- Producers decide what goods and services to produce, how much to produce and how to produce, given their limited resources.

KEY ECONOMIC AGENTS

- Consumers
- Producers

1. INTRODUCTION

Learning Objectives

- ✳ Describe the features of a free market economy
- ✳ Explain the role of price mechanism in resource allocation in a market-based economy

1.1 THE PRICE MECHANISM AND ITS ESSENTIAL ROLE OF RATIONING

In Chapter 1, you have learnt that all societies face the problem of scarcity; where unlimited human wants exceed limited resources. As a result, there has to be some method to ration the available resources, goods and services. The price mechanism, which you will learn in this chapter, performs this rationing function. Other examples include rationing by coupons, lotteries, and queues (first-come-first-served basis). Governments may arrange for rationing, too.

There is no one best method of rationing. However, economists say that rationing via the price mechanism leads to the most efficient use of available resources.

1.1.1 THE PRICE MECHANISM AND HOW IT ANSWERS THE THREE ECONOMIC QUESTIONS

The price mechanism describes the means by which various decisions are made by consumers and firms interacting to determine the allocation of scarce resources between competing uses. Prices are **signals** to reflect what is relatively scarce and what is relatively abundant. This signaling aspect of the price mechanism provides information to buyers and sellers about what should be bought and what should be produced.

a. What and how much to produce?

In a free market system, the interaction of demand and supply for each good determines what and how much to produce. Consumers indicate their preferences by the price they are willing to pay for various goods and services. The prices then act as a **signal** to producers indicating what goods are demanded by consumers (also known as ***Consumer Sovereignty***).

Producers respond to the price signals by increasing or reducing the production of the respective goods and services. For instance, a rise in demand for a particular good is signaled by a rise in price, ceteris paribus. The higher price of this good relative to its cost of production is signaling that consumers are willing to see resources diverted from other uses. The rise in price acts as an **incentive** for production (i.e. quantity supplied) to rise, as firms' profits will increase by selling more of the good at the higher price. Firms divert resources from goods with lower prices relative to costs (and hence lower profits) to those goods that are more profitable. In this way, resources are allocated to goods which are demanded by consumers (consumer sovereignty), thus addressing the question "what to produce". At the same time, more resources are diverted from goods with lower demand to goods with higher demand, thus determining "how much to produce".

b. How to produce?

In a free market system, competition forces firms to use the least cost combination of inputs to produce a given level of output. This is because the least cost combination helps firms to earn higher profits (recall the objective of firms in Chapter 1). Any firm that does not employ the least costly production technique will find that other firms can undercut its price, causing it to lose its customers and this inefficient firm will eventually be forced out of business. The price mechanism helps producers in determining the method of production based on the prices of inputs. If the price of labour (wages) rises relative to the price of physical capital (machinery and equipment), firms may find it more profitable to employ more capital and less labour in producing the goods. In this case, the least cost combination of inputs would mean employing more capital and less labour, thus addressing the question of "how to produce".

c. For whom to produce?

Essentially, this question is about who gets what. In a free market system, the allocation of finished products to consumers is based on consumers' ability and willingness to pay for the market price for the product. Those who are unable or unwilling to pay the market price will not be able to obtain the good. Relative prices **ration** the available resources, goods and services among those who place the highest value on these items. The question of whose wants are to be met by the production of goods is thus determined by the purchasing power of the consumers. Those with higher purchasing power (due to higher income) are able and willing to pay higher prices for the goods they want. This is known as the "dollar votes" of consumers. More resources are thus allocated to producing these goods to satisfy their wants. Those with lower purchasing power (lower income) are able and willing to pay lower prices for the goods they want. Fewer resources will thus be allocated to producing goods to satisfy their wants. In this way, resources are allocated to the production of goods and services according to the "dollar votes" of consumers, thus determining "for whom to produce".

In summary, the price mechanism allocates scarce resources in the free market through signalling, incentive and rationing functions.

Signalling function: 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 for producers to expand production.

Incentive function: Changes in prices provide incentives for producers to reallocate their scarce resources. For example, rising prices act as an incentive for producers to allocate more resources to earn more profits.

Rationing function: Changes in prices enable scarce resources to be rationed to the parties who are most willing and able 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.

1.2 KEY FEATURES OF THE FREE MARKET ECONOMY

a. Private Ownership of Property

Individuals have the right to own, control and dispose of land, capital and natural resources. Owners of factors of production, thus, have the right to the income (in the form of wages, rent, interest and profits) earned from the use of these factors of production.

b. Freedom Of Choice And Enterprise

Economic agents undertake all decisions. Household (consumers) are free to decide what to buy with their incomes (commonly known as consumer sovereignty). Workers are free to choose where and how much to work. Firms (producers) are free to choose what to sell and what production methods to use.

c. Pursuit Of Self-Interest

Economic activity in the free market system is driven by self-interest. Each unit in the economy attempts to do what is best for itself. Hence, firms try to maximise profits, consumers try to maximise satisfaction and workers try to get jobs that yield as high a return as possible. (Adam Smith, father of modern Economics, believed that the individual pursuit of self-interest leads to the maximum good for society.)

d. Perfect Competition

Competition is an essential feature of the free market economy. Competition here refers primarily to price competition where, in the market for each commodity, there are a large number of buyers and sellers, each having an insignificant share of the market and hence there is no influence on the market demand and supply. No single buyer or seller is influential enough to control a market and exploit other sellers or buyers. This is also because in markets with perfect competition, there is perfect information. Information on the product prices and quality is readily and easily available to all consumers. Therefore, producers have little influence over the market price since any price increase will be made known to the consumers and would cause a significant fall in quantity demanded for their good as most if not all consumers would switch to relatively cheaper perfect substitutes. Similarly, information on the production processes and technology is readily and easily available

to the producers. Therefore, no firm has an exclusive right to technology. As such they all have similar production techniques and firms are unlikely to have any influence over the market.

1.2.1 THE PRICE MECHANISM

The price mechanism encompasses the theories of demand and supply, determining the price and quantity transacted of a good or service under consideration. The market equilibrium of a good or service can be illustrated using the demand-supply diagram as appended below. We shall first examine the relationship between price and consumption in the Theory of Demand, and price and production in the Theory of Supply before combining our analysis to examine how market equilibrium for a good or service is determined (Figure 1).

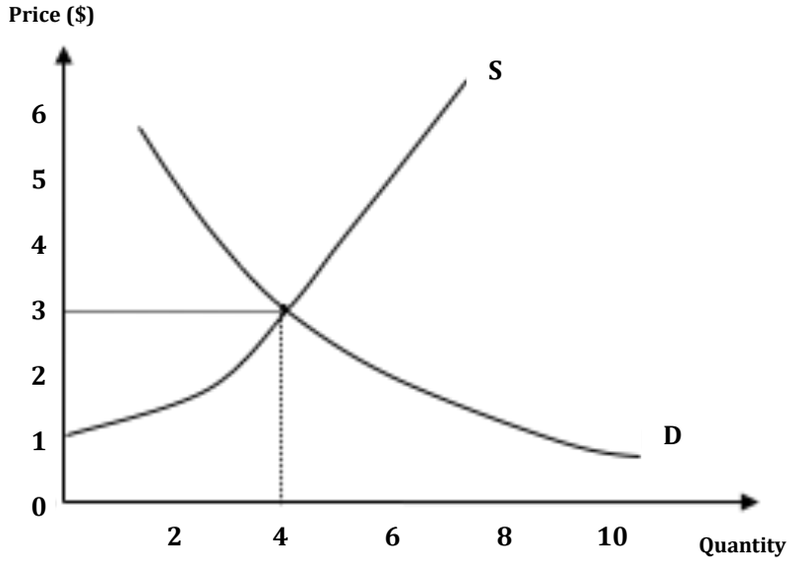


Figure 1: The Determination of Market Equilibrium

2. THEORY OF DEMAND

Learning Objectives ceteris paribus

- State the definition of demand and the Law of Demand
- Explain the law of diminishing marginal utility and why the demand curve is downward-sloping
- Analyse how the price and non-price determinants of demand affect the demand curve (i.e. movement along demand curve versus shifts of demand curve)
- Illustrate with the aid of diagrams the difference between changes in quantity demanded (i.e. movement along demand curve) and changes in demand (i.e. shifts of demand curve)
- Explain and apply the different interrelated demand concepts in analysis of different markets

DEFINITION:

Demand is defined as the quantity of a well-defined commodity that consumers are both **willing and able** to buy at each and every price during a given period of time, *ceteris paribus*.

When analyzing the different factors that affect demand and supply, we generally assumed that the **ceteris paribus** condition exists. Ceteris paribus is a Latin phrase meaning "all other things (variables) being equal or held constant". This is an important assumption in conducting economic analysis, to find out the relationship between different factors/variables.

Demand is sometimes known as effective demand, or desire backed by purchasing power.

Demand can be expressed in 3 main ways.

a. **As an equation, for example:**

Demand = f(price of the good, income, taste, prices of other goods, etc.)

This is known as the **demand function.**

b. In the form of a table, for example:

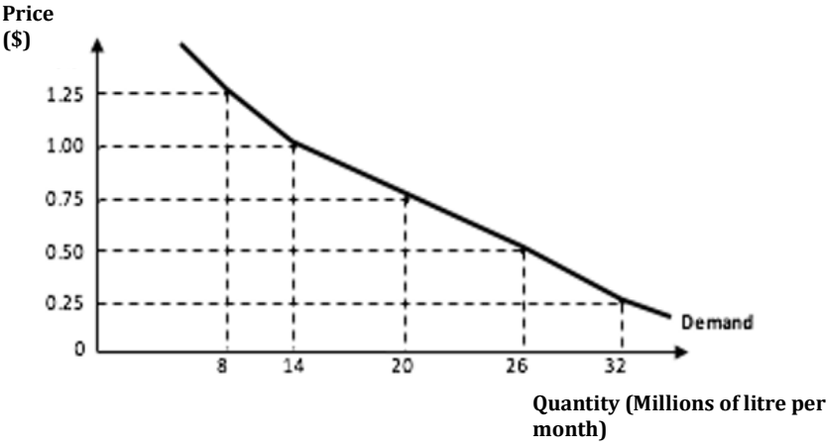
Price per litre ($)	Quantity Demanded per month (millions of litres)
1.25	8
1.00	14
0.75	20
0.50	26
0.25	32

This is known as a **demand schedule.**

NOTE:

For completeness, we include all three representations of demand for this set of notes. Students must know the graphical representation in detail (i.e. how to draw and label the graph etc). Knowledge of table representation may also be needed in case studies.

c. In diagrammatic form, as a graph (Figure 2), for example:



Price & quantity demanded are inversely proportional.

Figure 2: An Individual's Demand Graph

This is known as a **demand curve.**

DEFINITION:

The **demand curve** shows the relationship between the price and quantity demanded of a well-defined commodity. It shows us the quantity demanded of a well-defined commodity that consumers are both willing and able to buy at each possible price during a given period of time, ceteris paribus.

2.1 THE LAW OF DIMINISHING UTILITY: THE BASIS FOR A DOWNWARD SLOPING DEMAND CURVE

NOTE:
The law of diminishing utility is just good to know only.

"Utility" (U) refers to the perceived satisfaction derived from the consumption of a good or service. As a consumer consumes more of a good, his overall satisfaction level or Total Utility (TU) increases. However, as he consumes more and more of a good, the additional satisfaction he derives from each additional unit of the good (or Marginal Utility) gets less. This is known as the Law of Diminishing Marginal Utility. Marginal Utility (MU) refers to the additional satisfaction derived from the consumption of an additional unit of a good or service. Mathematically, marginal utility can be calculated with the following equation.

$$\boldsymbol{MU = \frac{\Delta TU}{\Delta Q}}$$

where TU is Total Utility from the consumption a good and Q is the quantity of good consumed.

The Law of Diminishing Marginal Utility (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 consuming successive units decreases. (Note that Total Utility still increases but is increasing at a decreasing rate).

The price an individual is willing to pay for a unit of a good is determined by the satisfaction he derives from consuming that unit of the good (i.e. his Marginal Utility). The price a consumer is willing to pay for a good is the consumer's valuation of the unit of the good i.e. how much he values the unit of the good based on the perceived satisfaction he derives from consuming it. This means that the consumer equates the price he is willing to pay to the Marginal Utility he derives from consuming the additional unit of the good. Since the MU of a good decreases as the individual consumes more of it, the price he is willing to pay for each additional unit of the good also decreases.

In Figure 3 below, we see that the consumer is prepared to pay $2.50 for the first can of Coke, but only $2.00 for the second can, $1.50 for the third can, $1.00 for the fourth can and $0.50 for the fifth can.

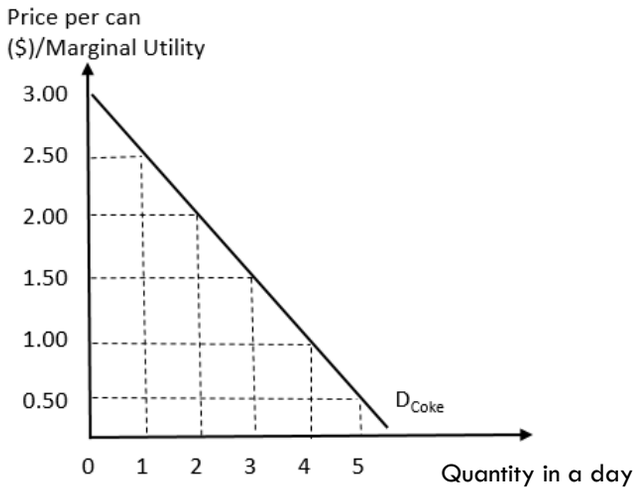


Figure 3: An Individual's Demand for Coke

The amount that a consumer is prepared to pay for any particular unit of good/service reflects the consumer's valuation of the additional unit of the good/service. In other words, in Figure 3, the consumer is prepared to give up $2.50 worth of other goods/services for the first can of Coke. This can be explained by the fact that the first can of Coke gives the consumer a satisfaction that is worth $2.50. As long as the price of that first can of Coke is equal to or less than $2.50, the consumer will buy that first can of Coke. The second can of Coke, however, would add less to his satisfaction (this reflects the Law of Diminishing Marginal Utility at work), and would only give him $2.00 worth of satisfaction, Likewise, if the price of a can of Coke is $2.00, the consumer will buy the first and second can of Coke i.e. he will buy 2 cans of Coke. Given the price of a can of Coke, the marginal utility curve thus determines how many cans of Coke the consumer will buy. (The consumer will keep buying an additional can of Coke as long as his marginal utility is greater than the price). In this way, the individual's demand curve for Coke is derived from his marginal utility curve.

2.2 INDIVIDUAL DEMAND VERSUS MARKET DEMAND

Individual demand is the demand of one consumer, whereas the market demand is the sum of the individual demand of all the consumers in the market.

Let us take a look at the demand for books in a local book market.

NOTE:

Market demand curves are generally "flatter" (more price elastic) than individual demand curve.

[Price elasticity of demand will be covered in Chapter 2B.]

Price per book	No. of books demanded by		
($)	Sue	Annie	Market
8	0	1	1
7	1	3	4
6	4	6	10
5	7	9	16
4	11	17	28
3	13	24	37

The **horizontal summation** (summation of quantity demanded across each & every price level) of individual demand curves gives the market demand curve. Refer to Figure 4 below.

Assuming the market for books has only two consumers, Sue and Annie,

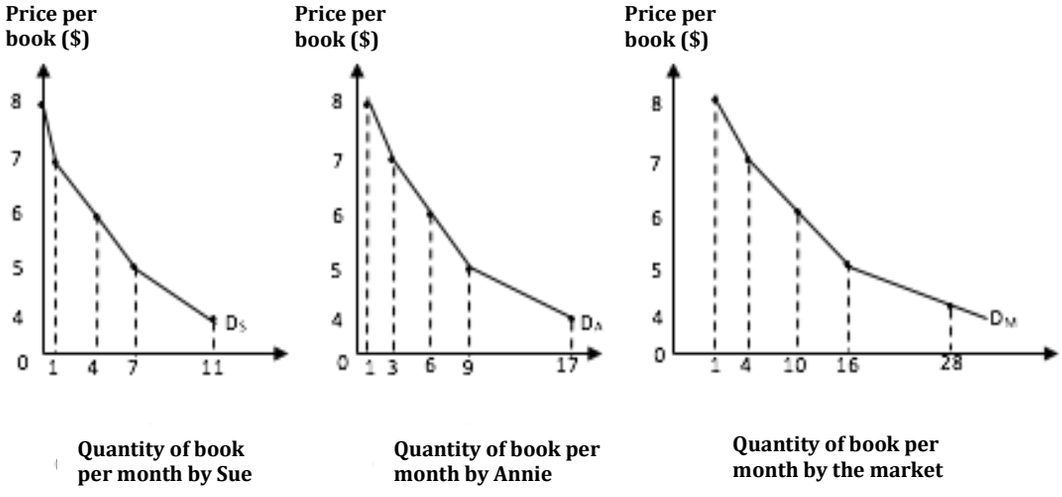


Figure 4: Deriving the Market Demand Curve

2.3 THE LAW OF DEMAND

DEFINITION:

The **law of demand** states that in a given time period, the quantity demanded of a product is ***inversely related*** to its price, ceteris paribus.

NOTE:

When determining equilibrium price and/or quantity, DO NOT draw only demand or only supply curves alone.

For completeness, please draw diagrams with both demand and supply curves.

2.4 CHANGE IN QUANTITY DEMANDED VERSUS CHANGE IN DEMAND

When there is a change in the amount of a good/service purchased by consumers **due to a change in price of the good/service**, economists say that there has been a **change in quantity demanded** of the good/service. In diagrammatic form, such a change is illustrated by a **movement along the demand curve** of the good/service (refer to Figure 5 below), obeying the law of demand.

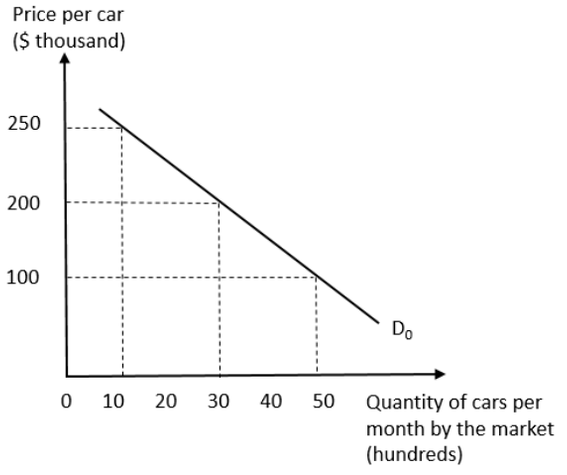


Figure 5: Change in Quantity Demanded

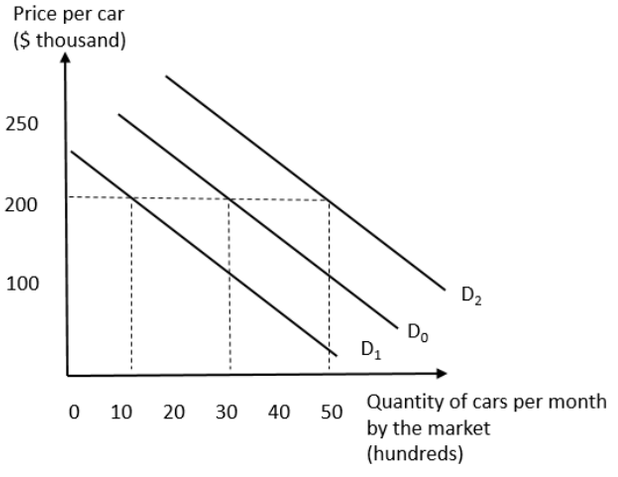


Figure 6: Change in Demand

When there is a change in the amount of a good/service purchased by consumers due to **factors <u>not</u> relating to the price of the good/service** (refer to section 2.4), economists say that there has been a **change in demand**. In diagrammatic form, such a change is illustrated by a **shift in the demand curve** of the good/service (refer to Figure 6 above).

2.5 NON-PRICE DETERMINANTS OF DEMAND

NOTE:

The following list of factors is not exhaustive. What other non-price determinants of demand can you think off?

Factors affecting the consumption of a good includes price changes of the good itself, as well as changes in factors not relating to the price of the good/service itself. Changes in non-price determinants will change demand reflected by a shift of the demand curve, either to the left (i.e. a decrease in demand) or to the right (i.e. an increase in demand). Such factors include changes in consumers' income, changes in the price of related goods, changes in expectations and changes in consumer taste and preferences amongst others.

a. Changes in consumers' income

income ↑ ⇒ income increases ⇒ increase purchasing power ⇒ more willing & able to buy normal goods ⇒ demand increases

income ↓ ⇒ fall purchas power ⇒ less willing buy normal good ⇒ demand decreases

normal vs inferior goods

P.P

L.W

N.G

Income is a non-price determinant of demand. As income increases, households / consumers would have higher purchasing power and thus more of a good and service is purchased at the existing price, so as to increase their level of satisfaction resulting from increased consumption. Figure 7(a) illustrates how an increase in income affects the market demand curve of a **normal good**. With an increase in income, the quantity demanded of a good increases at every price level (e.g. from $0Q_0$ to $0Q_1$ at price P_0), resulting in an increase in demand for the good; reflected by a rightward shift of the demand curve from D_0 to D_1.

However, as income increases, consumers may also purchase less of a good/service. For example, consumers may switch from buying ground beef or taking bus rides to buying steak or travelling by taxi. When consumers purchase less of the good/service at every price due to the higher income level, economists term such a good/service as an **inferior good**. Figure 7(b) illustrates the effect of higher income on an inferior good.

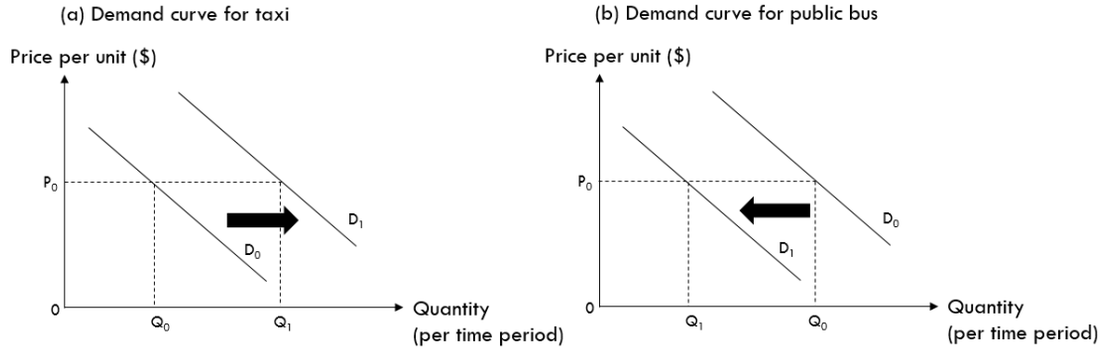


Figure 7: Effect(s) of Higher Incomes on the demand for different goods

THINK ABOUT IT:

Suppose your parents receive a rise in salary raise of 10%. Do you think a family's demand for items such as rice, salt or toilet roll will increase by a lot? Why or why not?

NO

NO

How about the demand for holiday overseas? What do you think its demand might be?

↑D

Does this imply that inferior goods are of poor quality? What do you think makes a good an inferior good?

NO

↳ subjective.

High class ↳ mid & low

inferior ↳ Diagram

taste, preference will, ability

b. Changes in the price of related goods

The quantity of any good/service that consumers buy depends in part on the price of related goods/services. Two goods/services may be related because they are either **substitutes or complements in consumption.**

DEFINITION:

Substitutes in consumption are goods that can be used in place of one another for the satisfaction of a particular purpose.

Using Figure 8 as an example to demonstrate the analysis involved, Apple MacBook and Sony Vaio can be considered as substitutes in consumption, since they can both be used to surf the internet and create documents for work, etc. If the price of a MacBook rises, people will buy fewer units of MacBook, according to the Law of Demand, which states that, there is an inverse relationship between price and quantity demanded, ceteris paribus. As fewer units of MacBooks are consumed and there is still a need to satisfy wants, quantity demanded for Vaio will increase at all existing price levels; resulting in an increase in the demand for Vaio, illustrated by a rightward shift of the demand curve for Vaio from D0 to D1. Substitutes in consumption are also known as goods in competitive demand.

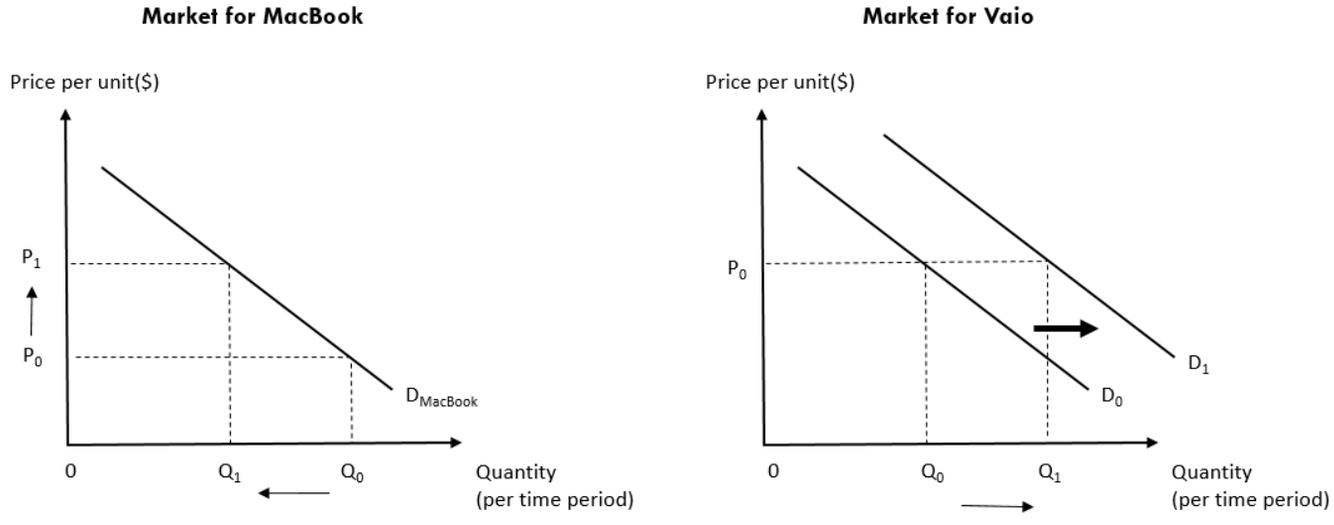
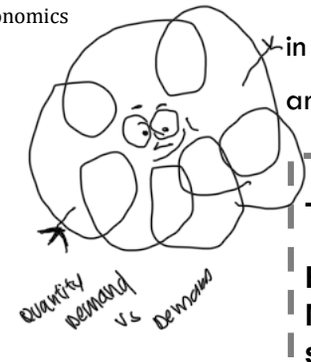


Figure 8: Change in Price of a good and its Effect on the Demand of a Substitute

DEFINITION:
Complements in consumption are goods used in conjunction with one another in the satisfaction of a particular purpose.

Some examples of complements are iPhone and Singtel mobile phone subscription plan, cars and petrol, bread and butter. When the price of a mobile phone plan increases, quantity demanded of mobile phone plans will fall based on the law of demand. Given that the iPhones and subscription plans for mobile phones are complementary goods, there will be less demand for iPhone, even though the price of iPhone has not changed. In economic terms, the quantity demanded for mobile phone plans falls hence the demand for iPhone falls. This is illustrated by a shift



in the demand curve for iPhone to the left. Complements in consumption are also known as goods in joint demand.

THINK ABOUT IT:

Explain and illustrate the effect of a rise in price of the Singtel Mobile subscription plan on the demand for iPhones in the space given below. (Hint: use Figure 8 as a guide)

A level economics

(i) Demand factor → how affected demand for coal inc.

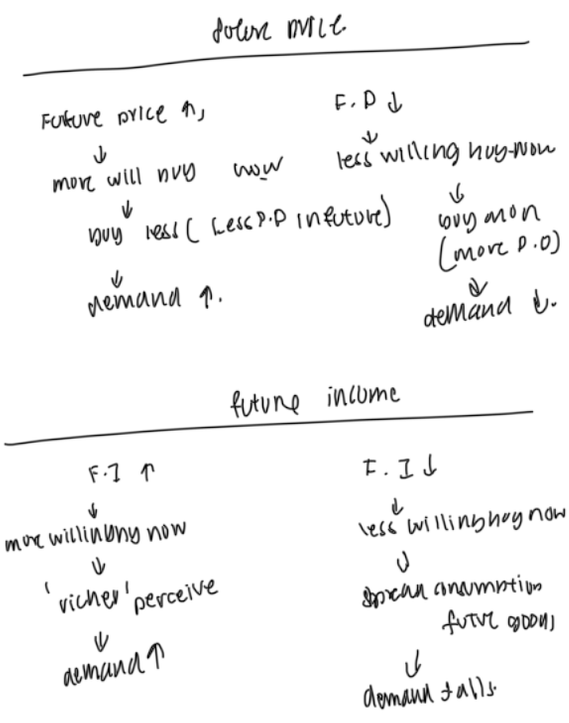
(i) price of gas fell
↓
more willing, buy gas
↓
quantity demand increases
↓
gas, coal substitute
↓
less willing buy coal
↓
demand coal fall.

---

printer (cheap) cartridge [expensive]

when curry chicken ↑ price
↓
less willing → ↓ buy
↓
quantity demand ↓

Lime complement C.C
↓
lime juice goes well with C.C
↓
more willing buy lime juice
↓
demand for lime juice ↑ increases.



THINK ABOUT IT:

Analyse the impact of an increase in price of laptops on the demand for mouse-pads. Now, analyse the impact of an increase in the price of mouse-pads on the demand for laptops. Are the two analysis similar? If not, why?

NOTE:

Changes in expectations can be used in conjunction with some other determinants of demand. For example, expectation of future fashion trends, expectation of government policies, expectations for the changes in price of related goods, etc.

c. Changes in consumers' expectation

Another factor that affects demand is the consumers' expectation about factors that influence demand, such as the future income of the consumers and the future price of the good. For example, a consumer who learns about a future pay increase might increase current demand well before that pay increment occurs. Changes in future price expectation can also shift the demand curve. If consumers think that prices are going to increase in the future, they are likely to buy more now before the price does go up despite the fact that the current price remains the same.

THINK ABOUT IT:

Suppose that Kinokuniya announced that it will be having storewide 15% sales tomorrow, how would demand for books be affected today?

d. Changes in consumers' taste and preferences

Consumers' taste and preferences can change over time. Taste and preferences can be affected by advertising, or the latest fashion trends etc. For example, the recent proliferation of travel blogs, travel documentaries (e.g. Japan Hour), travel advertisements with catchy slogans (e.g. Incredible India, Malaysia Truly Asia, Taiwan Touch Your Heart) will increase peoples' awareness of these countries and reshape their perception of these places of interests, thus changing taste and preferences favourably towards travel.

This will lead to an increase in demand (quantity demanded at all existing price levels) for travel to those countries, despite prices remaining unchanged.

THINK ABOUT IT:

Suppose that yesterday you went for a health talk followed up by a health checkup. You're now convinced of the importance of staying healthy and thus, become more health conscious.

How would your demand for gym membership and Chinese New Year goodies be affected?

e. Changes in the number or composition of consumers

The demand for a good or service will vary with the size and composition of the population. As mentioned earlier, the market demand curve is the horizontal summation of the individual demand curves of all consumers in the market. For example, if the population grows, the demand for rice will increase even if the price of rice remains the same. On the other hand, with ageing population, demand for old-age services would increase while the demand for childcare services would decrease.

THINK ABOUT IT:

Given that Singapore is facing an ageing population and that senior citizens are expected to comprise almost 20% of the population by 2030. What is the effect of this demographic change on product markets in Singapore?

Does this change in the composition of the population mean that the demand for young persons' product markets would fall?

f. Government Policies

Government policies are also able to influence the purchasing power of consumers (e.g. direct taxes and direct subsidies; more details will be given in Chapter 2C), as well as their tastes and preferences for different categories of goods and services. For example, the government may implement a Healthy Eating Campaign, thus influencing the demand for healthier types of food. Thus, government policies can change the demand for goods and services.

2.6 DERIVED DEMAND

Derived demand describes a market in which a good is demanded not for its own sake but for the purpose of producing another good. In other words, the demand for an input is derived from the demand for the output that uses the input. An increase in the demand for handmade furniture would lead to an increase in the demand for carpenters. This is because the demand for carpenters is derived from the demand for furniture as carpenters are required to produce the furniture. Derived demand applies to inputs used in the production of another good, and is different from complements where both goods are final goods consumed by the consumer.

THINK ABOUT IT:

What is the relationship for each pair of goods below? Complements in consumption or derived demand?

1st pair of goods:

Fuel-powered car

Gasoline / Petrol / Fuel pump

2nd pair of goods: derived

Air ticket

Jet fuel

3. THEORY OF SUPPLY

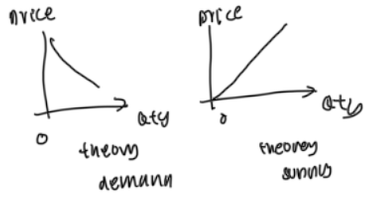
Learning Objectives

- State the definition of supply and the Law of Supply
- Explain why the supply curve is upward-sloping
- Analyse how the price and non-price determinants of supply affects the supply curve (i.e. movement along supply curve vs shifts of supply curve)
- Illustrate with the aid of diagrams the difference between changes in quantity supplied (i.e. movement along supply curve) and changes in supply (i.e. shifts of supply curve)
- Explain and apply the different interrelated supply concepts in analysis of different markets

DEFINITION:

Supply is defined as the quantity of a well-defined commodity that producers are both **willing and able** to produce / to offer for sale at each and every price during a given period of time, *ceteris paribus*.

Supply can be expressed in 3 main ways.



a. As an equation, for example:

Supply = f(price of the good, technology, costs of relevant resources, etc.)

This is known as the **supply function.**

b. In the form of a table, for example:

Price per litre ($)	Quantity supplied per month (millions of litres)
1.25	28
1.00	24
0.75	20
0.50	16
0.25	12

This is known as a **supply schedule.**

NOTE:

For completeness, we include all three representations of supply for this set of notes. Students must know the graphical representation in detail (i.e. how to draw and label the graph etc). Knowledge of table representation may also be needed in case studies.

c. In diagrammatic form, as a graph (Figure 9), for example:

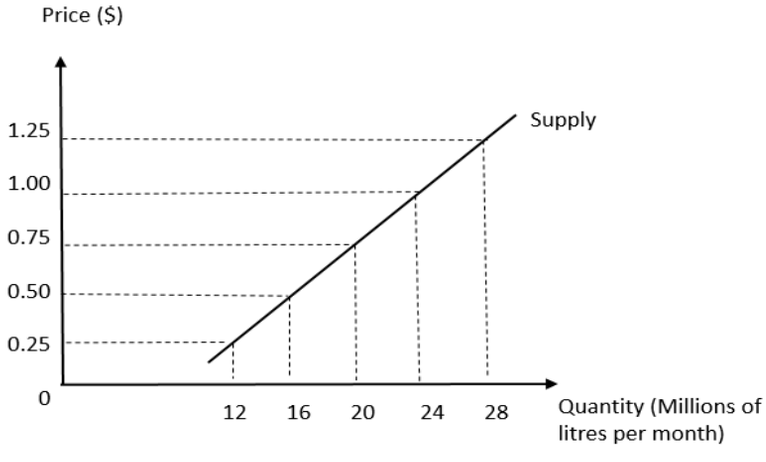


Figure 9: A Firm's Supply Curve

This is known as a **supply curve.**

DEFINITION:

The **supply curve** shows the relationship between the price and quantity supplied of a well-defined commodity. It shows us the quantity supplied of a well-defined commodity that producers are both willing and able to sell at each possible price during a given period of time, ceteris paribus.

3.1 THE LAW OF INCREASEING OPPORTUNITY COST: THE BASIS FOR AN UPWARD SLOPING SUPPLY CURVE

Why must producers be paid more for subsequent units of a good/service?

Higher prices increase the ability to produce a good/service. The **law of increasing opportunity cost** states that as more of a particular good is produced, the opportunity cost of additional output becomes greater – that is, the **marginal cost** of production increases. (For H2 syllabus, the reason for the increasing marginal cost will be explained in Chapter 4). Since producers face a higher marginal cost for additional units of output, they must receive a higher price for the additional units of output to be able to increase the quantity supplied.

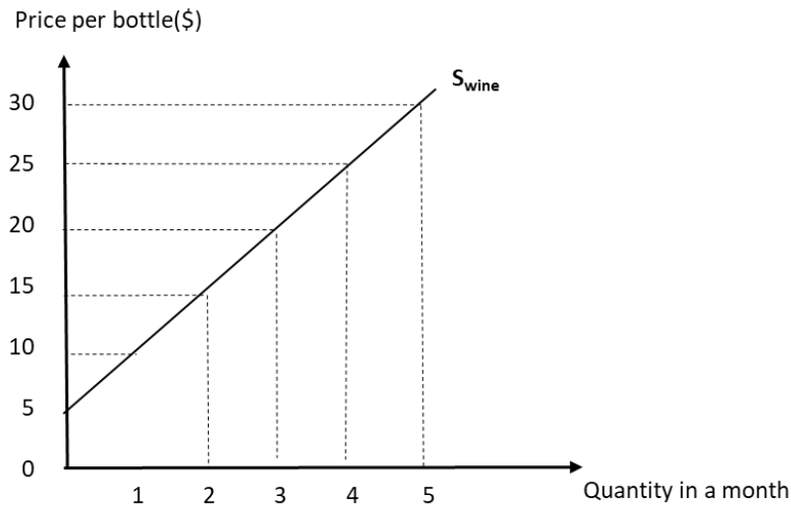


Figure 11: A producer's supply curve

With reference to Figure 11 above, the supply curve shows us that for a producer to supply one bottle of wine, he requires at least a payment of $10. If we wish the producer to supply the **second** bottle of wine, the producer must be paid at least $15 for this second bottle. Likewise, if we

want three bottles of wine, the producer must be paid at least $20 for the **third** bottle of wine. As long as the price of a bottle of wine exceeds or is at least equal to the minimum required payment for a particular bottle of wine, the producer will supply that bottle of wine.

3.2 INDIVIDUAL FIRM SUPPLY VERSUS MARKET SUPPLY

Individual firm supply is the supply of one producer, whereas the market supply is the sum of the supplies of all the producers in the market.

For example:

Price per book ($)	No. of books supplied by		
	Lesters'	Bookers'	Market
8	20	42	62
7	18	40	58
6	16	34	50
5	10	18	28
4	6	13	19
3	2	5	7

The horizontal summation of individual firms' supply curves gives the market supply curve. Refer to Figure 10 below.

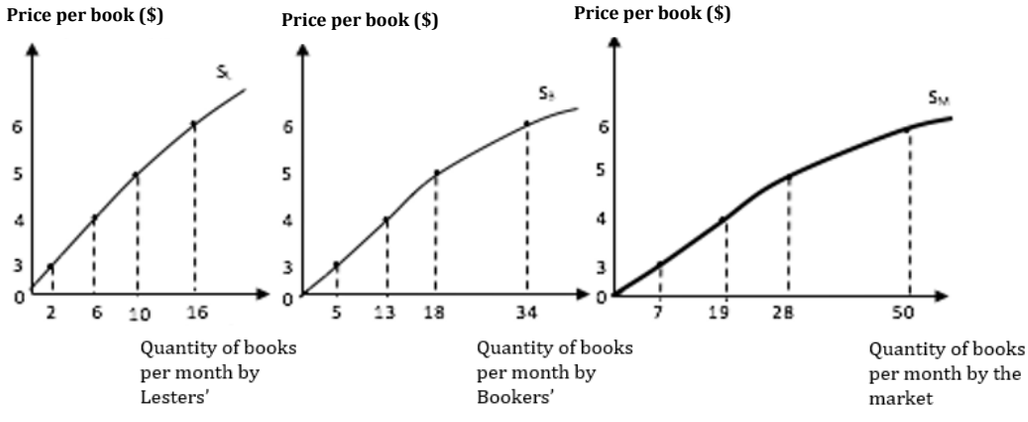


Figure 10: Deriving the Market Supply Curve

3.3 THE LAW OF SUPPLY

DEFINITION:

The **law of supply** states that in a given time period, the quantity supplied of a product is ***directly related*** to its price, ceteris paribus.

3.4 CHANGE IN QUANTITY SUPPLIED VERSUS CHANGE IN SUPPLY

When there is a change in the amount of a good/service produced by producers **due to a change in price of the good/service,** economists say that there has been a **change in quantity supplied** of the good/service. In diagrammatic form, such a change is illustrated by a **movement along the supply curve** of the good/service (refer to Figure 12 below).

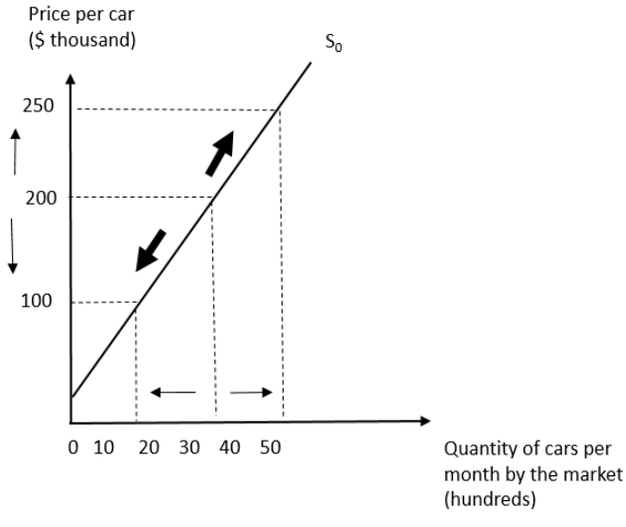


Figure 12: Change in Quantity Supplied

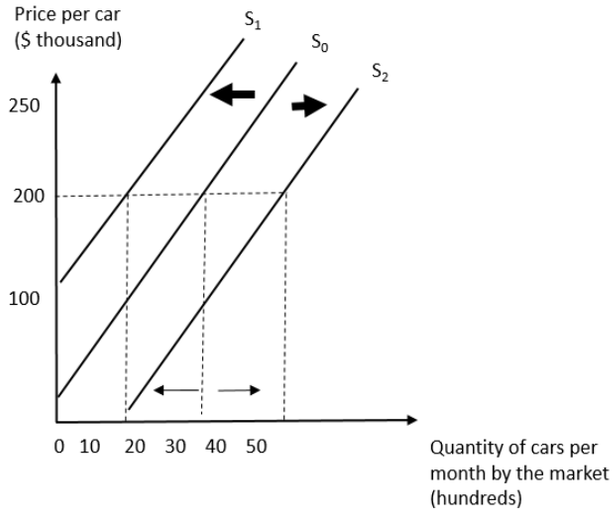


Figure 13: Change in Supply

When there is a change in the amount of a good/service produced by producers due to **factors <u>not</u> relating to the price of the good/service,** economists say that there has been a **change in supply.** In diagrammatic form, such a change is illustrated by a **shift in the supply curve of the good/service** (refer to Figure 13 above).

3.5 NON-PRICE DETERMINANTS OF SUPPLY

NOTE:

The following list of factors is not exhaustive. What other non-price determinants of supply can you think of?

Factors affecting production of a good / how much firms offer a good for sale includes price changes of the good itself, as well as changes in factors not relating to the price of the good/service itself. Changes in non-price determinants will shift the supply curve, either to the left or to the right. Such factors include changes in the costs of relevant resources and changes in the price of related goods, amongst others.

a. Changes in the prices of relevant resources

Changes in any of the factor prices of the factors of production will affect the costs of production. Some examples are, changes in wages of labour, prices of raw materials, fuel and power etc.

An increase in the price of electricity, for instance, will raise the cost of operating machines. Producers will produce fewer of the good due to the higher production cost, even though the price of the good/service has not changed, nor has the amount of resources available for production. In other words, there is a fall in the quantity supplied of the good at every price level. The effect of an increase in the costs of production is illustrated by a shift of the supply curve from S0 to S1 in Figure 14.

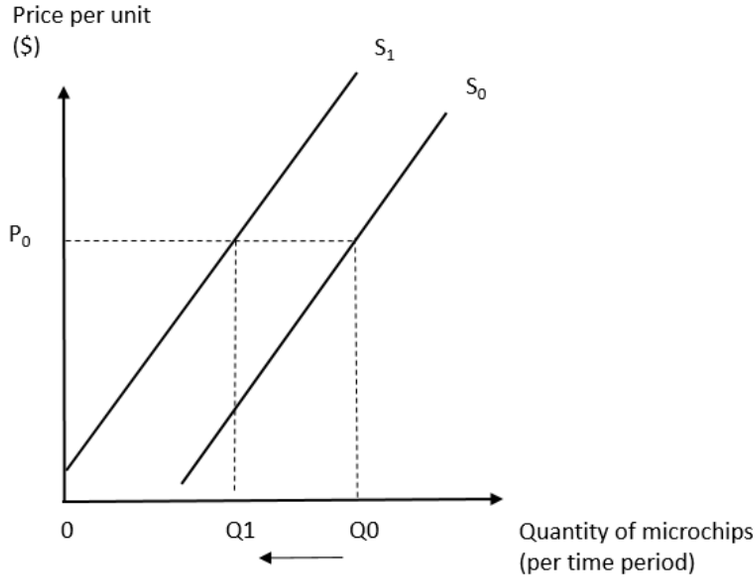


Figure 14: An increase in the price of electricity

IMPORTANT!

Be careful of the differences between substitutes/complements in production, that affect supply versus substitutes/complements in consumption that affect demand.

THINK ABOUT IT:

(i) With reference to Figure 14, illustrate and explain the effect when there is a fall in costs of production instead.

(ii) What factors could contribute to a fall in costs of production of microchips?

b. Changes in the price of related goods

The quantity of any good/service that producers put up for sale depends in part on the price of related goods/services. Two goods/services may be related because they are either substitutes or complements in production.

Substitutes in production are goods that compete for the use of the same resources in production thus when more of one good is produced, less of the other good can be produced. These goods are said to be in **competitive supply**. For example, corn and soybeans can be considered as substitutes in production, since they both require the same resources (land, fertiliser, farm workers, etc.) to be produced. If the price of corn rises, producers will put up more corn for sale and less soybeans for sale, even though the price of soybeans has not changed. This fall in supply of soybeans is shown by a shift of the supply curve of soybeans to the left (refer to Figure 15).

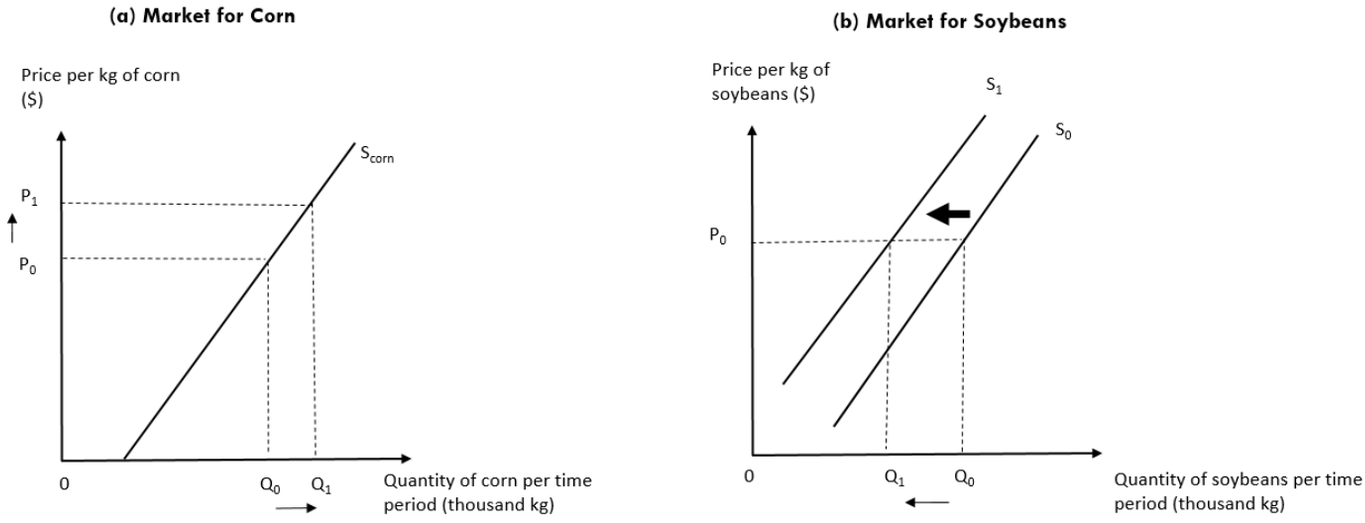


Figure 15: Market for Corn and Market for Soybeans

Complements in production, on the other hand, are goods that are jointly or simultaneously produced when the same resources are used thus when more of one good is produced, more of the other good is also produced at the same time. They are said to be in **joint supply**. Some examples of complements in production or "joint supply" are beef and leather, lumber and paper, honey and beeswax.

THINK ABOUT IT:

Explain and illustrate the effect of a rise in price of beef on the supply of leather (Hint: use Figure 15 as an example.)

c. Nature, 'random shocks' and other unpredictable events

In this category, factors include the weather and diseases affecting farm output, wars affecting the availability of raw materials, the breakdown of machineries, industrial disputes, earthquakes, flood, etc. These events destroy factors of production and reduce the amount available for production, hence causing a fall in the supply of goods and services.

THINK ABOUT IT:

Rice prices in Singapore have climbed to a 15 year high in December 2023. What caused the prices of rice to increase during this period of time?

d. Expectation of future price changes

If price is expected to rise, producers may temporarily reduce the amount they sell. Instead they are likely to build up their stocks and only release them on the market when the price does rise. Therefore, supply of the good would decrease now but would increase in the future as firms may reallocate resources to install new machines or take on more labour, so that they can be ready to produce more in the future when the price has risen.

e. Changes in technology

If a more efficient technology is discovered, production costs will fall as more output can be produced using the same amount of inputs. Suppliers will be more willing and more able to produce the good at each price. Consequently, supply will increase.

THINK ABOUT IT:

Illustrate the effect of research and development in capital intensive method of production on (a) a capital intensive good and (b) a labour intensive good. Compare the two effects and highlight one key difference.

f. Number of Sellers

Market supply depends in all those factors that influence the supply of individual sellers, such as prices of inputs used to produce the good and expectation of future prices etc. In addition, the supply in a market depends on the number of sellers. If the number of sellers increases, supply will shift to the right and vice versa.

g. Government policy – Indirect taxes and indirect subsidies

Sometimes, governments may intervene by imposing taxes and/or subsidies on the market. An indirect tax levied on the product will shift the supply curve upwards. When an indirect subsidy is paid to producers, the supply curve will shift downwards. More details will be given in Chapter 2C.

4. MARKET EQUILIBRIUM

Learning Objectives

- ✳ Illustrate and explain the determination of the market equilibrium price and quantity transacted

Consumers and producers have different views of price because consumers pay the price and producers receive the price. As prices rise, consumers reduce the quantity demanded and producers increase the quantity supplied. How is this ongoing conflict between consumers and producers resolved?

The differing views of price held by consumers and producers are sorted out by the market for the product. A market is an impersonal mechanism that co-ordinates the independent decisions of buyers and sellers. The co-ordination that occurs through markets takes place not because of some central planning by the governments, but because of Adam Smith's "invisible hand".

4.1 THE PRICE MECHANISM REVISITED

In Section 1.2, we saw how the price mechanism helps allocate resources to determine what goods to produce, how much to produce, how to produce and for whom to produce. We can now explain this in more detail using the demand and supply analysis.

Consider the market for apps. Suppose the price of smartphones fall and given that apps are complementary goods to smartphones, the demand for apps will increase, as given in the table below.

Price per app ($)	Quantity demanded of apps per week (millions)		Quantity supplied of apps per week (millions)
	When price of smartphone is $500	When price of smartphone is $300	
1	9	13	0
2	6	10	3
3	4	8	4
4	3	7	5
5	2	6	6

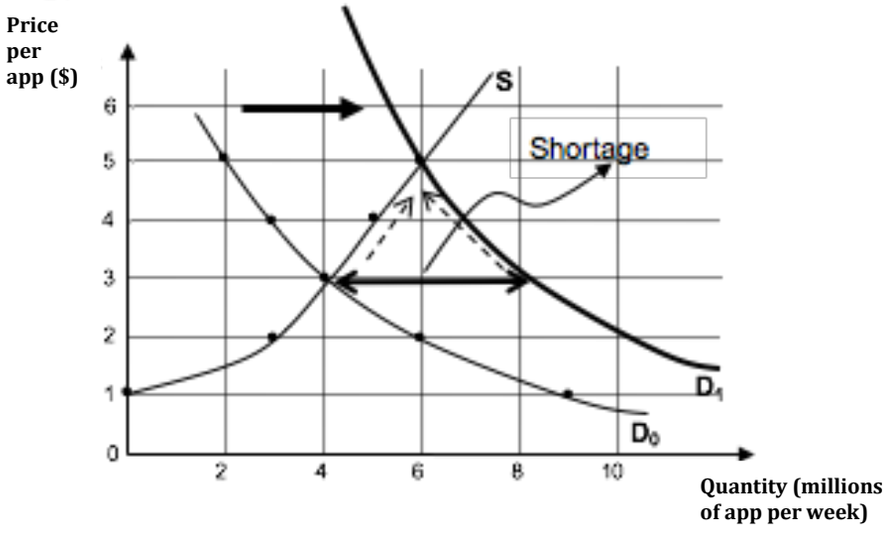


Figure 16: Effect of an increase in Demand for apps

Market equilibrium occurs at a price at which the quantity demanded by consumers is equal to the quantity supplied by producers, i.e. QD = QS. In the example above, this occurs at the price of $3 for which 4 million apps are exchanged in the market initially.

Assuming the price of smartphones fall, demand for apps increases (illustrated by a rightward shift of the demand curve from D0 to D1). At the current market price of $3, the quantity demanded exceeds the quantity supplied. This results in a shortage where consumers are unable to obtain all the apps they want and would thus be willing to offer a higher price. However, with the higher price, quantity demanded falls as the app is no longer affordable or it may not be worthwhile to purchase for some consumers as it is higher than the marginal utility they derive from it. This is indicated by the upward movement along the demand curve. Producers on the other hand are unable or unwilling to produce more apps to meet the demand at the initial market price. With the higher price offered by consumers, producers are now willing and able to produce more as shown by the upward movement along the supply curve, due to the higher profits they can earn from selling the good at a higher price. As long as the shortage exists in the market, there will be an upward pressure on prices and movements along the demand and supply curves continue until a new market equilibrium is achieved where QD = QS. This process is known as the Price Mechanism. Price, hence, acts as a signal that efficiently allocates resources.

IMPORTANT!

Following the increase in demand, the quantity supplied increased due to the rising price but the supply does not change, i.e. the supply curve does not shift.

Similarly, if the demand for apps falls as illustrated by a leftward shift of the demand curve, this will lead to a surplus in the market as the quantity supplied is greater than the quantity demanded at the initial market price of $3. There will be a downward pressure on prices till the market equilibrium is once again achieved whereby QD = QS.

THINK ABOUT IT:

What other factors may contribute to a leftward shift of the demand curve for apps?

Now suppose, there is now a change in a factor affecting the supply of apps. A technological breakthrough leads to more apps being produced at every price. What will happen in the market for apps?

Price per app	Quantity demanded of apps per week (millions)	Quantity supplied of apps per week (millions)	
($)		Old technology	New technology
1	9	0	3
2	6	3	6
3	4	4	8
4	3	5	10
5	2	6	12

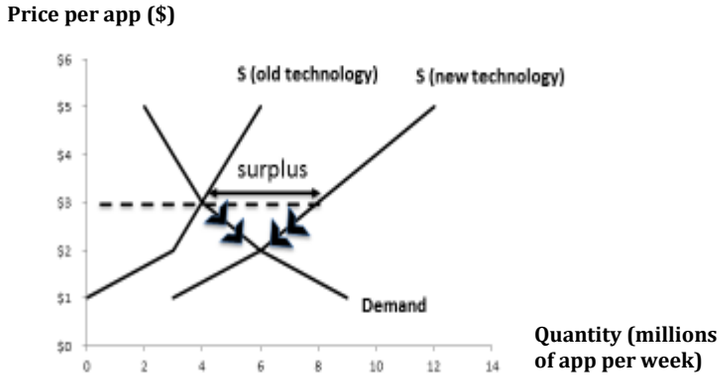


Figure 17: Effects of increase in supply of apps

A technological breakthrough leads to more apps being produced at every price. Supply for apps increases (illustrated by a rightward shift of the supply curve from S0 to S1). At the current market price of $3, the quantity supplied exceeds the quantity demanded. This results in a surplus where there is an excess amount of app which places a downward pressure on the market price. Prices tend to decline as firms recognise that consumers are unwilling to purchase the quantity of product available at prevailing prices. Similarly, producers would also cut back on the production of apps, reducing the quantity supplied which is indicated by a downward movement along the supply curve. With the lower price, quantity demanded rises as the app is more affordable or it may be worthwhile to purchase for some consumers as it is lower than the marginal utility they derive from it. This is indicated by the downward movement along the demand curve. As long as the surplus exists in the market, there will be a downward pressure on prices and movements along the demand and supply curves continue until a new market equilibrium is achieved where QD = QS.

THINK ABOUT IT:

What will happen to equilibrium price and quantity if both the demand and supply curves shift simultaneously?

Case 1: When both the demand and supply curves shift to the right.

Please complete the diagram.

Scenario A: Increase in demand > Increase in supply

Scenario B: Increase in demand < Increase in supply

Scenario C: Increase in demand = Increase in supply

Case 2: When both the demand and supply curves shift to the left.

Please complete the diagram.

Scenario A: Decrease in demand > Decrease in supply

Scenario B: Decrease in demand < Decrease in supply

Scenario C: Decrease in demand = Decrease in supply

Can you think of other possible combinations of shifts in the demand and supply curves? What would be the effect on equilibrium price and quantity in those cases? Make use of the decision matrix below to help you. The first one is done for you. Consider the ambiguous results: under what circumstances will the results be certain?

		Demand	
		Decrease	**Increase**
Supply	**Decrease**		
	Increase		

4.2 THE CONCEPT OF CONSUMER SURPLUS

(FOR H2 ONLY)

DEFINITION:

Consumer surplus is the difference between of how much consumers in the market are prepared to pay and how much they actually pay.

It can be calculated by taking the difference between the total amount that consumers are willing and able to pay for a given quantity of good/service and the total amount that they actually pay for that same quantity of good/service.

Consumer surplus = Total amount that consumers are prepared to pay – Total amount that consumers actually pay

The demand curve for a good/service not only shows us the quantity of good/service that consumers would buy at each price. It also shows us the highest price consumers are prepared to pay for that particular unit of good/service.

With reference to the example below, we can calculate the amount of consumer surplus. Figure 18 below shows us the market demand for salt in a day.

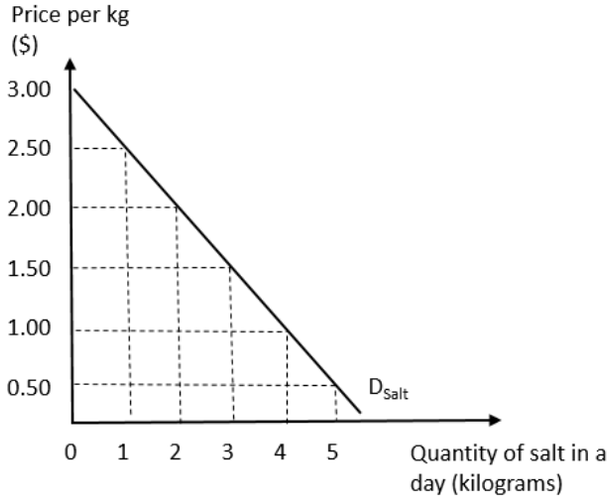


Figure 18: Market demand for Salt

Assuming that the price of a kilogram of salt is $1.00, the amount of salt purchased by consumers is 4 kilograms. What is the total consumer surplus in this case? Economists estimate the total consumer surplus by calculating the area that lies under the demand curve but above the market price.

Therefore, in Fig 18 above, the consumer surplus is equal to

$[0.5*(3 – 1)*(4)] = $4

THINK ABOUT IT:

Will consumer surplus increase or decrease when the price of a good (e.g. MRT rides) increases, assuming that there is no change in the demand curve?

Will consumer surplus increase or decrease when the demand curve for MRT rides increases, assuming that the price of each ride does not change?

4.3 THE CONCEPT OF PRODUCER SURPLUS

(FOR H2 ONLY)

DEFINITION:

Producer surplus is the difference between the price that producers in the market are prepared to sell their good or service and how much they actually receive.

NOTE:

Producer Surplus is not the same as Profit (which is Total Revenue – Total Cost)

It can be calculated by taking the difference between the total amount that producers actually receive for a given quantity of good/service and the total amount that they are prepared to receive for that same quantity of good/service.

Producer surplus = Total amount that producers actually receive – Total amount that producers are prepared to receive

The supply curve for a good/service not only shows us the quantity of good/service that producers would put up for sale at each price. It also

shows us the minimum price producers are prepared to receive for that particular unit of good/service.

With reference to the example below, we can calculate the amount of producer surplus. Figure 19 below shows us the market supply for rice in a month.

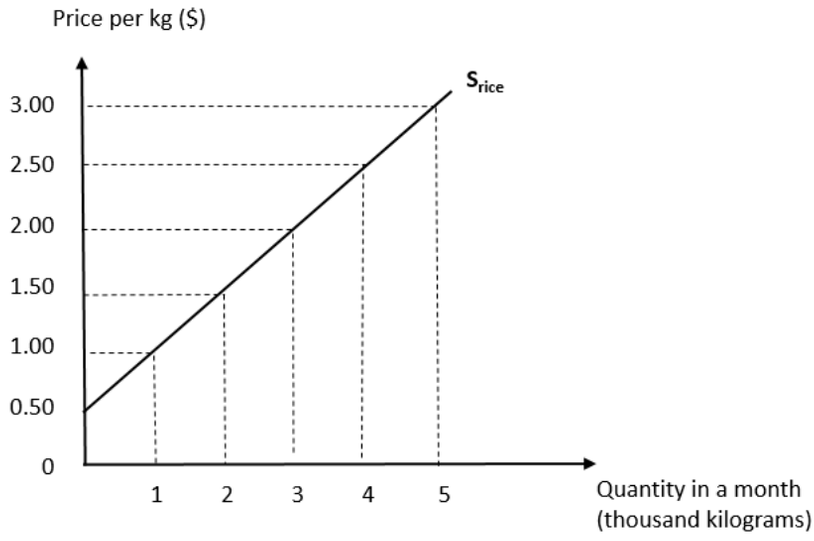


Figure 19: Market supply for Rice

Assuming that the price of a kilogram of rice is $2.50, the amount of rice produced by producers is 4 thousand kilograms. What is the total producer surplus in this case? Economists estimate the total producer surplus by calculating the area that lies above the supply curve but under the market price.

Therefore, in figure 19, when the price of a kilogram of rice is $2.50, the producer surplus is equal to $[0.5*(2.5 – 0.5)*(4)] = $4

THINK ABOUT IT:

Will producer surplus increase or decrease when the price of a good (e.g. bubble tea) increases, assuming that there is no change in the supply curve?

Will producer surplus increase or decrease when the supply curve for bubble tea shifts to the right, assuming that the price of each cup does not change?

5. DECISION MAKING EXAMPLE

1. Key Concepts

- Price Mechanism
- Determinants of demand – price and non-price factors
- Determinants of supply – price and non-price factors

2. Decision to be made (by consumer)

- Consumer's Decision: A working adult is in a hurry to get to work. He is going through the decision-making process on whether to take Grab or MRT to his workplace. Should he take Grab or MRT?

3. Perspectives on the Decision/Issue

- Consideration of his workplace needs (a meeting with an important client) and also his professionalism (in being punctual).

4. Relevant information to support consumer's decision making

- Grab fixed fare
- MRT fare
- Response time of Grab driver for the pick-up schedule
- Traffic conditions on the road
- Time taken to reach destination on MRT

5. Constraints

- The limited amount of money the consumer has for transportation.

6. Benefits and Costs (Consumer's perspective)

- The cost is the higher fare incurred by taking Grab. However, the fare of Grab rides depends on many factors, such as whether the consumer is commuting during peak hours (during which Grab might charge a higher fare for the same route) or non-peak hours, and whether the consumer orders GrabCar (more expensive) or GrabShare (cheaper), etc.

- The opportunity cost (of the higher fare): The value of the next best alternative forgone, for example a treat to a Korean BBQ meal.
- The benefits which accrue to taking a Grab ride over MRT may be the reduced travelling time and greater convenience and comfort. Moreover, the consumer may also benefit from arriving earlier and thus having more time to prepare for his meeting.

7. Decision made (based on weighing of benefits and costs)

- After weighing the benefits and costs, the consumer decided to take a Grab ride (as the expected benefits outweighed the expected costs). This could be because the consumer valued being punctual for his meeting more than the cost of taking Grab, and had realised that the commute was during non-peak hours, which would mean smoother traffic as well as a lower Grab fare. Moreover, the consumer might also have known the gain in Grab Points after every ride, which could be used to get promotional discounts in the future – this could be an example of a secondary benefit with the Grab ride.

8. Intended Consequences

- The benefits and costs of taking a Grab ride.

9. Unintended Consequences

- A congestion on the road which defeats the purpose of increasing the time efficiency from taking Grab as taking the MRT may be a faster option in getting to his destination.
- The Grab driver may cancel the booking, as a result, the consumer may incur inconvenience as he has to rebook or take an alternative mode of transport to his destination.

10. Review of the decision made

*Subsequently, the consumer might review his decision (on whether to take Grab) after taking into account **changes** that over time (such as the surge pricing that occur when the demand for Grab has outweighed the supply of Grab cars on the road, improved public transport network such as the Downtown Line and the increased convenience of booking a normal taxi using Comfortdelgro app) and the **unintended consequences** of taking Grab. The consumer may switch to taking a taxi or simply the public transport.*

Decisions made by consumers (Grab passengers) in the Grab market can have **effects on others** – left to market forces, as the demand for Grab ride rises, the Grab fares would increase, signalling **producers** or Grab drivers to increase the quantity supplied and, hence, the number of the Grab cars on the road taking up passengers. The increase in the number of Grab cars would have an impact on road usage, on other commuters and the taxi companies. If the Grab car population is left uncontrolled, there could be unintended consequences in the form of congestion, pollution and some taxi companies may shut down or merge with other taxi companies. This leads to market failure (negative externality and market dominance), hence the **government** might choose to intervene (by regulating the private-hire car industry) to address the inefficient allocation of resources in order to achieve a more socially desirable outcome.