Topic 2: Demand & Supply

Theme 2.1

Price Mechanism and its Applications

How to use this set of lecture notes?

1) **BEFORE LECTURES – UNDERSTANDING CONTENT**
   - Reference your notes against your H2 syllabus. Mark out the key concepts so that you know what you MUST know
   - Read your notes ahead so that you can focus on listening and capturing additional notes during lectures

2) **During lectures – APPLYING CONTENT**
   - Bring your hard copy notes along, and use your PLDs to refer to the lecture slides concurrently
   - Capture additional notes, especially the real-world examples where you can note down how concepts are applied and how economic analysis are developed in varying contexts
   - You should make use of a notetaking/consolidation tool to take notes during lessons and to consolidate your learning at timely junctures. Examples are MIRO, Notion, Good Notes, Notability, Microsoft One Note, KAMI, and etc. The choice is yours!

3) **After Lectures – TUTORIAL PREPARATION to use content flexibly to show application, analysis and evaluation skills**
   - Revise concepts relevant for the case study and essay questions
   - Refer to the notes and use it flexibly to prepare your answers to meet question requirements. Pure memorisation will not work as it does not involve deep understanding.
   - Do share your notes with your friends to multiply learning!

CONTENTS

Essential Questions:

1. How do consumers and producers make choices about the use of limited resources amongst unlimited wants?
2. How does the market system assist in the allocation of limited resources and distribution of goods and services?
3. What are the factors that affect the market, and what are the impact on market prices and quantities of goods and services?

Introduction to Price Mechanism and its Applications

To recap, we learnt why the central economic problem of scarcity arises. This is because resources are limited in meeting unlimited human wants. As such, price serves to influence the allocation of limited resources and hence goods and services, in a free market.

Have you ever wondered why the price of property in Singapore has been increasing? 10 years ago, a 1,400 square ft private condominium could be as low as $650,000; today, that same condominium would cost a few million dollars! That is a more than 100% increase in price. Could it have been because of higher raw material prices or due to an increasing population? Even so, the increase in price does not seem to deter many people from investing or speculating in it. Is there a way to explain this apparently irrational behaviour?

On a global scale, we have seen sharp spikes and plunges in oil price. What are the possible reasons for the volatility in the prices of oil? What were the key determinants? How would changes in oil prices affect other markets such as electricity or even the market for cars?

In this topic, you will be equipped with the relevant economic tools in unraveling these complex questions. One such tool is the demand and supply model. We start by understanding the factors that affect demand and supply. After establishing the basic set up of the model, we will introduce various scenarios and consider their impacts on the consumers and producers.

Let's begin!

1. Price Mechanism and its Functions

1.1 The role of price mechanism in resource allocation

The central economic problem, scarcity, forces economic agents to make decisions on how they are going to allocate their scarce resources to meet competing wants.

How do societies allocate scarce resources?

In his publication of *An Inquiry into the Nature and Causes of the Wealth of Nations in 1776,* Adam Smith argued that markets guide production and consumption of goods and services like an "invisible hand". Even though everyone is looking after their own private self-interest, their interaction in the market will lead to social good. **This is achieved by the price mechanism that allocate scarce resources in producing the optimal amount of goods and services that society desires.**

Connect*, *Extend, Challenge
What is the "invisible hand"?

It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their self-interest. We address ourselves not to their humanity but their self-love, and never talk to them of our own necessities, but of their advantages.

Every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it… he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other eases, led by an invisible hand to promote an end which was no part of his intention.

By pursuing his interest, he frequently promotes that of the society more effectually than when he really intends to promote it.

Source: Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, Volume 1

Prices facilitate resource allocation as they fulfil the different functions of **signalling, incentivising,** and **rationing**. These functions would help economists answer the following questions:

i) **What** goods and services to produce? (Signalling)
ii) **How much** to produce and how to produce? (Incentivising)
iii) **Who** should receive the goods and services? (Rationing)

1.1.1 Signalling function

One role of **prices is a signal** from consumers to producers to answer ¨**What to produce?**¨when allocating scarce resources amongst unlimited wants to address the fundamental problem of economics. Recall under Topic 1 on Rational Decision Making, where consumers use the marginalist principle, specifically marginal private benefit and marginal private cost to decide how much to consume a good or service? In terms of marginal private benefit, for example, the marginal private benefit of consuming education services can be the personal satisfaction of learning new knowledge and skills. The level of personal satisfaction will determine the price that consumers are willing to pay for education, and that is the quantitative measure of marginal private benefit. **So, consumers use price as a signal to inform producers what goods and services they are able and willing to buy, which allows the producers to know what to produce and allocate the necessary resources to produce the goods and services.** The reverse is true. **When consumers no longer want a good or service, they will not be willing to pay any price for it. Hence the lack of a price signal means that producers will know what NOT to produce and divert resources away from that production.**

For example, during Covid pandemic, consumers were willing and able to pay a price for the Covid vaccines. Then the price of Covid vaccines serve as a signal for producers to allocate limited resources to produce Covid vaccines. That led to many pharmaceutical companies developing Covid vaccines. In contrast, diseases such as smallpox are fully eradicated by World Health Organisation since 1980, so consumers are no longer willing to pay a price for the smallpox vaccine. So, there is no price signal, and producers now no longer allocate resources to produce smallpox vaccines anymore.

1.1.2 Incentive function

Another role of **prices is an incentive** for producers to **answer ¨How much to produce?¨ and ¨How to produce?¨** when allocating scarce resources amongst unlimited wants to address the fundamental problem of economics.

(1) How do the prices of goods and services serve as an **incentive to producers when answering 'How much to produce"?** Recall under Topic 1 on Rational Decision Making, where producers use the marginalist principle, specifically marginal private benefit and marginal private cost to decide how much to produce a good or service?

So, the price that consumers are willing and able to pay for each additional unit of good reflects the marginal private benefit (marginal revenue) that producers can gain from selling that unit to the consumers.

When consumers are willing to pay a higher price for a good or service, the rise in the price of a good/service incentivizes producers to allocate more limited resources and produce more of that good/service. This is because a higher price means a higher unit revenue and higher unit profit for producers, assuming same unit cost. Profit-motivated producers are then incentivized to allocate more resources and

produce more of the good/service. **The reverse is true. When the price falls, it becomes a disincentive to produce, so firms will allocate less resources and produce less of that good/service.**

For example, during the Covid pandemic, with rising demand for Covid vaccines, the prices of Covid vaccines are rising. The rise in prices of Covid vaccines incentivizes producers to allocate more resources to produce more Covid vaccines and in research and technology to fight the new variants.

(2) How the **prices of factors of production (FOP)** serve as an **incentive** to producer when **answering 'How to produce?** In this case, the prices of FOP will be relevant to the producers. **When the prices of FOP rises, it incentivizes producers to use switch to another relatively cheaper, alternative resource.** This is because higher input prices mean higher unit cost of production and lower unit profit for producers, assuming same revenue. Profit-motivated producers are then incentivized to look for cheaper, alternative factor input. The reverse is true. When prices of an FOP fall, it becomes an incentive for the producers to switch away from other relatively more expensive FOP, so as to lower COP and increase profit.

For example, with rising demand for Covid vaccines, there is a rise in derived demand for factor inputs such as glass to make the vials to package the vaccines. This leads to rising price of glass by almost 40% in 2021. The rise in price of glass incentivizes producers to look for cheaper, alternative factor input, such as Aclar thermoplastic film for drug packaging.

1.1.3 Rationing function

The last role of **prices is a rationing tool** for producers to **answer ¨For whom to produce?¨**when allocating scarce resources amongst unlimited wants to address the fundamental problem of economics. When there is a scarcity of resources and shortages of goods/services, there needs to be an economic allocation process to determine how the limited goods/services and resources distributed. For example, should surgical masks be given to the poor and needy in society or to those who can pay the highest price?

A rise in price helps producers ration the limited goods/services produced by limited resources only to consumers who have effective demand i.e. those who are willing and able to consume. **When the price of a good/service rises, the low-income consumers will not be able to afford the good/service. So, the rising price will ensure that the limited goods/services produced by limited resources are rationed to only those who can afford to pay the rising price.** As a result, consumers with more income tend to enjoy a disproportionate amount of an economy's goods. **That also means that profit-motivated producers will**

allocate more resources to produce the goods and services for higher income group, and allocate less resources to the lower income group.

Evidently, income inequality and hence unfair access to goods/services and resources emerge as key problems of a free market. Hence, most governments try to redistribute incomes from the rich to the poor while also striving for a fairer distribution of goods and resources to the poor. For example, with rising demand for Covid vaccines, the prices of Covid vaccines are rising, This means that the low-income group would not be able to afford it, They would have to depend on government subsidies or even free provision to access the vaccines and be protected from Covid virus.

As resources are automatically allocated under free markets, as opposed to being allocated in a planned manner for a command economy, **the price mechanism is also known as the 'Invisible Hand'.** The various functions of prices allocate resources automatically across different markets without the need for government intervention, as if there is an "invisible hand".

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

Consumers who are willing and able to pay for goods they desire will **use prices to signal** to producers on **"What to produce".** Profit-maximising producers will be **incentivised by rising prices of goods/services to determine "How much to produce" i.e.** allocate more of their resources (factors of production) to the production of the goods/services with rising prices, while using prices of FOP to answer "How to produce" i.e. falling prices of FOP will incentivise them to use the least-cost method to maximise profit.

Connect, Extend, <u>Challenge</u>

Is the price mechanism the 'best' way to allocate scarce resources? Can you think of any real-life scenario where the price mechanism may be limited in effectiveness?

2. Demand and Supply Model

2.1 Rationale for the use of models in Economics

Each economic agent (consumers, producers and governments) has individual objectives, and the economist seeks to explain, predict economic phenomena and how it shapes human behaviour. To achieve this, economists construct economic models to make sense of the economy.

Economists use economic models to explain the cause and effect of different phenomena. It is important to note in all economic models, economists employ the ***ceteris paribus* assumption**, which means other things remain the same.

Connect*, *Extend, Challenge

Why is the *ceteris paribus* assumption important?

The ceteris paribus assumption states that other than the variable being studied, *every other variable that could affect the outcome, remains constant.*

There could be many factors that affect an outcome. For example, with the onset of the COVID-19 pandemic in 2020, economists could predict its impact on the price of surgical masks. While there could be many factors affecting the price of surgical masks, the ceteris paribus assumption assumes that other factors are held constant, thereby isolating how the trigger affects the outcome. Therefore, using the demand and supply model, economists would be able to predict the effect of COVID-19 on the market for surgical masks.

2.2 Features of the demand and supply model

This model is used to analyse **how changes in demand and/or supply affect the market – primarily the price and quantity of a good/service produced and consumed.** A market is the interaction between buyers (consumers) and sellers (producers) where goods are exchanged at an agreed market price.

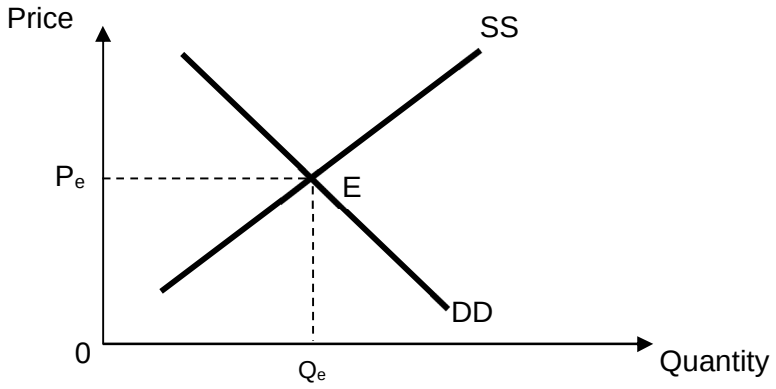


Figure 1: Demand and Supply model

Note: *The vertical axis represents the **price** of the good in the market, while the horizontal axis reflects the **quantity** of the good transacted in the market.*

Two observations from Figure 1:

- The market equilibrium E is represented by the intersection of the demand (DD) and supply (SS) curves.
  - DD represents consumers' valuation of the good/service.
  - SS represents producers' cost of producing the good/service.
- P_e and Q_e are the equilibrium price and quantity. At the equilibrium price and quantity, there is no tendency for the price or quantity to change.

2.3 Assumptions of the demand and supply model

When the allocation of resources is left to demand and supply forces, the free market arises. The free market has the following assumptions[1]:

- Individuals are rational: Economic agents make decisions based on their self-interest, applying the marginalist principle to achieve their objectives. Consumers want to maximise their satisfaction (utility) and producers want to maximise their profits.
- Large number of consumers and producers in the market: No producer or consumer have power to influence the market outcomes.
- Perfect factor mobility and perfect information.

[1] These are the basic assumptions that undergirds how the demand-supply model can explain price and quantity in the market. Other assumptions are needed to make the claim that the demand-supply model resolves the problem of scarcity by achieving allocative efficient outcomes. These assumptions will be discussed in the topic 'Market Failure'.

3. Demand Theory

3.1 Definition of demand

The **demand** of a good refers to the quantity of the good that **consumers are willing and able to purchase** at every given price over a given period of time, *ceteris paribus*.

Demand typically refers to effective demand. For a demand to be effective, the willingness to purchase the good at each and every price, must be backed by ability.

3.2 Law of Demand

The Law of Demand states that at a given time, the **quantity demanded of a good** is **inversely related to its price**, *ceteris paribus.*

This means that other things remaining constant (*ceteris paribus*), when the price of a good increases, quantity demanded for the good will decrease. Conversely, when the price of the good decreases, the quantity demanded for it will increase.

3.3 Demand curve

A demand curve is a curve that shows the relationship between the quantity demanded of a good and its price, ceteris paribus.

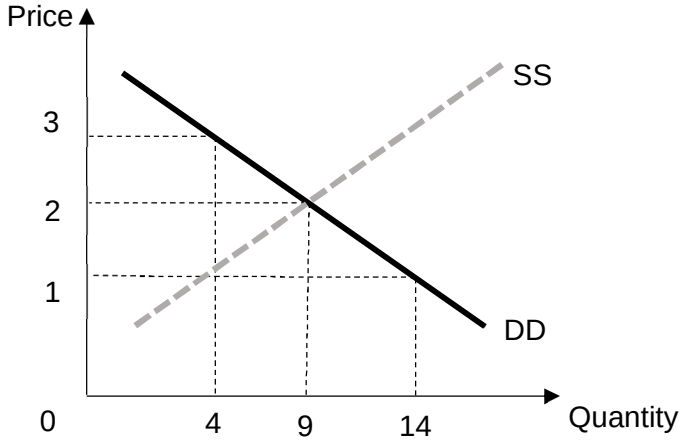


Figure 2: Demand Curve

Figure 2 shows a downward sloping demand curve, and it reflects the **inverse relationship between price and quantity demanded**.

3.4 Explaining the downward-sloping shape of the demand curve

The downward sloping nature of the demand curve can be explained by the Law of Diminishing Marginal Utility (LDMU).

Before explaining the idea of the LDMU, it is important to distinguish between total utility and marginal utility. Total Utility (TU) is the total satisfaction a person gains from consuming all units of a good within a given time period. In contrast, marginal Utility (MU) refers to the additional utility derived from consuming an additional unit of the good per period of time.

The LDMU states as more and more units of a good are consumed, the additional utility derived from the consumption of each successive unit, will decrease.

When we attach a dollar value to utility, then the following is an example of how TU and MU change with increasing consumption of ice cream:

Scoops of Ice Cream	Total Utility ($)	Marginal Utility ($)
1	12	12
2	19 (=12+7)	7
3	23 (=19+4)	4
4	25 (=23+2)	2
5	26 (=25+1)	1

Table 1: Diminishing Marginal Utility

Since each subsequent unit of the good (e.g., next scoop of ice cream) consumed gives decreasing additional utility, a rational consumer would only be willing to pay a lower price for an additional unit of the good, up to the additional marginal utility that he receives from consuming the good. Therefore, the consumer is willing and able to buy more of a good only at a lower price because of the law of diminishing marginal utility.

Recall that a rational consumer will maximise his satisfaction. This means that he/she will consume a good up to a point where the price (marginal cost of consuming) is equal to marginal benefit, constrained by his income.

3.5 Individual demand schedule

An individual demand schedule shows the relationship between price and quantity demanded, *ceteris paribus*, of a single consumer in a tabular representation. Quantity demanded of a good refers to the amount of a good a consumer is willing and able to buy at a given price level. Assume that a market for ice cream has only two consumers, Tristan and Felicia. In the table below, columns 2 and 3 show the individual demand schedule for Tristan and Felicia at the respective price levels.

(1)	(2)	(3)	(4)
Price per unit ($)	No. of units demanded by Tristan	No. of units demanded by Felicia	Total market demand [(2) + (3)]
10	1	2	3
5	2	4	6
2.50	3	6	9

Table 2: Demand schedule for ice cream

3.6 Market demand schedule

The market schedule is the demand for all consumers in the market for a particular good during a period of time. It is obtained by summing the quantity demanded at each price by each consumer. This is represented in column 4 of Table 2.

3.7 Market demand curve

To derive the market demand curve, it is the horizontal summation of all individuals' demand curves, as illustrated in Figure 3.

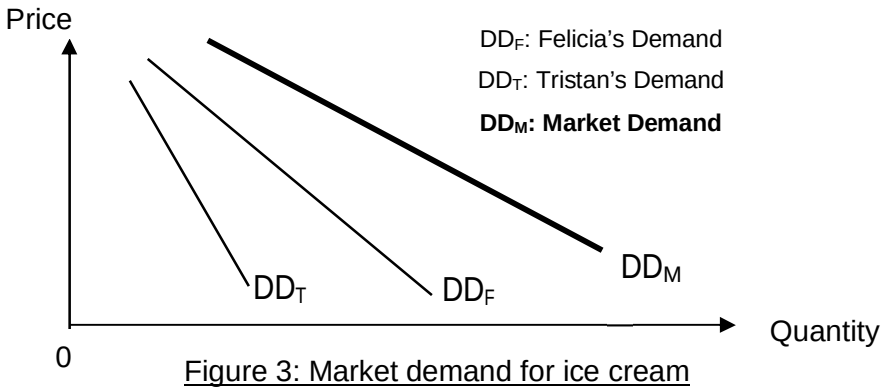


Figure 3: Market demand for ice cream

In reality of course, a market consists of many consumers. The market demand thus aggregates all consumers' individual demand curves. (Note that this is an incomplete market diagram. **A market diagram should always consist of both demand and supply curves**.)

3.8 Change in quantity demanded vs. Change in demand

3.8.1 Change in quantity demanded caused by changes in price of the good itself

When a change in the quantity of a good or service bought by consumers is *due to a change in price* of the good or service, economists say that there has been a change in quantity demanded of the good or service.

Diagrammatically, a change in price is illustrated by a *movement along* the demand curve of the good/service as shown in Figure 4.

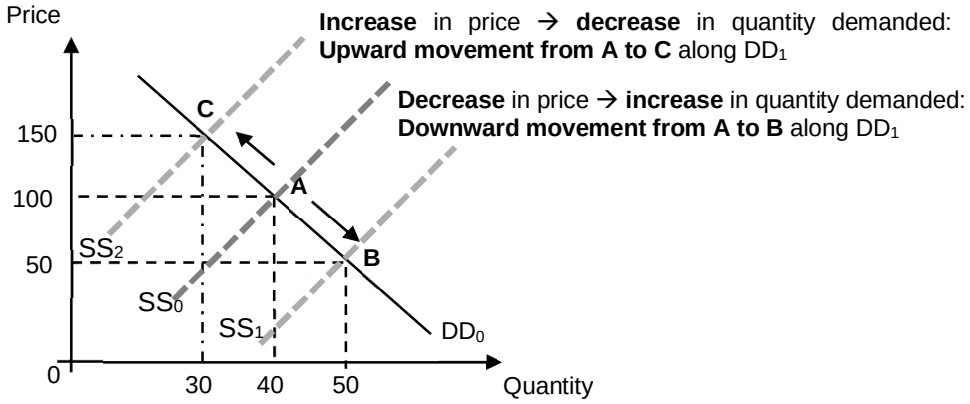


Figure 4: Change in ***Quantity Demanded*** arising from a change in the ***Price*** of ice cream

In the free market, these movements along the demand curve are caused by changes in supply, i.e., shifts in the supply curve. (We will explore what causes shifts in supply in 4.8.)

3.8.2 Change in demand (caused by changes in non-price determinants)

A change in demand refers to either increase or decrease in demand, which is *brought about by changes in non-price determinants*. A non-price determinant is a determinant other than price of the good itself which causes demand to rise or fall.

Diagrammatically, a change in non-price determinant is illustrated by a *shift of* the demand curve of the good or service as shown in Figure 5.

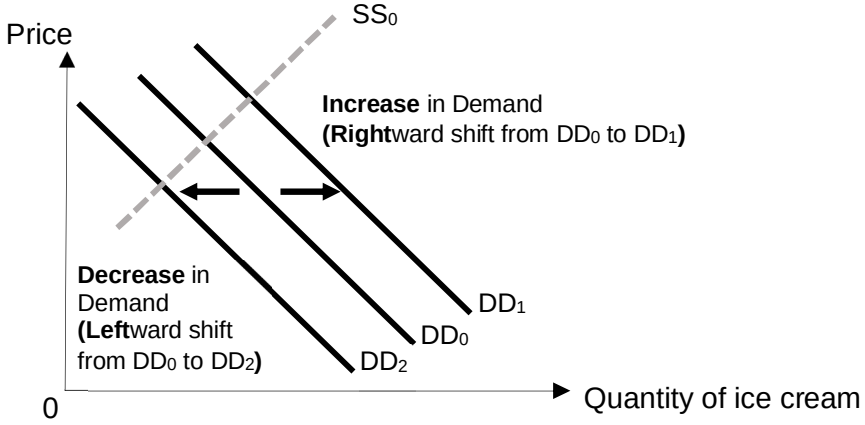


Figure 5: Changes in ***Demand*** for ice cream arising from a change in **non-price** determinants

Non-price determinants of demand (*to be elaborated on later*) include changes in:

- Income of consumers
- Tastes and preferences
- Expectations of consumers
- Prices of related goods (substitutes and complements)
- Population size and structure (demographics)
- Government policies

E – Expectations
G – Government policies
Y – Income
P² – Population/Prices of related goods
T – Tastes & preferences

Note: these factors are not exhaustive.

In summary,

Determinants of Demand

Price Determinant	**Non-Price** Determinants
• As **price of the good itself** changes, **quantity demanded** changes in the opposite direction [Law of Demand] • Represented by **movement along** the same demand curve	• **Demand** changes for reasons *not due* to a change in price of the good itself • Represented by a **shift** of the entire demand curve

4. Supply Theory

4.1 Definition of supply

The **supply** of a good refers to the quantity of the good that **producers are willing and able to produce** at every given price over a given period of time, *ceteris paribus*.

4.2 Law of Supply

The Law of Supply states that the **higher** the price of a good, the **greater** the quantity supplied of the good, ceteris paribus. This implies **quantity supplied is directly related to the price of a good**.

4.3 Supply curve

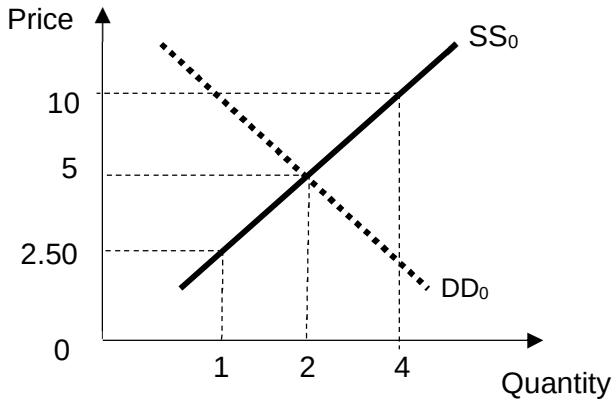


Figure 6: Supply Curve

A supply curve is a curve that shows the relationship between the quantity supplied of a good and its price, *ceteris paribus*.

Figure 6 shows an **upward-sloping** supply curve, and it reflects the **direct relationship between the price and quantity supplied**

4.4 Explaining the upward-sloping shape of the supply curve

There are a few reasons for this: Firstly, as producers increase production, they are likely to find that beyond a certain level of output, additional cost to produce one more unit rise more rapidly. (You will learn this later under Topic 6 Objectives of Firms, Cost and Revenue.)

In the case of farming, if more and more crops (e.g. potatoes) are grown, then the land which is less suitable for potato cultivation has to be used, incurring higher opportunity costs. This raises the cost of producing potatoes. In the case of manufacturing, beyond a certain output level, costs are likely to rise rapidly as workers have to be paid overtime and as machines approach working capacity. Thus, producers will need to get a higher price for the next unit to cover the rising additional cost when producing one more unit and if they are to be persuaded to produce extra output.

Secondly, the higher the price of the good, the more profitable it becomes to produce. Firms will be persuaded to produce more of it by switching from producing less profitable goods.

4.5 Individual supply schedule

An individual supply schedule shows the relationship between price and quantity supplied, *ceteris paribus*, of a single producer, in a tabular representation. Quantity supplied of a good refers to the amount of a good a producer is willing and able to sell at a given price.

Assume that a market for ice cream has only two producers, Walls and Kings. In the table below column 2 shows the individual supply schedule for Walls ice cream whereas column 3 shows the individual supply schedule for Kings ice cream at the respective price levels.

(1)	(2)	(3)	(4)
Price per unit ($)	Walls ice cream (units)	Kings ice cream (units)	Market Supply (units)
10	4	8	12
5	2	4	6
2.50	1	2	3

Table 3: Supply schedule for Ice cream

4.6 Market supply schedule

The market schedule is the supply for all producers in the market for a particular good during a period of time. It is obtained by summing the quantity supplied at each price by each individual producer. This is represented in column 4 of Table 3.

4.7 Market supply curve

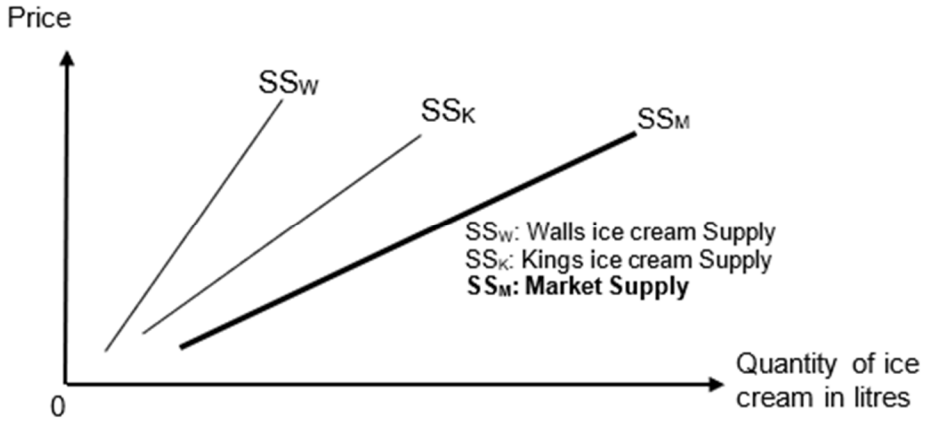


Figure 7: Market supply

To derive the market supply curve, it is the horizontal summation of all individual producers' supply curves, as illustrated in Figure 7. In reality, the market supply consists of many producers. The market supply is the aggregate of all producer's supply curves.

4.8 Change in quantity supplied vs. Change in supply

4.8.1 Change in quantity supplied caused by changes the price of the good itself

When a change in the quantity of a good or service sold by the producer is *due to a change in price* of the good or service, economists say that there has been a change in quantity supplied of the good or service.

Diagrammatically, a change in price is illustrated by a *movement along* the supply curve of the good or service as shown in Figure 8. A movement along the supply curve is due to changes in demand, i.e., shifts of the demand curve.

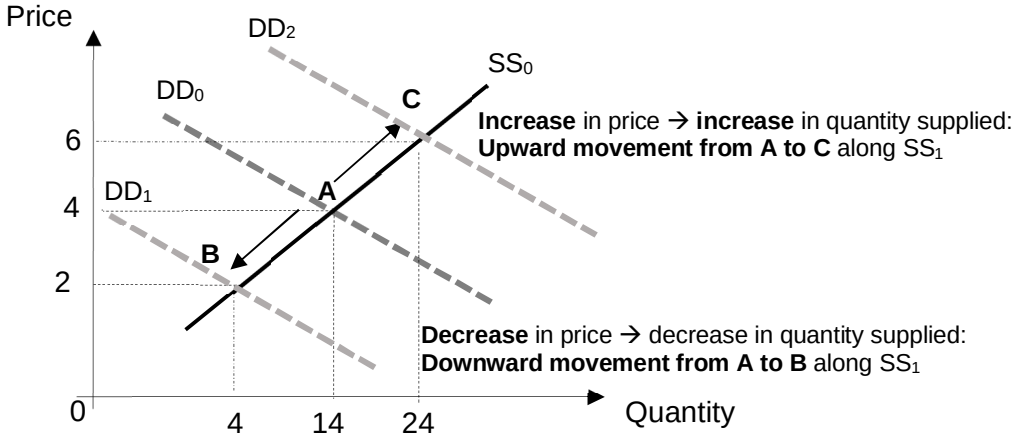


Figure 8: Changes in ***Quantity Supplied*** in response to a change in ***Price*** of ice cream

4.8.2 Change in supply (caused by changes in non-price determinants)

A change in supply refers to either increase or decrease in supply, which is brought about by a *change in the non-price determinants*. A non-price determinant is a determinant other than price of the good itself which causes supply to rise or fall. Diagrammatically, a change in non-price determinant is illustrated by a *shift* of the supply curve of the good as shown in Figure 9.

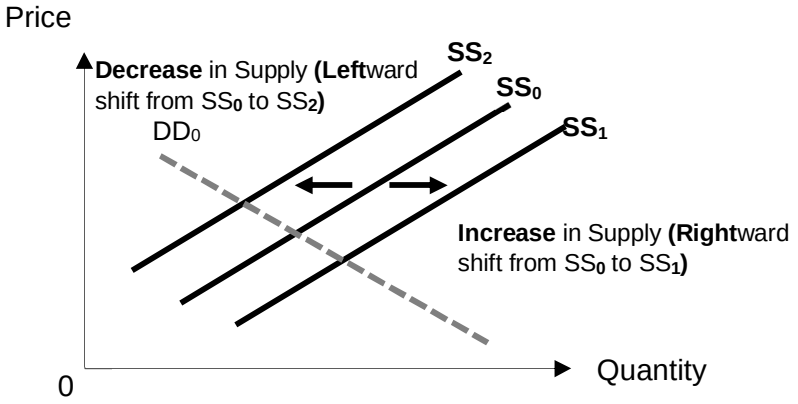


Figure 9: Changes in **Supply** of ice cream in response to a change in **non-price** determinants

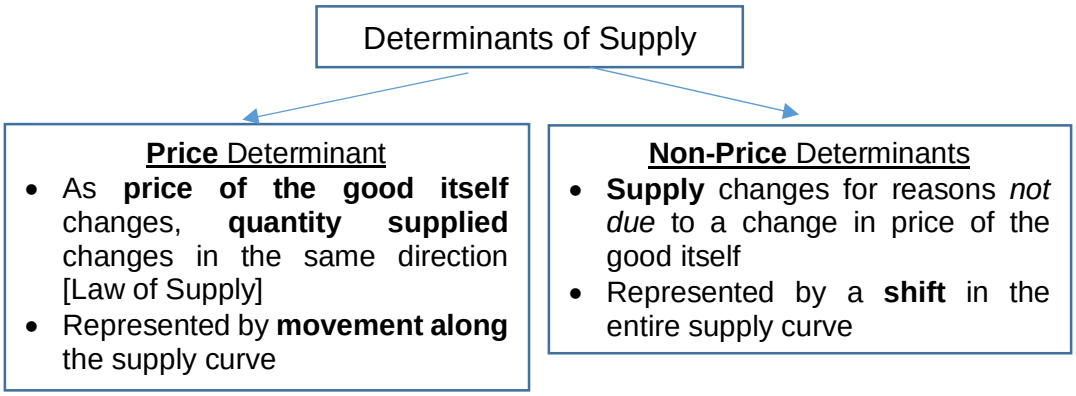
Non-price determinants of supply (*to be elaborated on later*) include changes in:

- Input prices/Cost of production
- Technology
- Weather and seasonal factors
- Government policies
- Price of related goods (Competitive supply and joint supply)
- Number of sellers
- Expectation of future prices

W – Weather & season
E – Expectations of future prices
T – Technology
P – Price of related goods
I – Input prices
G – Government policies
S – Sellers (number of)

Note: these factors are not exhaustive.

In summary,



5. Market Equilibrium

5.1 Definition

Market equilibrium occurs at the intersection of the demand and supply curve, whereby **quantity demanded is exactly equal to quantity supplied at the equilibrium price**. At this equilibrium, there is no tendency for the price and quantity to change.

In the free market, consumers and producers pursue their self-interest independently and simultaneously. This means that consumers make decisions to maximise their utility (represented by the demand curve) while producers make decisions to maximise profits (represented by the supply curve). When consumers and producers interact in the free market and agree on a price for the good, this is where their objectives are met.

5.2 Price adjustment process

To understand why market equilibrium occurs where the demand curve intersects the supply curve, it is more intuitive to approach it from a situation when the market is not in equilibrium i.e., when quantity demanded ≠ quantity supplied at the current equilibrium price. In this situation, there will either be a shortage or surplus, resulting in a tendency for the price to change. This change in price will trigger changes in quantity demanded and quantity supplied. The change in price will continue until quantity demanded is equal to quantity supplied.

a. Shortage ($Q_d > Q_S$) at P_0

In Figure 10, the price P_0 is below the equilibrium price P_e. At prices below the equilibrium price, a shortage arises because quantity demanded Q_d is greater than quantity supplied Q_s.

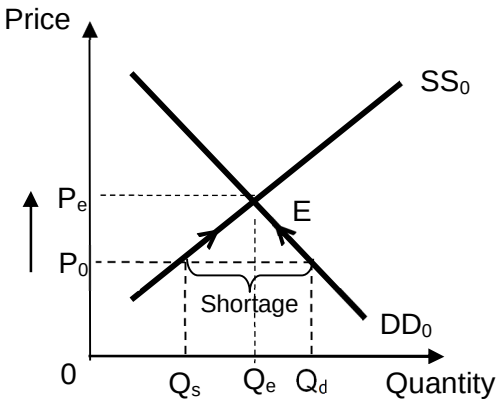


Figure 10: Shortage

This shortage exerts an upward pressure on price as consumers compete for the limited good. The higher price signals and incentivises the profit-maximising producers to increase quantity supplied along the supply curve since the good is more profitable to produce (Law of Supply). With the increase in price, consumers are less willing and able to consume. This means that the higher price both signals and incentivises consumers to reduce quantity demanded along the demand curve (Law of Demand). Price will continue to rise until the shortage of Q_sQ_d is eliminated and market equilibrium is reached again at point E.

b. Surplus (Qs>Qd) at P0

In Figure 11, the price P_0 is above the equilibrium price P_e. At prices above the equilibrium price, a surplus arises because quantity supplied Q_s is greater than quantity demanded Q_d.

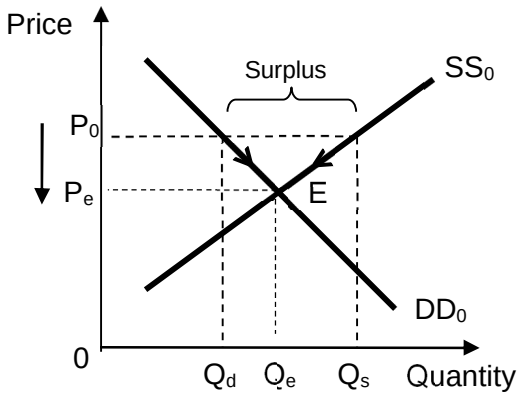


Figure 11: Surplus

This surplus exerts a downward pressure on price as producers lower prices to clear their inventories. The lower price disincentivises the profit-maximising producers, hence producers will lower quantity supplied along the supply curve, since the good is less profitable to produce (Law of Supply). With the decrease in price, consumers are more willing and able to consume, hence the lower price both signals and incentivises consumers to increase quantity demanded along the demand curve (Law of Demand). Price will continue to fall until the surplus of Q_dQ_s is eliminated and market equilibrium is reached again at point E.

6. Factors affecting Demand

Recall that changes in demand occur only when there are changes to factors NOT relating to the price of the good itself. Diagrammatically, such a change is illustrated by a shift in the demand curve of the good.

6.1 Income of Consumers

Changes in consumers' income is usually caused by changes in national income of a country.

a. Normal goods

Normal goods are goods whose demand is directly related to consumers' incomes, i.e., as income increases, consumers' demand for normal goods also increases.

This is because when there is an increase in income, consumers will have higher purchasing power. This means that consumers are able to purchase more goods at each price. This leads to an increase in demand, represented by a rightward shift of the demand curve from DD_0 to DD_1 in Figure 12.

Connect*, *Extend, Challenge

Note: *Figure 12 and its accompanying explanation below can be used to describe the effects of subsequent examples of an increase in demand.*

Price Adjustment Process (PAP)

At original price P_0, quantity demanded Q_d is greater than quantity supplied Q_s, creating a shortage that exerts an upward pressure on price. As price increases, quantity supplied rises while quantity demanded falls. Price continues to increase until the shortage is eliminated and a new equilibrium is reached at P_1 and Q_1.

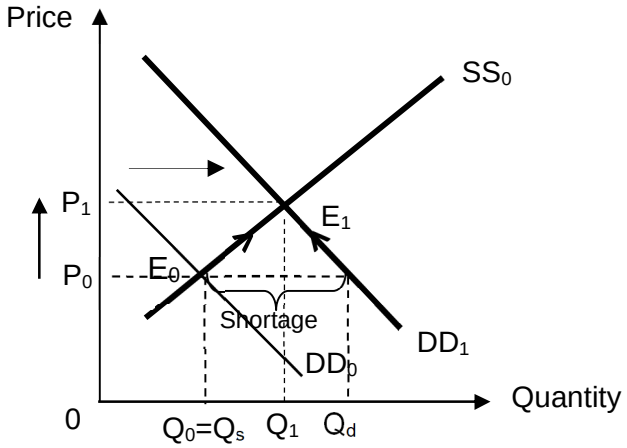


Figure 12: Increase in demand

Inferior goods

Inferior goods are goods whose demand is inversely related to consumers' income, i.e., as income increases, consumers' demand for inferior goods decreases.

This is because when there is an increase in income, disposable income increases, and so does purchasing power of consumers. These consumers will now switch to consuming alternative goods that they can now better afford. Thus, demand for inferior goods will fall, represented by a leftward shift of the demand curve from DD_0 to DD_1 in Figure 13.

Connect, Extend, Challenge

Note: *Figure 13 and its accompanying explanation below can be used to describe the effects of subsequent examples of a decrease in demand.*

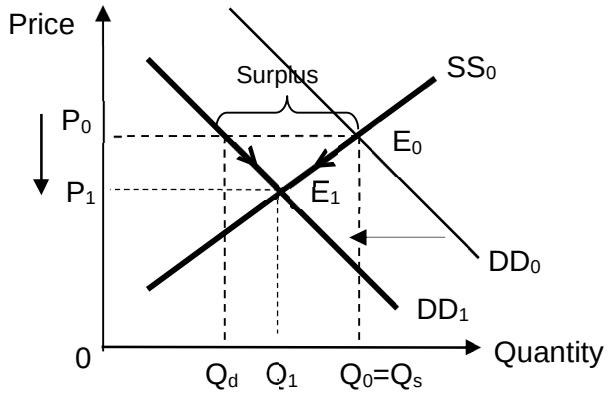


Figure 13: Decrease in demand

Price Adjustment Process (PAP)

At original price P_0, quantity supplied Q_s is greater than quantity demanded Q_d, creating a surplus that exerts a downward pressure on price. As price decreases, quantity supplied falls while quantity demanded rises. Price continues to decrease until the surplus is eliminated and a new equilibrium is reached at P_1 and Q_1.

Contrasting normal and inferior goods:

An example of normal good can be smartphones, while an inferior good can be non-smartphone. When consumers' incomes increase, their demand for smartphones increases and the demand for non-smartphone falls.

Another example is restaurant meals (normal good), distinct from instant foods (inferior good).

Note: *The concept of normal versus inferior good is relative depending on consumers' income level. This is because the same good can be a normal good to consumers in one market, but an inferior good to consumers in another market. In the same way, a normal good can also become an inferior good over time. For example, a basic smartphone can be considered as a normal good to consumers in a developing country like India, while the same basic smartphone is considered as an inferior good for consumers living in a developed country like the US. As income increases, consumers will switch from consuming these inferior goods to normal goods. While inferior goods may be comparatively of poorer quality or status, the focus is on the willingness and ability to buy these goods as income changes, rather than as a statement about the quality of the good.*

We will revisit Section 6.1 under Income Elasticity of Demand concept in Topic 3.

Connect, Extend, Challenge

What would happen to the demand of iPhone 16 when the country is undergoing an economic recession (negative growth rates and increase in unemployment)? How would you illustrate this on a demand and supply diagram?

6.2 Tastes and preferences

The more desirable consumers find a good, ceteris paribus, their willingness to purchase the good increase. The changing taste and preferences can be influenced by the effects of advertising, research findings and consumer reviews.

For instance, over the last few years, research has shown that the consumption of brown rice brings about health benefits. Coupled with strong advertising by the Health Promotion Board, resulted in a rising preference for brown rice. This led to an increase in the demand for brown rice.

There may also be *seasonal changes* in tastes and preferences. For example, during winter, the demand for thermal and winter clothes increases. Similarly, just before Chinese New Year, the demand for pineapple tarts and abalone increases. Likewise, the advent of Christmas usually sees a spike in the demand for retail goods, especially toys.

6.3 Expectations of consumers

a. Consumers' expectation of future changes in price

When consumers expect the price of a good to rise in the future, they may buy more of the good today and cause the demand for the good to rise. During the COVID-19 period, many consumers stocked up on surgical masks to avoid future price rises in anticipation of production constraints. Another possible reason is because some consumers are speculatively purchasing goods to sell them in future at a higher price.

Conversely, when the price of a good is expected to fall, consumers will postpone their purchases now, thus reducing the demand for the good.

The article below is about expectations of rising food prices.

Connect, Extend, Challenge

In the News

Amid drought, conflict and rocketing prices, a global food crisis could be approaching, top expert warns

Global food prices are soaring. Fertilizer costs are sky-high. In Afghanistan, nearly 23 million people — more than half the population — are expected to face potentially life-threatening food insecurity this winter. Madagascar is confronting its worst drought in 40 years, with more than a million people there in need in urgent food aid.

The world is witnessing an increase in localized and conflict-driven food crises, particularly in sub-Saharan Africa. But across the globe, the food price surges of recent months are still not as bad as the two critical spikes sparked by weather, biofuel production and surging Asian demand in 2007-2008 and 2011-2012.

Because of the pandemic, global hunger shot up by an estimated 118 million people worldwide in 2020, jumping to 768 million people, the most since as far back as 2006. The number of people living with food insecurity — or those forced to compromise on food quantity or quality — surged by 318 million, to 2.38 billion.

As vaccination rollouts lag in the developing world, there are fears that the slower economic recoveries in low- and medium-income nations could worsen the food insecurity picture further in 2022.

The major drivers before COVID-19 were conflict, and climate and economic downturns. Lockdowns and COVID-19 have exacerbated those problems.

But what is new are two things: One is the significant recovery plans and inflation we are seeing as the U.S., China and other countries create excess demand,

which has affected, of course, prices because of their demand for commodities. The competition for containers has exacerbated the situation, making transportation costs higher.

The other element is fertilizer prices and scarcities. Countries like Bolivia that used to export to Peru, for instance, are exporting much, much less. An incredible shrinkage. Russia has put some export limits on fertilizers. China produces one-quarter of the fertilizers in the world, but now they are also importing. So the pressure on that sector is a different than we've faced before.

Source: The Washington Post, December 15, 2021

b. Consumers' expectation of future changes in income

When income is expected to increase in the future, consumers will tend to be more generous in their current spending due to the perception of an increase in future purchasing power. Since consumers perceive that their future increase in income will compensate for their current spending, they choose to spend more on big-ticket items now, leading to an increase in demand for some goods now.

Likewise, due to COVID-19, consumers expect greater loss of jobs and falling incomes that may then translate to future fall in purchasing power. As such, consumers are more likely to save more now and will then postpone their purchases till later, leading to a decrease in demand for some goods now.

Connect, Extend, <u>Challenge</u>

What if consumers view the increase in income as a one-off event? How would this affect the demand for goods as opposed to if the income increase is perceived as permanent?

6.4 Prices of related goods (Substitutes and Complements)

a. Change in price of substitutes

Substitutes are alternatives of each other that **satisfies similar consumer want/need.**

Examples of substitutes include soft drinks and caffeinated drinks, bicycles and scooters as well as board games and video games.

If two goods are substitutes of each other, a fall in the price of one good would lead to a fall in demand for the other good. Likewise, a rise in the price of one good would lead to a rise in demand for the other good.

Impact of price of soft drinks on the caffeinated drinks market

The increase in the number of suppliers of soft drinks lead to a rise in supply (look at the new brands in the Singapore market imported from countries like Korea and Japan). This is illustrated by a rightward shift in the supply curve from SS_0 to SS_1 in Figure 14a, resulting in a fall in price from P_0 to P_1 in the soft drinks market. *(Note - This causes a rise in quantity demanded for soft drinks from Q_0 to Q_1.)*

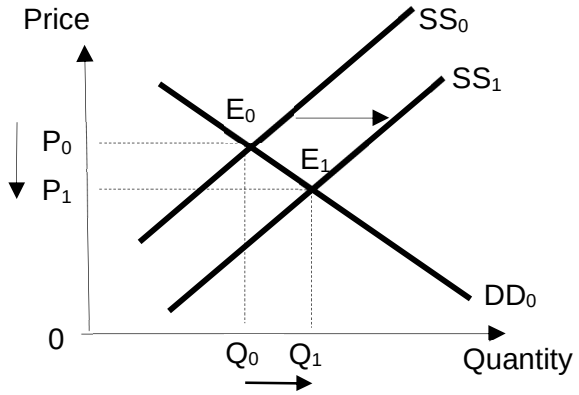


Figure 14a: Market for soft drinks

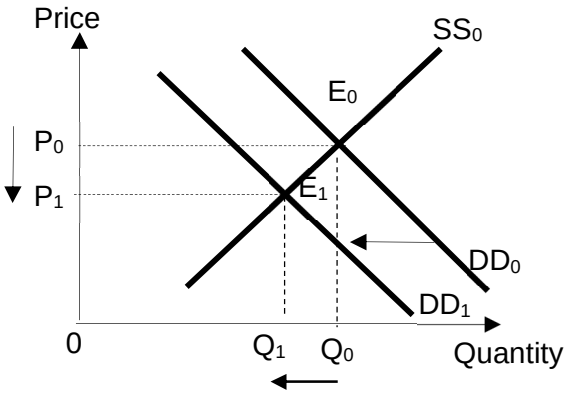


Figure 14b: Market for caffeinated drinks

This then leads to a fall in demand for caffeinated drinks since both can similarly satisfy consumer needs. This is represented by the leftward shift of the demand curve for caffeinated drinks from DD_0 to DD_1 in Figure 14b.

b. Change in price of complements

Complements are goods/services that **enhance consumers' satisfaction when consumed together.**

Examples of complements include tennis rackets and tennis balls, computer hardware and software, and also car and petrol.

If two goods are complements, a fall in the price of one good will lead to a rise in demand for the other good. Likewise, a rise in the price of one good will lead to the fall in demand for the other good.

Impact of fall in price of computer hardware on the computer software market

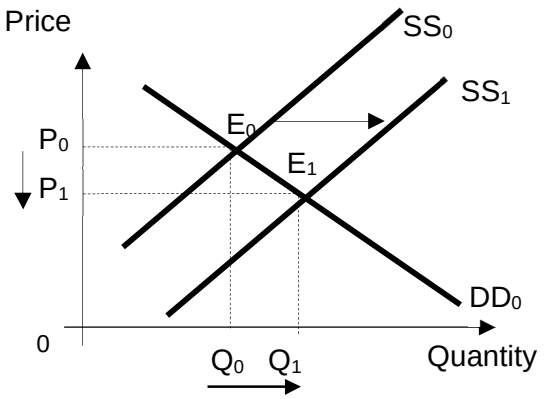


Figure 15a: Market for Computer hardware

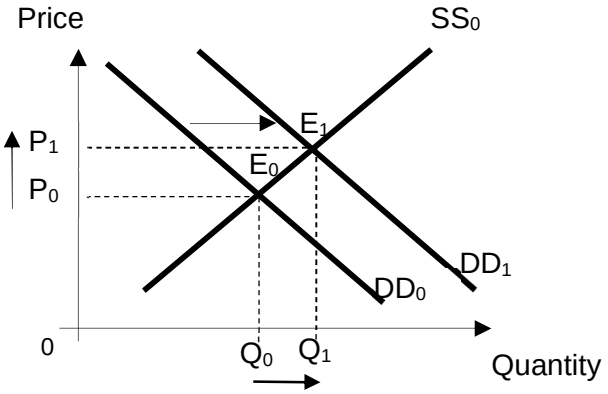


Figure 15b: Market for Computer software

As complements, computer hardware and software need to be used together in order for consumers to derive more utility. A fall in cost of producing hardware leads to a rise in its supply, and hence a fall in its price, in Figure 15a.

The cheaper hardware causes the demand for software to rise as consumers are more willing to purchase software to complement the hardware they have bought (Figure 15b).

Note: *We will revisit Section 6.4 under Cross Elasticity of Demand concept in Topic 3.*

6.5 Population size and structure

a. Changes in population size

The market demand is a summation of all individuals' demand for a good. An increase in population size due to immigration policy can lead to an increase in demand for certain goods, such as basic necessities. Consequently, this increase is represented by a rightward shift of the demand curve and an increase in equilibrium price and quantity, *ceteris paribus*.

Connect, Extend, Challenge

In the News

Commentary: To tackle food security, Singapore needs to revolutionise urban farming and raise a new generation of farmers

The world faces a critical challenge in feeding its growing population, which crossed the eight billion mark in 2022. The excessive use of fertilisers during the 1960s, which was part of the green revolution that helped increase food production and meet the demands of a growing population, is unsustainable and has led to barren lands and contaminated groundwater.
In the Asia Pacific region, the number of people living in urban areas is expected to reach over three billion by 2050. This presents significant challenges for food security as urban areas — such as Singapore — typically have limited land and resources for food production.

In addition, given Singapore's highly developed economy, people may not have had exposure to agriculture and tend to pursue other less physically demanding sectors — such as business, technology and finance — that hold seemingly larger opportunities for career growth. To realise Singapore's vision of producing 30 per cent of its nutritional needs on local soil by 2030, the agricultural sector needs to be reinvigorated.

Source: Today Online, 2023

b. Changes in population structure

If the population structure were to change, such as the rise in the proportion of elderly in an ageing population, this would lead to an increase in demand for goods consumed by the elderly (e.g., elderly healthcare, medical aids).

Connect, Extend, Challenge

In the News

Greater focus on preventive care to rein in soaring healthcare costs in S'pore: Ong Ye Kung

A national programme focusing on preventive care will be launched to help rein in soaring healthcare costs and reduce the burden on patients' families, said Health Minister Ong Ye Kung on Saturday. With healthcare expenditure expected to triple in the coming decade to almost $60 billion a year by 2030, Mr Ong said it will make a huge difference if chronic illness can be prevented or delayed.

"If we can prevent chronic diseases and severe diseases, we will age more gracefully, with much better quality of life. The burden on our family will be much less, the entire healthcare system will be more sustainable, and our whole nation's fiscal position will be more sustainable," said Mr Ong, who added that preventive care will be a key priority this year for the Ministry of Health.

Mr Ong noted that the Government is spending a lot on healthcare, by investing in infrastructure and in recruiting doctors, nurses and other healthcare workers to run them. "All this is needed because of the inexorable trend that our population is ageing," he said.

The median age of the population last year was 41.8 years, up from 34 years in 2000. By 2030, there will be around 900,000 people here aged 65 years and older. This alone will push up healthcare costs, said Mr Ong, who noted that as a population grows older, more people will fall sick and need medical care.

His predecessors in the Health Ministry had also directed more money into preventive care, which resulted in initiatives like Screen for Life. The heavily subsidised national screening programme which offers tests for chronic illnesses like diabetes, and for three cancers, is capped at $5 for Singaporeans. It is free for the Pioneer Generation.

Source: The Straits Times, 12 February 2022

6.6 Government policies

a. Direct tax

While income is an important determinant of demand, it is also important to recognise that **disposable income** is more important than income in determining a consumer's purchasing power. Disposable income is the income that is available to be spent or saved as one wishes after deduction of income taxes. For example, a worker earning $5,000 will have $4,840 disposable income after paying $160 of income tax.

Direct tax is a tax imposed directly on the payer, rather than on goods and services. It is levied on the income or profits of the person who pays it and cannot be avoided. An increase in direct income tax will lead to a reduction in consumers' disposable income. The fall in disposable income will lead to a fall in purchasing power. Consumers are now less able to purchase goods and services at every single price. This will lead to a decrease in the demand for norm goods

In Budget 2022, Singapore's government increased the income tax for higher-income earners from 22% to 24% for those earning in excess of $1 million annually from year of assessment 2024. This decrease in disposable income led to a decrease in demand for normal goods for these income bracket earners, ceteris paribus.

b. Subsidies to consumers

Subsidies could be in the form of payments given to consumers by the government to help offset prices of goods and services. An increase in such subsidies increases the **purchasing power** of consumers, resulting in an increase in demand for goods and services and is represented by a rightward shift of the demand curve.

Community Development Council (CDC) vouchers are an example of subsidies to consumers to cushion the impact of the rise in cost of living in Singapore. Every Singaporean household will receive a total of $500 worth of vouchers which they can spend at participating merchant and hawkers as well as supermarkets. With a rise in their disposable income, the demand for various goods and services such as fruits and vegetables (considered normal goods) are likely to increase, ceteris paribus.

c. Public education

The use of graphical pictorial images on cigarette packets is a form of public education as it informs the consumer about the negative effects of the consumption of cigarettes. Assuming that it is effective, it will reduce the demand for cigarettes as **taste and preferences** are swayed.

Connect*, *Extend*, *Challenge

Steps to explain changes in demand

1. Identify the change in the non-price determinant (EGYPT)
2. Elaborate on how this change affects the willingness and ability of consumers of the good/service to consume at each and every given price level of the initial demand curve
3. Explain the impact on demand (increase or decrease) and the demand curve (shifting to the left or right)
4. Include price adjustment process with diagrammatic explanation (Refer to Page 21 and 22)
5. With reference to diagram, state the final impact on equilibrium price and equilibrium quantity and/or total revenue

7. Factors affecting Supply

Changes in supply occur only when there are changes to factors NOT relating to the price of the good itself. Diagrammatically, a change in a non-price determinant is illustrated by a shift in the supply curve of the good.

7.1 Price of factors of production/cost of production

With higher factor input prices, the unit cost of production of the good increases, leading to a decrease in profit per unit of output. Driven by the aim to maximise profits, producers would now be less willing and able to produce goods at every given price level, thereby reducing the supply of the good. This is represented by a leftward shift in the supply curve from SS_0 to SS_1 as seen in Figure 17.

Connect, Extend, Challenge

Note: Figure 17 and its accompanying explanation above can be used to describe the effects of subsequent examples of a decrease in supply.

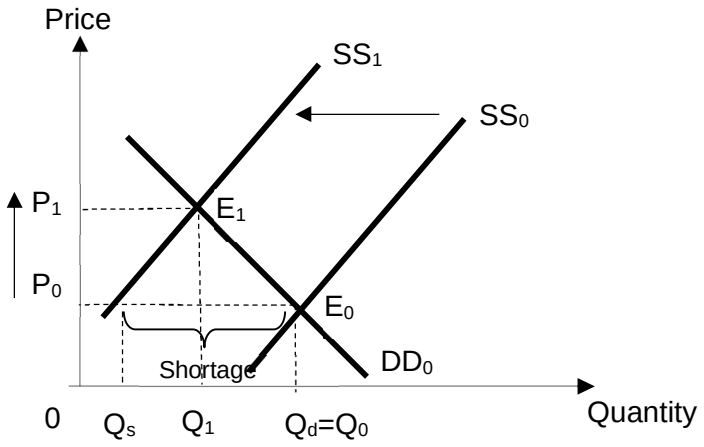


Figure 17: Decrease in supply

Price Adjustment Process (PAP)

At original price P_0, quantity demanded Q_d is greater than quantity supplied Q_s, creating a shortage that exerts an upward pressure on price. As price increases, quantity supplied rises while quantity demanded falls. Price continues to increase until the shortage is eliminated and a new equilibrium is reached at P_1 and Q_1.

In the same way, a fall in factor input prices would reduce the cost of production. Keeping initial price constant, a fall in cost of production will lead to an increase in profits. Producers would now be more willing to produce goods at each and every given price level and this is represented by a rightward shift in the supply curve from SS_0 to SS_1 as seen in Figure 18.

Connect*, *Extend*, *Challenge

Note: *Figure 18 and its accompanying explanation above can be used to describe the effects of subsequent examples of an increase in supply.*

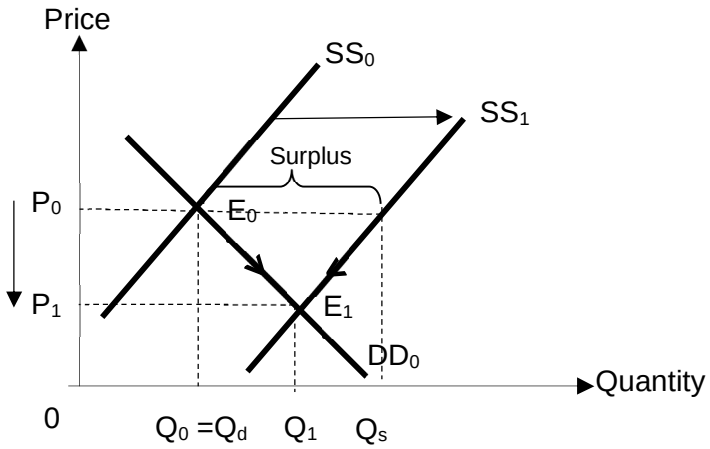


Figure 18: Increase in supply

Price Adjustment Process (PAP)

At original price P_0, quantity supplied Q_s is greater than quantity demanded Q_d, creating a surplus that exerts a downward pressure on price. As price decreases, quantity supplied falls while quantity demanded rises. Price continues to decrease until the surplus is eliminated and a new equilibrium is reached at P_1 and Q_1.

7.2 Technology

An improvement in the state of technology can affect the **productivity** of a resource. With an increase in resource productivity, the producer can produce more output with the same amount of inputs. This means that the unit cost of production is reduced. Hence, producers are now more able and willing to produce at each and every given price level of the good. This increase in supply is represented by a rightward shift of the supply curve.

Connect, Extend, Challenge

In the News

3D-printing to be used in HDB projects for the first time, in Tengah and Bidadari estates

For the first time, 3D-printing could be used to build landscape furniture and architectural features in a Housing Board (HDB) estate, such as a bench or a pavilion, in the upcoming Tengah and Bidadari estates.

Using such technology would not only allow for faster, cheaper and less labour-intensive construction, it could also increase the potential for more unconventional designs than traditional precast methods.

This is among projects that the HDB is embarking on to improve productivity amid sluggish productivity growth in the construction industry.

Source: The Straits Times 2019

As seen from the above article, the adoption of 3D printing technology has increased the productivity of capital and increased the number of flats they can build at every price. This increase in supply is represented by a rightward shift of the supply curve.

7.3 Weather and seasonal factors

The output of some agricultural products is severely affected by variation in weather conditions. Favorable weather conditions could bring a good harvest and producers are now more able to produce vegetables at each and every price level. Thus, there is an increase in supply of fresh vegetables. On the other hand, poor weather conditions (e.g., droughts) would bring about a decrease in supply of fresh vegetables.

The supply of certain agricultural products is also dictated by certain seasons in the year. Certain agricultural products, for example durians, will have a peak season, hence the supply of these products will rise during this period of time.

Connect*, *Extend, Challenge

In the News

Food Supply Stays Tight as Disappointing U.S. Harvest Adds to Global Challenges

A lackluster U.S. harvest this year is setting back efforts to relieve a global food supply that has been constrained by Russia's war in Ukraine, agriculture-industry executives said. A lackluster U.S. harvest this year is setting back efforts to relieve a global food supply that has been constrained by Russia's war in Ukraine, agriculture-industry executives said.

High temperatures this summer exacerbated drought conditions in the U.S. West and the country's Great Plains. Intense heat in states such as Kansas, Nebraska and Oklahoma set in as corn crops were pollinating in many parts of the Grain Belt, when the plants require the most water. Some corn crops were also planted late this year after a wet spring, causing some yield loss, according to agriculture analysts.

Source: The Wall Street Journal, 2022

7.4 Government policies

Government policies can also take various forms such as indirect taxes or subsidies to producers. Both policies affect the cost of production thereby affecting the supply curve.

7.4.1 Indirect taxes

An indirect tax is a tax imposed on goods and services by the government. Such a tax is initially borne by the producers. A tax imposed on a good will raise the unit cost of production, leading to a decrease in supply. Indirect taxes are of two types:

a. Specific tax

A *specific tax* is a type of tax in which a fixed amount of tax (for example, $2) is levied on every unit of the good sold. When a specific tax is imposed on a good, producers will reduce the supply of the good because of the increase in the unit cost of production and a fall in profits. Hence, producers are now less able and willing to produce at every given price level of the good. This is represented by a leftward shift of the supply curve.

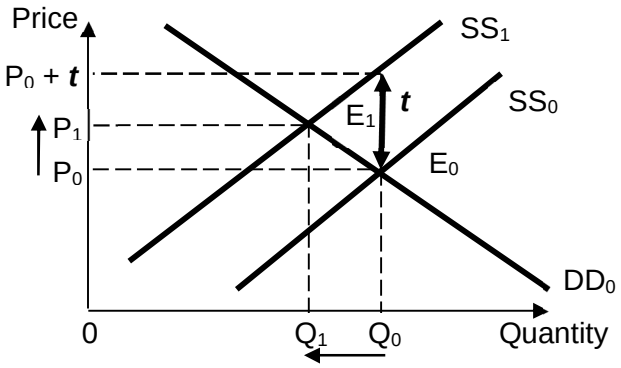


Figure 19: Specific tax on supply curve

The vertical distance (t) represents the tax levied per unit of output. The producer is now willing and able to offer for sale the same amount of output i.e., Q_0 at a higher price that is equal $\$(P_0 + t)$ as seen in Figure 19.

Example of a specific tax in Singapore would be the Petrol Excise Duty set at $0.41/litre for 92 octane and 95 octane petrol, $0.44/litre for petrol rated 97 octane and above.

b. Ad-valorem tax

An ad-valorem tax is a tax imposed as a fixed percentage of the price of the good [e.g., Goods and Services Tax (GST) of 9% in Singapore). Since the tax is fixed in percentage terms, the amount of tax ($) per unit of output increases as price increases.

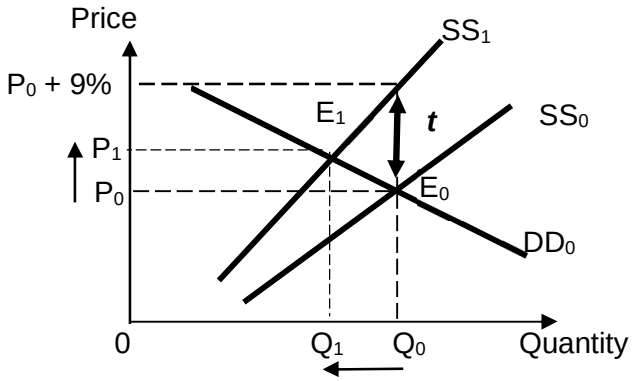


Figure 20: Ad-valorem tax

For example, the absolute amount of 10% tax on $1 and 10% tax on $100 is different, the latter will yield a larger absolute value. Since the vertical distance is the amount of tax, this explains why the initial supply curve and new supply curves gets wider. In other words, as a result of the imposition of or increase in ad-valorem tax, it leads to a leftward pivotal shift of the supply curve as seen in Figure 20.

7.4.2 Subsidies to producers

Subsidies are given by the government to help producers cover part of their production costs. The reduction in the cost of production and hence rise in profits leads to an increase in supply of the goods.

The vertical distance(s) represents the subsidy levied per unit of output. This shifts the supply curve rightward as seen in Figure 21.

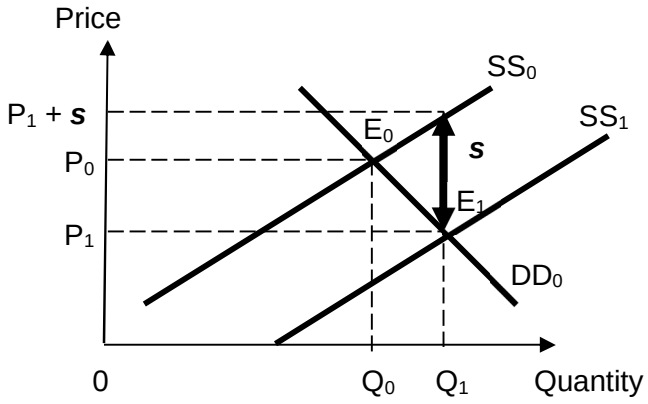


Figure 21: Subsidy per unit

Connect*, *Extend*, *Challenge

In the News

55 cancer drugs to be added to list of subsidised drugs; fewer patients to pay out-of-pocket for cancer treatment

Another 55 cancer drugs will be added to Singapore's list of subsidised drugs following negotiations with pharmaceutical companies, which have allowed the Republic to secure the drugs at lower prices.

These additions to the Standard Drug List and Medication Assistance Fund (MAF) will mean increased funding for around 150 cancer treatments, said the Ministry of Health (MOH) on Tuesday (Aug 17).

It added that eligibility criteria for the MAF - which subsidises expensive drugs that have been deemed necessary - will also be expanded from September next year.

Close to 90 per cent of subsidised Singaporean patients who use cost-effective and clinically proven cancer treatments will have their drug bills fully covered by subsidies, MediShield Life and MediSave, MOH said. They will not have to fork out any money out-of-pocket.

In comparison, about 70 per cent of all subsidised patients taking cancer drugs now have their bills fully covered.

Source: The Straits Times, 17 Aug 2021

7.5 Price of related goods (Competitive supply and Joint supply)

The production of some goods will affect goods in the related market and vice versa. Goods that have related production are either in competitive supply or joint supply.

a. Price of goods in competitive supply

Goods in competitive supply refers to goods that require the same resources (factors inputs) in the production.

Goods in competitive supply competes for the same set of resources. For example, maize can either be used to produce biofuel or to produce food.

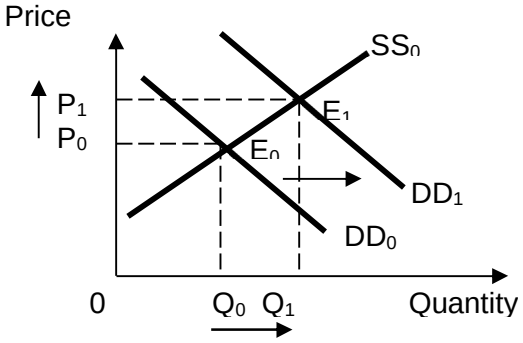


Figure 22a: Market for biofuel

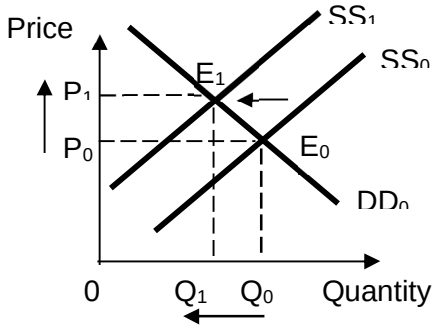


Figure 22b: Market for food

An increase in demand for biofuel from DD_0 to DD_1, ceteris paribus, will cause equilibrium price and quantity to increase from P_0 to P_1 and Q_0 to Q_1 respectively, as shown in Figure 22a. The higher price suggests that it is more profitable to grow maize for biofuels, and profit-maximising producers will shift resources (land) away from the production of maize for food to the production of maize for biofuel. Consequently, the supply of maize for food decreases resulting in a rise in equilibrium price and fall in equilibrium quantity of maize for food as seen in Figure 22b.

Hence, when two goods are in competitive supply, a rise in the price of one good, *ceteris paribus*, will result in a fall in the supply of the other. Conversely, a fall in the price of one good, *ceteris paribus*, will lead to a rise in the supply of the other.

Price of goods in joint supply

Joint supply refers to the production of a good leading to a **simultaneous production of another or more products.**

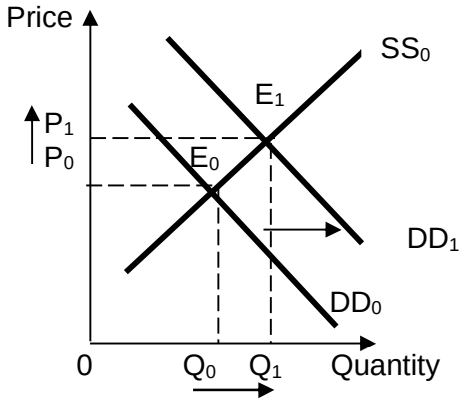


Figure 23a: Market for beef

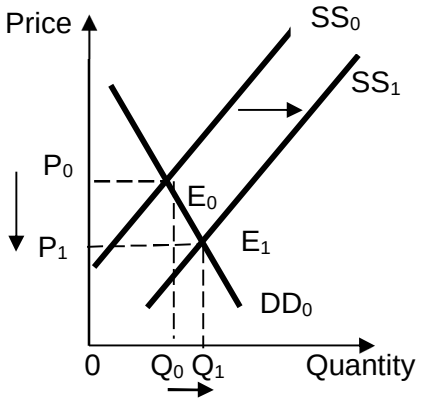


Figure 23b: Market for hide

Consider an increase in the demand for beef from DD_0 to DD_1 as shown in Figure 23a, which causes the equilibrium price and quantity to increase from P_0 to P_1 and Q_0 to Q_1 respectively. Simultaneously, the supply of hide will also increase due to the higher number of cows being slaughtered. This will cause the equilibrium price of hide to fall and its equilibrium quantity to rise, ceteris paribus, as illustrated in Figure 23b.

Hence, when two goods are in joint supply, a rise in the price of the first good, which is produced jointly with another good, will result in an increase in the supply of the second good. Conversely, a decrease in the price of the first good, will lead to a fall in the supply of the second good.

7.6 Number of sellers

The market supply curve is a summation of the number of sellers in market. An increase in the number of sellers means that more sellers are now able to produce the good at each price level, i.e., increase in supply of the good. For example, if the government deregulates an industry such that there is less licensing and restrictions for new producers to establish themselves, the supply in that industry would rise, and supply curve shifts to the right.

Conversely, a decrease in the number of sellers will reduce the quantity supplied at each price level, i.e., a decrease in supply. This may happen when producers that are not profiting shut down.

7.7 Expectations of future prices

If the price of a good is expected to increase, profit-maximising producers may temporarily cut down the amount of good they would be willing to supply. Instead they are likely to build up their stock and only release them into the market when the price of the good rises.

For example, if the price of a private property is low and property developers expect that the future price will rise, they may choose to withhold supply in the market. From the producers' point of view, launching a property development at a low price will yield lower profit. However, if a higher profit is probable then it can compensate for the opportunity cost of withholding it. This expectation of an increase of future prices will lead to a fall in current supply, as represented by a leftward shift of supply curve.

Conversely, if the price of a good is expected to fall, the current supply of the good will increase. By choosing to withhold the good, the opportunity cost is greater than the future gain in profit. Hence, profit-maximising producers would choose to release the good into the market, resulting in an increase in the supply of the good.

***Connect*, Extend, Challenge**

Steps to explain changes in supply:

1. Identify the change in the non-price determinant (WET PIGS)
2. Elaborate on how this change affects the willingness and ability of producers of the good/service to produce the good at each and every given price level along the initial supply curve
3. Explain the impact on supply (increase or decrease) and the supply curve (shifting to the left or to the right).
4. Include price adjustment process with diagrammatic explanation (Refer to Page 33 and 34)
5. With reference to diagram, state the final impact on equilibrium price and equilibrium quantity and/or total revenue

8. Simultaneous Shifts in Demand and Supply

While it is possible that changes in price and quantity can be due to either demand or supply factors, it is more likely that we will encounter situations where both demand for and supply of a good are changing simultaneously in the real world.

In such situations, to determine the extent of change in price and quantity, it is important to observe both the direction and magnitude of change in demand and supply.

Case 1: Increase in demand and supply of a good

When the demand for a good increases, this is represented by a rightward shift of the demand curve. In the same way, an increase in the supply is represented by a rightward shift of the supply curve.

The concurrent increase in demand and supply will reinforce the increase in equilibrium quantity. However, the effect on equilibrium price is indeterminate as it depends on the extent of increase in demand relative to the increase in supply.

Let's examine the following scenarios:

Scenario 1a: Increase in demand greater than increase in supply

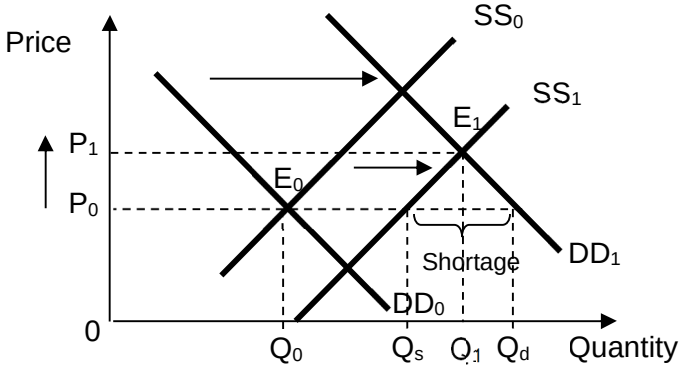


Figure 24: Increase in Demand > Increase in Supply

In Figure 24, the increase in demand is assumed to be greater than the increase in supply. At the original equilibrium price of P_0, quantity demanded is more than quantity supplied hence there is a shortage of Q_sQ_d.

PAP: This shortage exerts an upward pressure on price as consumers compete for the limited good or service. The higher price incentivises the profit-maximising producers to increase quantity supplied along the supply curve (Law of Supply). With the increase in price, consumers are less willing and able to consume, hence the higher price signals and incentivises consumers to reduce quantity demanded along the demand curve (Law of Demand). Price will continue to rise until the shortage is eliminated and the new equilibrium price is at P_1 and equilibrium quantity at Q_1.

Scenario 1b: Increase in demand less than increase in supply

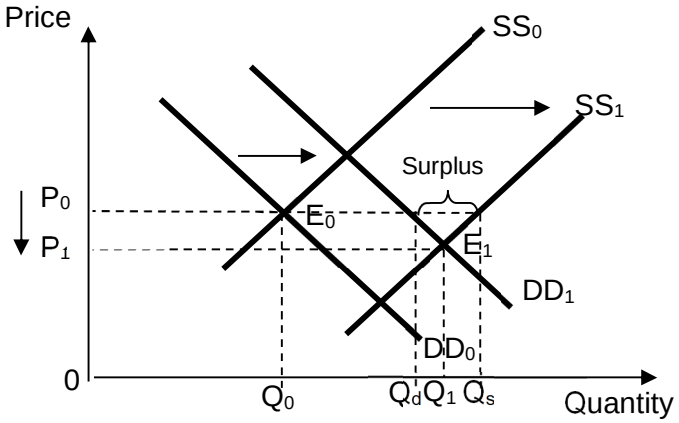


Figure 25: Increase in Demand < Increase in Supply

In Figure 25, the increase in demand is less than the increase in supply. At the original equilibrium price of P_0, there is a surplus of Q_dQ_s.

PAP: This surplus exerts a downward pressure on price as producers lower prices to clear their inventories. The lower price disincentivises the profit-maximising producers, hence producers will lower quantity supplied along the supply curve (Law of Supply). With the decrease in price, consumers are more willing and able to consume, hence the lower price signals and incentivises consumers to increase quantity demanded along the demand curve (Law of Demand). Price will continue to fall until the surplus is eliminated and the new equilibrium price is at P_1 and equilibrium quantity at Q_1.

Connect, Extend, <u>Challenge</u>

Due to the skyrocketing costs of imported chicken feed exacerbated by the Russia-Ukraine war, coupled with the use of chicken during the festive season, Hari Raya Aidilfitri, the chicken shortage in Malaysia worsened.

Source: Adapted from TJC H2 Promo 2022

- Draw a diagram that illustrates the changes in demand and supply in the market for chicken.

- Write a short paragraph on how the price mechanism can correct the shortage in the market for chicken arising from the simultaneous occurrence of the above events.

Prompt: What does the shortage suggest about the relative size of changes in demand and supply?

Thus far, to determine the impact on the output and price, we do so by representing it diagrammatically. The following table summarises the possible outcomes when there are simultaneous shifts:

		Change in Demand	
		↑ DD (↑P and ↑Q)	↓ DD (↓P and ↓Q)
Change in Supply	↑ SS (↓ P and ↑ Q)	P indeterminate ↑ Q	↓ P Q indeterminate
	↓ SS (↑ P and ↓ Q)	↑ P Q indeterminate	P indeterminate ↓ Q

When either the change in price or quantity is indeterminate, the magnitude of the shift in demand should be compared with that of the shift in supply. For example, when price is indeterminate because both demand and supply have increased, we will compare the size of the increase of each market force. If ↑DD > ↑SS, then price would increase (Scenario 1a above). If ↑DD < ↑SS, then price would decrease instead (Scenario 1b above).

9. Inter-Market Relationships

In a free market, changes in the conditions of demand and supply in one market can have an influence on another market of a related good or service. The following examples illustrate *resource movements* in interrelated markets.

9.1 Inter-related Demand

a. Substitutes (goods in competitive demand)
The explanation for this was covered in Topic 2 Section 6.4a, where the demand of a good can be impacted by a change in the price of its substitutes.

b. Complements (goods in joint demand)
The explanation for this was covered in Topic 2 Section 6.4b, where the demand of a good can be impacted by a change in the price of its complements.

c. Derived demand for factors of production (FOP)

Derived demand refers to the demand for a good or service that originates from the demand for another good or service. This is often seen in industries where products go through several production stages. For instance, the demand for steel is largely derived from the demand for cars.

As such, a changes in the final product market will cause demand for factor resources to change because the demand for factors of production (factor market). is derived from the demand of final goods.

The demand for factors of production is called derived demand, which is distinct from final demand. While final demand refers to the demand for goods that are used by end user consumers, derived demand for factors of production depends on the demand for the final good that uses it. In other words, demand for factors of production is derived from the demand for final goods.

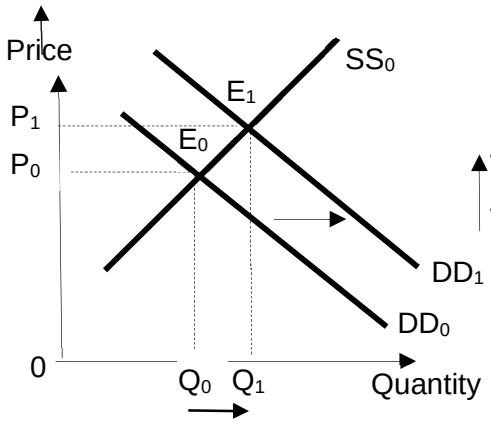


Figure 26a: Market for housing

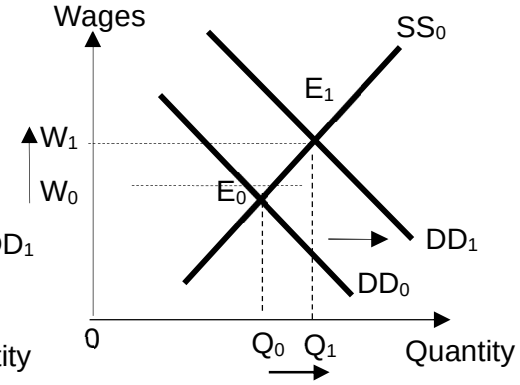


Figure 26b: Market for construction workers

An increase in demand for housing in Singapore is illustrated in Figure 26a. In order to meet this increase in demand, contractors would demand for more

construction workers to help to build these houses, thereby leading to higher derived demand for construction workers. This is represented by a shift in demand from DD_0 to DD_1 in Figure 26b.

9.2 Interrelated Supply

a. Joint Supply

The explanation for this was covered in Topic 2 Section 7.5a, where the supply of a good can be impacted by a change in the price goods in joint supply.

b. Competitive Supply

The explanation for this was covered in Topic 2 Section 7.5b, where the supply of a good can be impacted by a change in the price goods in competitive supply.

Summary

By the end of this set of notes, you should have attained the following **Enduring Understanding**:

1. The price mechanism allocates limited resources amongst unlimited wants in the free market through **signalling**, **incentive** and **rationing** functions.

2. Consumers and producers are assumed to be driven by **self-interest** when they decide how many units of a good or service to demand and supply respectively in response to changes in its price.

3. In a free market, the **equilibrium market price and quantity** are determined by the **interaction of demand and supply.**

4. **Changes in price** of the good/service cause a **movement** along the demand/supply curves and result in **changes in quantity demanded and quantity supplied**.

5. Changes in **non-price determinants of demand** (EGYPT) and how they cause **shifts of the demand curve.**

6. Changes in **non-price determinants of supply** (WETPIGS) and how they cause **shifts of the supply curve.**

7. **Changes in demand and/or supply** can cause **market disequilibrium (shortage and surplus)** and affect **equilibrium price and quantity** through the **price adjustment process (PAP).**

SUMMARY OF INTER-MARKET RELATIONSHIPS

	Related Demand			Related Supply	
Relationship	**Substitutes**	**Complements**	**Derived demand**	**Competitive supply**	**Joint supply**
Definition	Alternatives of each other that satisfies the same consumer want/need	Goods that enhance consumers' satisfaction when consumed together	Demand for factors of production	Goods that require the same resources (factors inputs) in the production, hence the production of either good competes for the same set of resources	Production of a good leading to a simultaneous production of another good (possibly as a by-product)
Trigger	Change in **price** of substitute affects demand of good	Change in **price** of complement affects demand of good	Change in **demand** for final good affects derived demand for factor of production	Change in **price** of good in competitive supply affects supply of good	Change in **price** of good in joint supply affects supply of good
Example	*Increase in **price** of coffee will increase demand for tea*	Decrease *in **price** of Xbox consoles will increase demand for Xbox games*	Increase *in **demand** for smartphones will increase demand for silicon chips*	*Decrease in **price** of biofuels will increase supply of maize for food*	*Increase in **price** of beef will increase supply of hide*