RAFFLES INSTITUTION

YEAR 6 H2 ECONOMICS 2023

HOW THE MACROECONOMY WORKS: INCOME & EMPLOYMENT DETERMINATION

ECONOMICS

CONTENTS:

- Circular Flow of Income
- Aggregate Demand and Aggregate Supply
- Equilibrium Level of National Income
- The Multiplier Effect

TUTORIAL PACKAGE

- Section A: Structured Questions
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This series of lectures introduces important economic models and tools to explain the workings of the macro-economy, namely, the circular flow of income and aggregate demand and supply framework. Students should be able to use AD-AS analysis to determine the equilibrium level of output and price in an economy and to subsequently apply the tools in illustrating macroeconomic problems and workings of policies.

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References:

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Lipsey and Courant (1996), *Economics, 11th Edition*, Harper and Collins, Chapter 16-21.
Hoon, et al (1998), *Economics Theory and Application*, McGraw-Hill, Chapter 13 & 14.
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Sobel, et al (2006), *Understanding Economics*, Chapter 9-11.

Lecture Objectives:

After the series of lectures, students should be able to:
1. Explain the circular flow of income, expenditure and output in a 4-sector economy.
2. Understand the relationship between income, output and employment in an economy.
3. Explain the key determinants of AD and AS.
4. Explain the determination of equilibrium real national income/output and GPL using the AD/AS model.
5. Explain the multiplier process.
6. Explain the limitations of the multiplier.

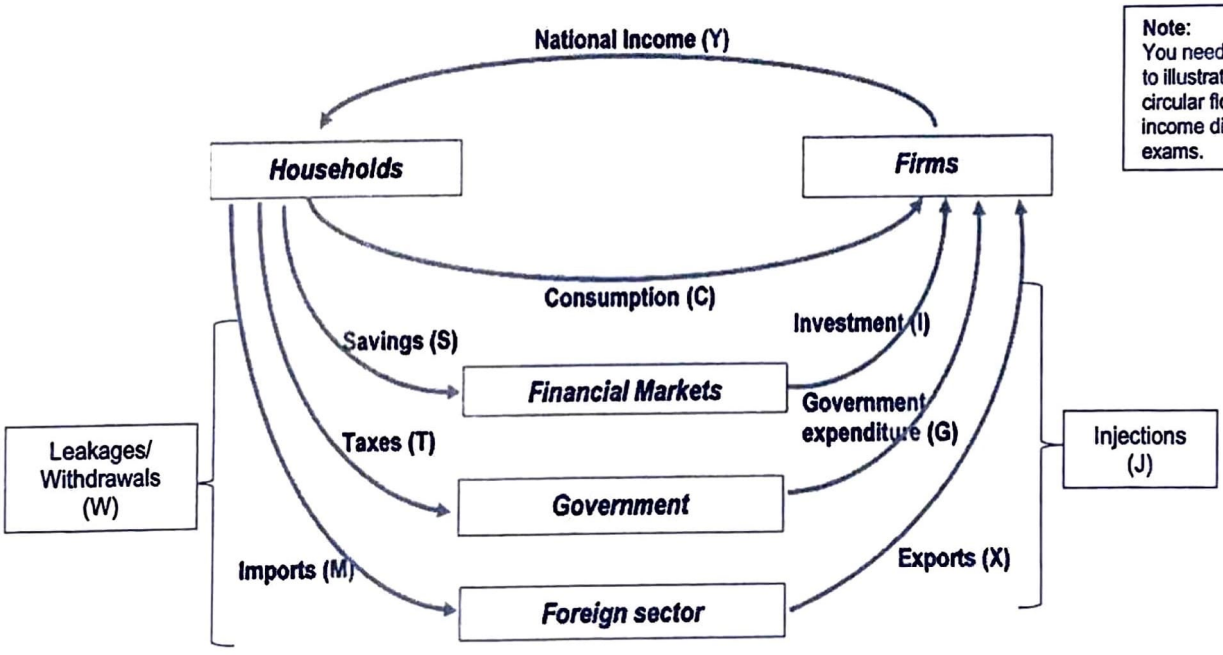
1. CIRCULAR FLOW OF INCOME

The circular flow of income is a useful model for understanding the workings of an economy. The circular flow of income illustrates the relationship between different economic units and how an economy arrives at a certain equilibrium level of national output, expenditure and income (GDP).

Let us begin by examining a two-sector economy comprising of households and firms. Households supply factors of production such as labour, land, capital and entrepreneurship to firms, which would utilize these factor inputs to produce goods and services.

In its simplest form, the circular flow of income refers to how income (Y) earned by households are spent (as consumption expenditure C) on firms' output of goods and services. The consumption expenditure is received by firms as their revenue, from which firms will make payment to the households in return. These factor payments or incomes comprise of wages (for labour), rental (for land), interest (for capital) and profits (for entrepreneurship). These incomes earned by households will once again translate into consumption expenditure, which in turn becomes the firms' revenue for their output produced and sold, and thereafter firms will pay incomes to households. If households spend all their incomes on buying domestically-produced goods and services, and if firms pay out all revenue they receive as incomes to domestic households, this flow will continue indefinitely. This process is unending and forms the circular flow of income, expenditure, and production.

However, in reality, it is not so simple. Instead of a two-sector economy, we are in a four-sector economy which comprises of Households, Firms, Government and Foreign Sector. Households do not spend all their income on domestically produced goods and services, and at the same time, incomes are injected into the circular flow by other sectors.



Note:
You need to be able to illustrate the circular flow of income diagram in exams.

Figure 1: The Circular Flow of Income

Only part of the income received by households will be spend on goods and services by domestic firms. The remainder will be set aside for savings (S), payment of taxes (T), and expenditure on imported goods and services (M) from abroad.

Key terminologies:

- Savings is income that households choose not to spend but to put aside for the future. Savings are normally deposited in financial institutions such as banks.
- Taxes are compulsory payments to the government that is levied on individuals and entities. Taxes such as income tax are paid out of household incomes, and corporate taxes are paid out of firms' incomes. For simplicity, taxes are shown to be leaving the circular flow from just one point – households.
- Import expenditure is expenditure on goods and services that are produced by other countries, or on goods and services using components that are produced by other countries.

With reference to Figure 1, only consumption expenditure returns to the domestic economy. Savings, Taxes and Imports, known as **leakages or withdrawals (W)**, are withdrawn from the circular flow. Leakages or withdrawals would lead to a contraction in income in the circular flow for the domestic economy. If there is an increase in leakages in terms of savings, taxes and import expenditure, households will spend less out of their given income on domestically-produced goods. Subsequently, firms will produce less output and receive less revenue to pay income to factor inputs. Thus, there will be lower output, income and expenditure in circulation for the domestic economy.

Important:
National Income = National output = National expenditure

While there are withdrawals from the circular flow, there are also injections (J) into the circular flow, in the form of investment expenditure (I) from the financial markets (e.g. banks), government expenditure (G) by the government sector and export expenditure (X) by the foreign sector. Injections refer to any payment of income to domestic producers that do not arise from domestic household consumption.

Note:
The determinants of C, I, G and X will be covered in Section 2 under determinants of Aggregate Demand.

Key terminologies:

- Investment is the act of acquiring new fixed capital assets like buildings, plants, equipment and machineries by firms, as well as the accumulation of stocks and inventories such as raw materials, semi-finished goods and finished goods held by firms.
- Government expenditure is expenditure by the government on goods and services produced by firms. It includes spending on roads, hospitals and schools.
- Export expenditure is expenditure by foreign buyers on goods and services produced by firms domestically.

With reference to Figure 1, when an injection I, G or X is experienced, the domestic economy will experience an increase in expenditure, and firms will hire more factors of production to produce more output, which in turn generates more income. Thus, there will be an increase in national expenditure, output and income in the circular flow.

Note:
Refer to Appendix 1 for more information on the Injection-Withdrawal approach to national income determination.

Equilibrium level of national income or output or expenditure is reached when the W = J, where there is no more tendency for national income to change. If injections greater

than withdrawals, the level of national income will rise. If injections less than withdrawals, the level of national income will fall. The determination of equilibrium level of national income (GDP) will be covered in greater detail under Section 3 and 4.

Sectional Summary

- The circular flow of income model depicts the flows of income and goods and services in the economy. It shows the flows of goods and services from firms to households and flow of factor inputs from households to firms.
- In addition, there are withdrawals from and injections to the circular flow.
- Withdrawals or leakages refer to any part of household income that is not spent on domestic goods and services. These include savings, taxes and import expenditure.
- Injections refer to any payment of income to domestic firms that do not arise from domestic household consumption. These include investment expenditure, government expenditure and export earnings.
- The circular flow of income demonstrates how economists calculate national income, or gross domestic product (GDP). It can be measured in three equivalent ways: value of all final goods and services produced, the total factor incomes earned from the production of these goods and services or the total expenditure on these newly produced goods and services by the different sectors of the economy.

2. AGGREGATE DEMAND (AD) & AGGREGATE SUPPLY (AS)

Note:
The AD/AS model is more comprehensive than the circular flow of income, and must be used in exams to explain the effects on the macroeconomy.

The **aggregate demand/aggregate supply (AD/AS) model** is an **important** model explaining the determination of national income, considering both the demand and supply factors. The AD/AS model is useful for understanding the determinants of **economic growth, unemployment, and inflation**. The equilibrium level of national income and the general price level in an economy are determined by the interaction of aggregate demand (AD) and aggregate supply (AS).

2.1 AGGREGATE DEMAND (AD)

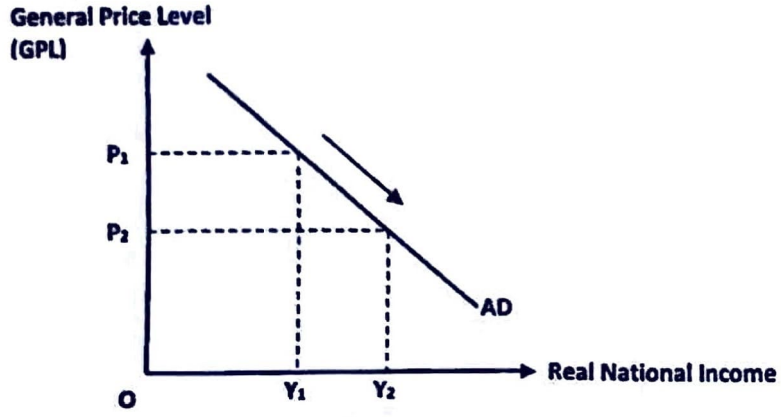
Aggregate demand (AD) refers to the total level of spending for an economy, based on the amount of domestically produced goods and services which households, firms, government and foreigners desire to buy, at each general price level. In a four-sector economy, AD reflects the total demand or expenditure on **domestically produced goods and services**. AD is computed via summing up consumer spending by households (C), investment expenditure by firms (I), government spending (G) and net export expenditure (X-M).

Note:
You need to know the four components that make up aggregate demand – namely C, I, G and X-M

$$AD = C + I + G + (X - M)$$

Note that import expenditure 'M' is subtracted to remove all expenditure made by households, firms, government on imported goods and services. This is to ensure that AD only represents the demand for domestically produced goods and services.

Other factors remaining constant, the higher the general price level (GPL), the lower the quantity demanded of all goods and services. As shown in Figure 2, as the general price level falls from P_1 to P_2, the quantity demanded of goods and services in the economy increases, and this is shown by a rise in the real value of output demanded from Y_1 to Y_2. In short, there is an *inverse* relationship between the general price level and level of real national output or income.



Note:
The horizontal axis for the AD-AS diagrams can be labelled as Real National 'Output' or Real National 'Income'.

Figure 2: The AD curve

This is explained by the wealth, the interest rate, and the international trade substitution effects.

- **The wealth effect**

When the general price level (GPL) falls, the purchasing power of households will increase. Assuming unchanged nominal income, households will be better off as that income can be used to buy more goods and services. This makes consumers wealthier, which in turn encourages them to spend more. This implies a larger quantity of goods and services are demanded.

- **The interest rate effect**

When GPL falls, households need less money to purchase a given quantity of goods and services. Given a fixed supply of money, a fall in demand for money would cause interest rates, which is the price of loans, to fall. A lower interest rate encourages borrowing by households for consumption on interest sensitive items such as new cars, as well as by firms for investments in new plants or equipment. Thus, this implies that quantity of goods and services demanded for the purpose of consumption and investment increases.

Refer to Macroeconomic Policies: Monetary Policies for more information on interest rate determination.

- **The international substitution effect**

When the domestic general price level falls while foreign prices remain constant, domestically produced goods have become cheaper relative to foreign substitutes. Ceteris paribus, residents are likely to demand less foreign goods, leading to a fall in import expenditure.

At the same time, foreigners are likely to purchase more of this country's goods and services which are relatively cheaper. Therefore, a fall in the general price level results in a higher quantity of domestically produced goods and services are being demanded.

The wealth, interest rate and international trade substitution effect explains the **shape and slope** of the AD curve (inverse relationship between GPL and real national output). *However*, it is more important to understand **what causes the AD curve to shift** – which is the next section on non-price determinants of AD.

2.1.1 Non-price Determinants of Aggregate Demand

Changes in non-GPL factors can cause a shift in the AD curve either to the right or to the left in Figure 3. An increase in AD is reflected by a rightward shift of the AD curve

from AD_0 to AD_1. This implies that at any price level, a larger quantity of real national output is demanded.

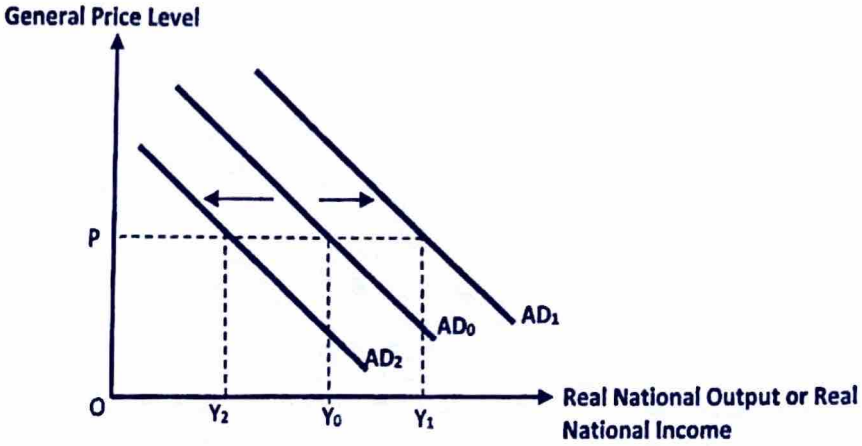


Figure 3: Changes in non-GPL factors / Shift in AD curve

Important:
If AD changes due to non-GPL factors, AD curve would shift (either leftwards or rightwards).

❖ CONSUMER EXPENDITURE (C):

Consumer expenditure is incurred by households when they use their income to purchase final goods and services to satisfy current wants. Households spend on perishables (e.g. food), consumer durables (e.g. washing machines) or services (e.g. haircuts).

Consumption comprises of autonomous consumption and induced consumption.

- Induced consumption refers to consumption that is dependent on the current level of real national income. When the current level of real national income increases, households' ability and willingness to purchase consumer goods and services will increase and hence *induced* consumption rises.
- Autonomous consumption, on the other hand, refers to consumption that is independent on the current level of real NY. Autonomous consumption is dependent on non-income factors such as changes in consumer confidence and changes in interest rate.

Note:
'Autonomous' changes in expenditure refer to changes in expenditure independent of changes in income.

'Induced' changes in expenditure refer to changes in expenditure arising from changes in income. For instance, a rise in national income will cause induced consumption to increase.

Autonomous consumption is determined by the following factors:

Determinants of Consumer Expenditure:

(a) Economic outlook and consumer confidence
Consumer confidence is a measure of how optimistic consumers are about their future income and the future of the economy. If consumers expect their incomes to increase, or if they are optimistic about the future of the economy (for e.g. due to sustained and strong GDP growth or world economic recovery), they might be more willing to spend on goods and services now, hence consumption increases. Similarly, if the covid-19 situation worsens and increase likelihood of stricter safety measures, this may reduce consumer confidence and result in a lower level of consumption.

(b) Interest rates and Access to credit
Some consumer spending is financed by borrowing and is thus influenced by interest rate changes. A fall in interest rates reduces the costs of borrowing, thus resulting in an increase in borrowing by households to purchase interest sensitive items or big ticket such as new cars as the cost of servicing the debt falls. In addition, lower interest

rates would mean that the returns on savings are now lower. Hence, instead of putting their money in banks, households will increase their holdings of money and that might lead to more spending on goods and services. Hence, consumption increases.

Financial institution can also affect consumption levels if their ability and willingness to provide credit changes. For example, the global financial crisis of 2009 saw credit criteria tighten dramatically. A tightening of credit practices such as reducing the size of loans made available relative to household incomes may reduce the level of consumption.

(c) Expectations of future prices
When consumers expect prices to increase in the future, they will increase their demand for more goods and services now because these goods and services are cheaper now than in the future, hence, consumption will increase, ceteris paribus.

(d) Distribution of Income
A redistribution of income from the rich to the poor in the form of higher income taxes on the rich and more benefits for the poor can increase the level of consumption expenditure in a country. The rich tend to spend less of any increase in income compared to the poor. Whilst the portion of the income taken from the rich might have been saved, almost all income distributed to the poor will be spent on consumption. Hence, such redistributive measures to reduce income inequality is likely to increase consumption in the economy.

(e) Changes in wealth
Wealth is the value of assets that people own, including their houses, stocks and bonds, their jewelry, works of art, and so on. *Wealth is not the same as income.* (Income refers to money received by a person over a period of time - for e.g. wages). An increase in consumer wealth (for e.g. an increase in stock market values, or an increase in the value of houses) makes people feel wealthier. They will be more willing to purchase goods and services, at the prevailing income level. Thus, consumption will increase.

Think:
Consider other factors that may affect consumption. Can you think of how demographics and technological changes may affect consumption levels?

(f) Personal Income taxes
If personal income taxes are lowered, the result is higher level of disposable income (disposable income is total personal income minus personal income taxes – for instance, if a person's income is $10,000 and personal income tax is 20%, his disposable income is $8,000), and thus consumer possess greater purchasing power, hence this will increase consumption.

❖ INVESTMENT EXPENDITURE (I)

Investment is the act of acquiring new fixed capital assets like buildings, plants, equipment and machineries by firms (also known as 'fixed capital formation'). Investment also includes the accumulation of stocks and inventories such as raw materials, semi-finished goods and finished goods held by the producer (also known as 'changes in physical stocks').

Determinants of Investment Expenditure:

(a) Interest rates and Access to credit

Key point:
Interest rate is an important determinant of C and I. The management of interest rate is a key macroeconomic tool of many governments.

Investment requires financing. Finance from banks, retained earnings, issue of bonds and new shares allow firms to raise funds for investment. Interest rates, the ease of access and availability to credit will affect the level of investment. For example, the global financial crisis in 2008 – 2009 has limited banks' lending to firms, and in turn,

limit investment. Also, the higher the rate of interest, the more expensive it will be for firms to finance investment, and hence the less profitable will the investment be.

According to the Marginal Efficiency of Investment (MEI) theory, **there is an inverse relationship between interest rate and investment.** Ceteris paribus, if interest rate increases, the level of investment will fall, and vice versa.

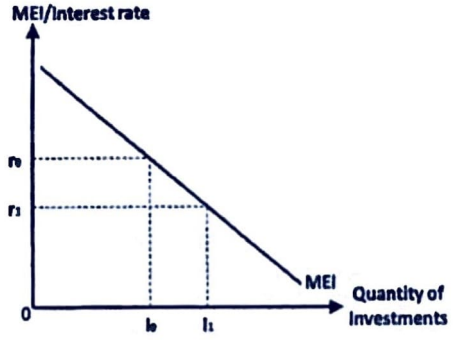
Note:
It is important to bring in the MEI theory when explaining how i/r affects I.

The MEI refers to the expected rate of return (or income or profit) of an additional unit of investment while the rate of interest (r) refers to the cost of borrowing. At any instance, there will be many investment opportunities with varying MEI or expected rate of returns. By ranking such investment opportunities from highest to lowest MEI, a downward-sloping MEI curve will be derived as seen in Figure 4a.

To decide whether to undertake an investment project, the rational firm will conduct a cost-benefit analysis. A firm will only invest if it makes a profit - meaning that the expected rate of return of investment (i.e. MEI) must be greater than or at least equal to the cost of borrowing for investment (i.e. the interest rate). If MEI ≥ r, firms will undertake the investment. If MEI < r, firms will not undertake the investment.

With reference to Figure 4a, if the interest rate is at r_0, firms will undertake additional investment projects up till I_0 units, because for investment projects up till I_0 units, the MEI or expected rate of returns of these projects can at least cover r_0, the cost of borrowing. Any additional units of investment beyond I_0 units will be unprofitable as MEI < r.

Fig 4a: Movement along MEI



Note:
The MEI curve shows that there is an inverse relationship between investment and interest rates.

A change in interest rates influences the quantity of investments undertaken, and this is represented by a movement along the MEI curve.

A change in non-interest rate factors affecting investment will cause a shift of the MEI curve.

When interest rate falls, there will be more investment projects that would yield a MEI or expected rate of return that is greater than or equal to the new lower interest rate. Referring to Figure 4a again, when interest rate falls from r_0 to r_1, the number of investment projects that yield an expected rate of return that is greater than or at least equal to r_1 (cost of borrowing) will now increase from I_0 to I_1, ceteris paribus. Therefore, a fall in interest rate would lead to an increase in level of investments, vice versa. This is reflected by a downward **movement along the MEI curve**.

(b) Business confidence and expectations

Since investment is made in order to produce output for the future, investment must depend on firms' expectations about future market conditions. Business confidence refers to how optimistic firms are about their future sales and the level of economic activity. Firms form their expectations by looking at the current state of the economy, political factors, and global situation. If firms become more optimistic about future sales and economic activity, they will expect the rate of return on investments to increase causing the **MEI curve to shift** to the right from MEI_1 to MEI_2 in Figure 4b. Hence,

when business confidence strengthens, the level of investment will increase from I_1 to I_2, assuming interest rate remains unchanged at r_1.

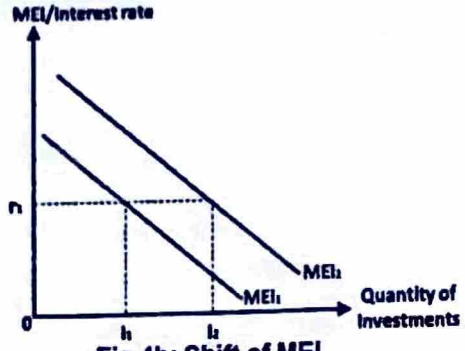


Fig 4b: Shift of MEI

On the other hand, if firms become more pessimistic about the future of the economy, they will expect the rate of return on investments to fall, and this causes the MEI curve to shift to the left. Hence, even though interest rates remain constant, there will be fewer investment projects that will yield an expected rate of return that is at least equal to the prevailing interest rate. Hence, when business confidence falls, the level of investment will fall, ceteris paribus.

(c) Corporate tax rates

If the government reduces the corporate tax on profits of businesses, firms' after-tax profits increase. This increases firms' willingness and ability to invest, leading to an increase in investment expenditure, likewise causing a shift of MEI curve from MEI_1 to MEI_2 in Figure 4b.

(d) Technology changes

Improvements in technology stimulate investment spending. This is because the implementation of new technology often requires new capital. For instance, advances in the sharing economy have encouraged massive investments in new sectors -the use of idle assets such as cars and spare bedrooms has led to growth of Uber and Airbnb. Likewise, if the cost of capital equipment goes down or machines become more efficient as a result of technological improvement, the return on investment will increase. This shifts the MEI curve rightwards from MEI_1 to MEI_2 in Figure 4b, such that at prevailing rates r_1 the level of investment increases from I_1 to I_2.

❖ GOVERNMENT EXPENDITURE (G):

Government expenditure refers to spending by governments on goods and services within a country. It includes payment of salaries of government workers and spending on public works and public investments of infrastructure such as building of roads, airports, power generators, schools, and hospitals, etc. Often, it increases or decreases depending on how the government plans that spending to achieve its microeconomic and macroeconomic goals. This is also known as fiscal policy. Other determinants of government expenditure in the longer run include government revenue, national reserves, and access to credit.

Refer to Macroeconomic Policies: Fiscal Policy for more information on how government expenditure is determined.

❖ NET EXPORTS (X-M):

Export expenditure are on goods and services produced within the country and sold to foreigners and should be included in the measurement of the country's national output

or Gross Domestic Product (GDP). Import expenditure, however, refer to domestic spending on goods and services that have been produced in other countries, and should be subtracted from national output or GDP. Net Exports is the value of all exports minus imports.

Determinants of Net Exports (X-M):

(a) National income of trading partners / domestic households

If the income levels of Country A's trading partners increase rapidly, foreign demand for Country A's goods and services may rise due to their higher purchasing power, assuming these exports are normal goods (YEDx > 0). Thus, Country A's export revenue increases. Ceteris paribus, net exports will increase.

Conversely, when the trading partners are experiencing recession, the reduced income will result in them demanding less foreign goods. Country A's export revenue falls, bringing about a decrease in net exports, ceteris paribus.

On the other hand, import expenditure can be influenced by national income of a country. If Country A itself experiences a rise in national income, the residents have greater purchasing power and might demand more imports, causing import expenditure (M) to rise.

(b) Relative price levels between countries

If the price level in other countries rise relative to that in Country A, then in the world market, the demand for A's goods and services will rise if they are substitutes to the foreign goods and services produced by the foreign countries. This is because the domestic goods have become relatively cheaper compared to its foreign substitutes. Thus, the export revenue of Country A will increase.

On the other hand, in Country A, its residents will buy less of the relatively more expensive imported goods and services and buy more of the relatively cheaper domestically produced import substitutes, thus reducing Country A's import spending. Hence, net export earnings for Country A will rise if the general price level of Country A's trading partners rise relative to that in Country A - if the inflation rate of other countries is higher than that of Country A.

(c) Exchange rates

Changes in foreign exchange rates affect the price of imports in terms of domestic currency and the price of exports in terms of foreign currency.

If the Singapore dollar depreciates (weakens) relative to that of its trading partners, Singapore's goods and services become cheaper in terms of foreign currency. This results in foreigners switching towards purchasing more of Singapore's goods (i.e. Singapore's exports) which increases Singapore's domestic export revenue. Conversely, foreign goods are now more expensive in terms of Singapore dollar, causing Singapore to reduce its purchases of imports from her trading partners and hence import expenditure. This could result in a rise in net exports (X-M).

Refer to the lecture notes on 'Macroeconomic Policy', specifically the section on 'Exchange Rate Policy' for detailed analysis of the impact of ER on Net Exports and the economy.

(d) Trade Policies – Protectionism

Countries may impose protectionist measures such as tarifsfs and quotas on imports and export subsidies. Imposition of tariffs and quotas by trade partners will affect a country's ability to sell exports, and *may* reduce its export revenue, decreasing AD.

Refer to the lecture notes on 'Globalisation', for detailed analysis of protectionism and effects on NX.

Likewise, imposition of these measures by the domestic country will reduce import expenditure and cause people to switch to domestically produced goods and services, thus increasing AD.

2.2 AGGREGATE SUPPLY (AS)

Aggregate supply (AS) refers to the total value of output of goods & services that domestic firms as a whole produce and sell at each general price level. Figure 4 shows the AS curve of an economy. The AS curve links the level of real national output to the general price level. Its shape is determined by the degree of spare capacity in the economy.

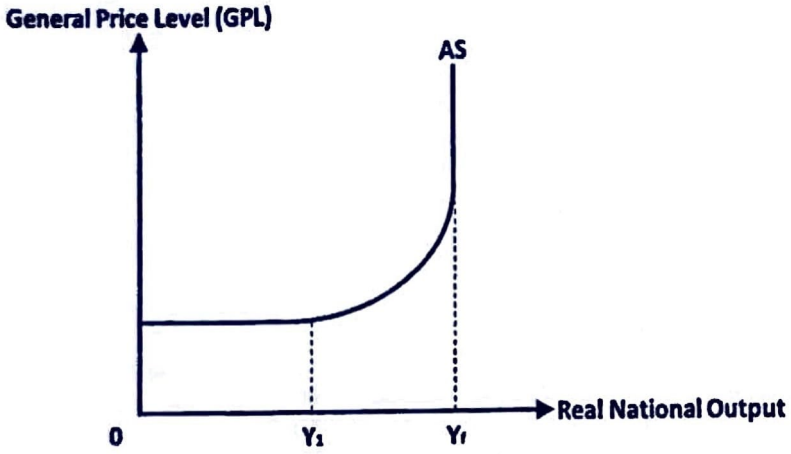


Figure 5: The AS curve

Note:
There is much discussion over the shape of the AS curve. Different economic models have proposed AS curves of different shapes and interpretations. We will use the hybrid AS curve to capture the diversity of views over the shape of the AS curve.

- Horizontal (Keynesian) range ($0Y_1$)
  - Over this range, real national output can increase without any increase in price. AS is said to be perfectly price-elastic.
  - This is because real national output is much lower than the full employment level (Y_f). Thus, there is an abundance of un-utilised and under-utilised resources, also known as spare capacity.
  - Should there be a rise in aggregate demand; the spare capacity will allow producers to increase output production easily without incurring higher costs. Hence there is no pressure on the general price level to increase.

Note:
There are 3 ranges of the AS curve – the horizontal, intermediate and vertical range. These depend on the level of spare capacity in the economy.

- Upward sloping (Intermediate) range (Y_1 to Y_f)
  - At this range, an increase in real national output is accompanied by rising general price levels.
  - This is because resources such as capital goods, raw materials and labour become increasingly scarce as production levels rise. There is less spare capacity as resources are increasingly employed.
  - If aggregate demand rises, the increase in output to meet the shortage of goods will cause supply bottlenecks to arise in production; resulting in rising costs and a higher general price level.

- Vertical (Classical) range (Y_f)
  - Beyond this range, there is no possible increase in output while prices continue to rise. AS is said to be perfectly price inelastic.
  - This is because the economy has reached full employment and output can no longer rise as resources are fully employed.

- If aggregate demand were to rise, only the general price level would increase with no change in real output.
- Changes in the Y_f level can only be brought about by changes in the productive capacity of the economy.

The general price level is not the only factor that influences the aggregate supply of goods and services. **Changes in non-price factors** can **cause a shift** in the AS curves, altering the amount produced at each price level.

2.2.1 Non-price Determinants of Aggregate Supply

Changes in non-price determinants of supply lead to a **shift in the AS curve.** Such factors affect the **cost of production** and / or **productive capacity** of the economy. They can be temporary or permanent. For instance, a rise in oil prices reduce current output, but that is unlikely to be severe enough to alter the country's long term productive capacity. On the other hand, a natural disaster will cause both temporary and long-term decrease in an economy's national output since its productive capacity is reduced as resources were destroyed.

(1) Downward and Upward Shifts of the AS Curve

Generally, a rise in **cost of production** leads to a decrease in the aggregate supply of goods and services. This shifts the AS curve upwards from AS_0 to AS_1 as shown in Figure 6. This is because firms are willing to produce less at each given price level as the higher production cost will reduce the possibilities for earning profits.

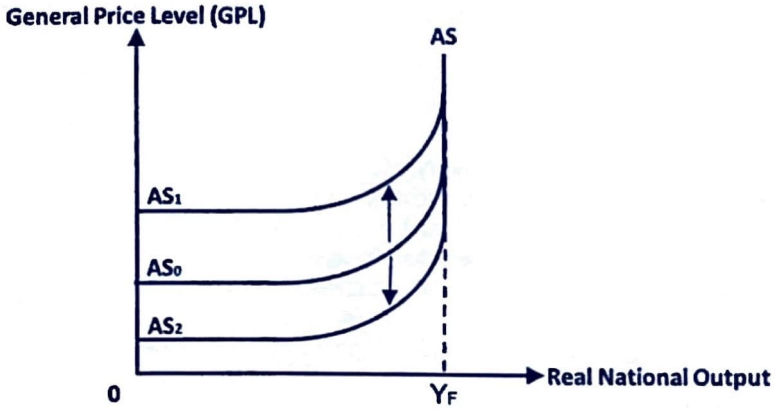


Figure 6: Upward / downward shift of AS

Conversely, a fall in production cost will provide an incentive for more to be produced at every given price level for output. This increases aggregate supply and shifts the AS curve downwards from AS_0 to AS_2, as shown in Figure 6.

(2) Outward and Inward Shifts of the AS Curve

A rise in **productive capacity** implies an increase in the potential of the economy to produce more goods and services. This has the effect of shifting the AS curve to the right from AS_0 to AS_1, as shown in Figure 7a. In other words, **potential** economic growth occurs, and the full employment real output frontier is pushed outwards from Y_{F0} to Y_{F1}. This is like an outward shift of the Production Possibility Curve. The reverse

is true for a fall in productive capacity, resulting in an inward shift of the AS curve and a fall in the full employment real output level from Y_{F0} to Y_{F1} as in Figure 7b.

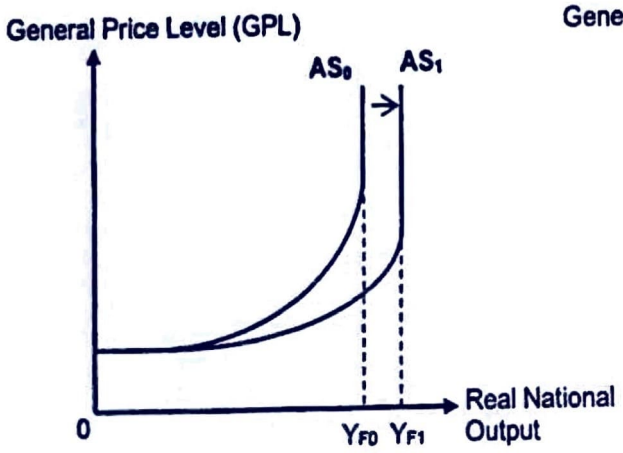


Figure 7a: Rise in Productive Capacity

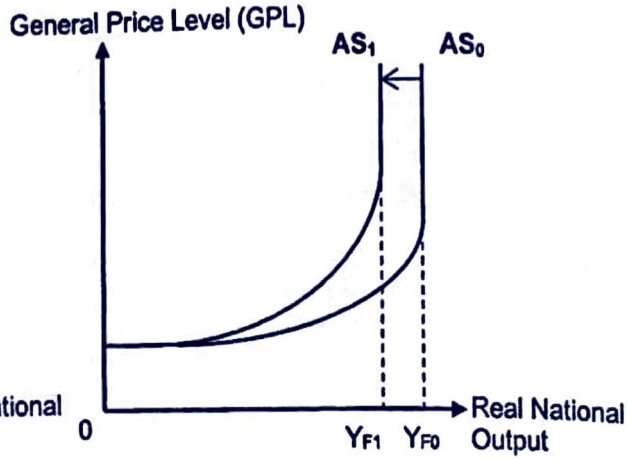


Figure 7b: Fall in Productive Capacity

(3) Determinants of Aggregate Supply

(a) Changes in Input prices

Assuming no changes to productive capacity, a rise in the price of inputs such as labour, oil and steel increases production costs and reduce AS, shifting the AS curve upwards from AS_0 to AS_1 as seen in Figure 6.

Rule of thumb:
- If only cost of production changes, the AS curve will shift up/down.
- If only productive capacity changes, the AS curve will shift left/right.
- If both COP and productive capacity has changes, the AS curve will shift both up/down, left/right.

(b) Changes in the quantity of resources

An increase in quantity of resources can be due to the discovery of new oil wells or mineral mines, and the level of investment. For example, the discovery and harvest of shale oil will lead to an increase in the quantity of resources (land) in a country. This increases the economy's ability to produce more goods and services. Investments will affect the rate of capital accumulation, which increases the quantity of capital. Ceteris paribus, this will increase the economy's productive capacity, leading to an increase in aggregate supply, shifting the AS curve to the right from AS_0 to AS_1 (Figure 7a).

(c) Changes in the quality of resources

An improvement in the quality of labour resources is referred to as an increase in **labour productivity**. Labour productivity can be increased through **human capital investment**. Since human capital refers to the qualifications, skills and expertise that contribute to a worker's productivity, human capital investment occurs through education and training. With greater productivity of workers, more goods and services can be produced for every input employed, increasing productive capacity of the economy, shifting the AS curve to the right from AS0 to AS1 (Figure 7a), and the full employment output level from Y_{F0} to Y_{F1}.

In addition, the higher productivity of workers can translate to lower unit cost of production if the wages of workers remain constant. This can also shift the AS downwards from AS_0 to AS_2 as shown in Figure 6. This is because firms are willing to produce more at each given price level as the lower production cost will increase the possibilities for earning profits.

An improvement in the quality of other resources (e.g. capital, natural resources) will also add to a country's productive capacity. An example is the improvement of the quality of land through improved irrigation systems whereby disturbed soil in dry areas can be revegetated. This increases the number of agricultural harvests from a given plot of land, and thus shifting AS curve to the right from AS_0 to AS_1 as in Fig 7a. Such improvements in the quality of resources can be achieved through R&D.

(d) Technological advancements

Improvements in technology aid in the discovery of less costly ways of production, augmenting the level of production for a given level of resources. Productive capacity or potential output increases. The advancement in technology also reduces unit cost of production. Hence the AS curve shifts both downwards and to the right. An example is the use of 3D printers for manufacturing goods. Because 3D printing utilized precise amounts of inputs to produce any good, there is minimal wastage of resources in the manufacturing process, increasing efficiency as well as lowering the unit cost of production.

(e) Government policies

Government policies can affect aggregate supply through influencing the costs of production and / or the productive capacity. For instance, providing indirect subsidies to firms helps to lower the cost of production, leading to an increase in aggregate supply and shifting the AS curve downwards.

Refer to lecture notes on 'Supply-side policies' for more detailed analysis on how government measures can affect AS.

Other government policies can also impact the aggregate supply. For instance, well-established property rights and contracts, proper law enforcement and crime prevention can lower business costs and reduce the uncertainties arising from loss of property and personal injury. It will also encourage savings and investment in long-term capital projects from local citizens and foreigners. The rise in investment can positively affect the productive capacity of the economy.

3. EQUILIBRIUM LEVEL OF NATIONAL INCOME

Equilibrium in the macro-economy occurs when aggregate demand (AD) equates aggregate supply (AS). At that position, the level of real national income is referred to as the equilibrium level of real national income. It is the level of national income towards which the economy will tend to. Once it is reached, it will be under no pressure to change.

Recall:
Under the circular flow of income model, when there are changes in the level of injections (I,G and X) or withdrawals (S,T and M), NY will also change.

Should there be changes in AD and/or AS, pressures on firms and households will move the economy towards equilibrium real national income and price level once again.

3.1 EFFECTS OF A CHANGE IN AD

With reference to Figure 8, the initial equilibrium level of national income is at Y_0 where AD_0 equals to AS. If AD increases and shifts right to AD_1, there will be disequilibrium as the aggregate quantity demanded (spending) exceeds aggregate quantity supplied (output). There will be a rundown of firms' stocks and inventories. The resulting shortages will drive up prices. As prices rise, since there is initial spare capacity and idle resources exist, profit-maximizing firms are incentivized by the higher prices to increase output and thus employ more FOPs such as labour (movement up along the AS curve). As firms produce more and hire more FOPs, national output/income rises. But as prices rise, the *level* of aggregate demand falls (movement back up along the AD curve) because of the wealth, interest-rate, and international substitution effects.

Recall:
There is an inverse relationship between GPL and level of AD due to the wealth, i/r, and international substitution effects. Can you remember how to explain these effects?

Hence, the shortage will be eliminated when real national output/income rises to the new equilibrium level Y_1 and GPL rises to P_1.

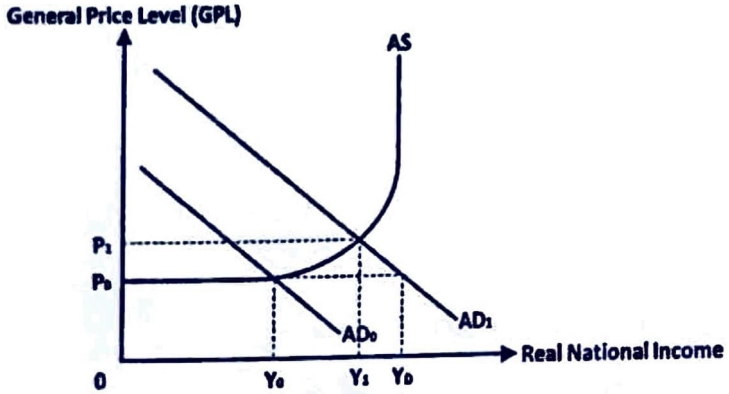


Figure 8: Effects of an Increase in AD

The rise in equilibrium real national output/income from Y_0 to Y_1 reflects **actual economic growth.**

Note:
Actual economic growth is achieved when a rise in real NY is experienced in an economy. Graphically, this is reflected by a rise in equilibrium real NY, which can be due to an increase in AD and/or an increase in AS.

Conversely, if the AD were to fall, the leftward shift of the AD curve will force firms to reduce prices to clear the excess inventories and stock. With a fall in prices, firms reduce production and demand fewer workers. Thus real national output/income falls, moving the economy to a new lower equilibrium.

Note that the shifts in AD are caused by changes in the components of AD seen in section 2.1.1.

3.2 EFFECTS OF A CHANGE IN AS

An increase in aggregate supply due to a fall in production costs is represented by a downward shift of the AS curve from AS_1 to AS_2 as shown in Figure 9. At the initial GPL, P_1, aggregate supply (output) exceeds the level of aggregate demand (spending). This will lead to an accumulation of stocks and inventories, and will cause firms to lower prices to sell off the excess inventories. As GPL falls, consumers are incentivised to consume more goods and services. This is represented by a downward movement along the AD curve. This continues until the GPL falls to P_2 where the equilibrium level of real national income is higher at Y_2. **Actual economic growth** is achieved in this case.

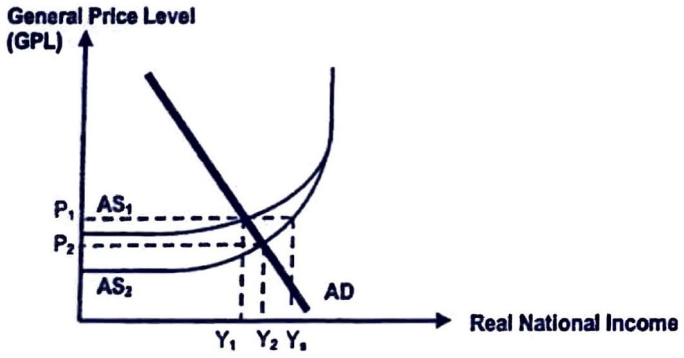


Figure 9: Effects of a downward shift in AS

If technological advancement is assumed to result in higher productivity and thus lower COP and higher productive capacity for the country, this causes the country's AS to increase, and its AS curve would shift downwards and rightwards as shown in Figure 10 below.

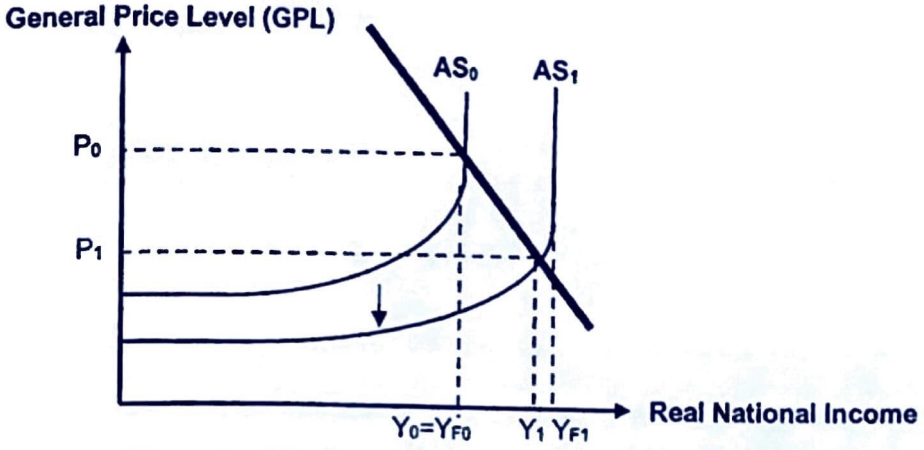


Figure 10: Effects of a downward and rightward shift in AS

As explained, the rise in productive capacity would increase the country's full employment level from Y_{F0} to Y_{F1}, resulting in **potential economic growth.** This expansion in productive capacity will also alleviate the existing supply bottlenecks and this would cause GPL to fall and real national income to rise. Thus, equilibrium GPL falls from P_0 to P_1 and equilibrium real national income rises from Y_0 (=Yf_0) to Y_1, which represents an increase in actual economic growth as well.

Note that the shifts in AS are caused by changes in the factors affecting AS as seen in Section 2.2.1.

Sectional Summary

- Aggregate demand consists of the sum of expenditure/spending by households, firms, government and foreign sector on domestically produced goods and services.
  AD = C+ I + G + X-M.
- Aggregate supply reflects the total value of output of goods and services that domestic firms are able and willing to sell at every price level. The AS curve compromises of three segments – the horizontal (Keynesian) range with an abundance of unemployed resources, an upward sloping (intermediate) range as well as the vertical (Classical) range where the economy has reached full employment.
- Changes in cost of production shifts the AS curve up/down while changes in productive capacity shifts the AS curve right/left.
- When AD intersects AS, the equilibrium real national income and general price level for an economy is attained.
- Actual economic growth occurs when the country's equilibrium real national output increases. Actual economic growth can be achieved by an increase in AD and / or an increase in AS.
- Potential economic growth occurs when productive capacity increases. Potential economic growth can only be achieved when there is an increase in full employment real output level (Y_{FE}), as represented by the vertical portion of the AS curve.

4. THE MULTIPLIER

It is generally observed that **when the AD increases** (due to an increase in any of the components of AD), this will **lead to a more than proportionate increase in national income.** An increase in AD will lead to a more than proportionate increase in income, while a decrease in AD will lead to a more than proportionate decrease in national income. This is due to the **multiplier effect.**

Key Point:
An increase in AD would trigger the multiplier effect, resulting in a more than proportionate increase in national income.

4.1 THE MULTIPLIER EFFECT

The multiplier is a numerical coefficient by which a change in autonomous spending (i.e. autonomous C, I, G or X), is multiplied to show the final change in equilibrium national income.

The multiplier *k* is as follows:

> ***k*** **= Δ NY / Δ AD**, *where*
> - ΔNY is change in equilibrium national income, and
> - ΔAD is change in spending

The theory of the multiplier is based on the following assumptions:
(1) Availability of spare capacity in the economy
(2) No change in the general price level
(3) A constant state of technology
(4) Absence of time lags

HOW DOES THE MULTIPLIER EFFECT OCCUR?

Suppose a firm makes an investment by building a new factory on Jurong Island or the government increases its spending by extending the MRT line, this creates income for the people directly employed. These people, in turn, spend a part of their income on domestically produced goods and services such as in restaurants, cinemas, supermarkets etc (induced consumption). The remainder of the income 'leaks out' of the circular flow, in the form of savings, taxes and import spending.

Recall: Induced consumption is the portion of consumption that varies with national income.

The income-induced consumption will then create more employment (e.g. increased hiring in restaurants), output, and income for other people in the economy. The income generated for this next group of people will lead to consumer expenditure and add on to induced consumption for the economy; and once again, another round of employment, output and income will be generated.

The multiplier process works on the **principle** that one person's spending generates income for another, and the process goes through many rounds of induced spending to increase national income by a larger magnitude, compared to the initial autonomous increase in AD.

Key Point:
The multiplier process perpetuates because of induced consumption. There are repeated increases in national income and induced consumption through the interaction between households and firms.

Thus, in this case, an initial increase in investment can cause a much bigger increase in national income. The magnitude of the increase will depend on the **rate at which income leaks out** (i.e., MPW or marginal propensity to withdraw) or the rate at which income is spent on domestically produced goods and services (MPC or marginal propensity to consume on domestically produced goods and services).

The multiplier process can be explained through a few approaches, such as through a numerical table, the AD-AS diagram as well as the circular flow model.

4.1.1 The multiplier process: A numerical example with a table, based on an increase in investment

To illustrate the full working of the multiplier in a 4-sector economy, the following assumptions are made:

- Investment increases by $100m.
- MPC (on domestically produced goods and services) = 0.6
- The economy is operating below the full employment output level.

Due to the rise in investment expenditure, firms affected by these investment projects will employ more factors of production such as labour to produce more output. Hence the $100m received by these firms will then be paid to the factors of production. Thus, national output/income rise by $100m. This reflects the first round of output and income generated, as indicated in Table 1 below.

This increase in national income of $100m will induce a rise in consumption expenditure on domestically produced goods and services of $60m. (MPC= 0.6). The remainder, $40m, will be saved, paid to taxes, and spent on imported goods. In other words, $40m will be 'withdrawn' from economy.

In turn, the $60m increase in induced consumption will create $60m worth of new output and income for the domestic economy. Hence a second round of output and income of $60m is generated. Consequently, households who earned this $60m of income will increase their consumption by $36m ($60m x 0.6), thereafter generating a third round of output and income of $36m for the economy. The process whereby expenditure generates income and income induces expenditure goes on and on until the initial injection of $100m has totally leaked out as withdrawals.

Eventually, as shown in Table 1 below, the initial increase in autonomous investment of $100m would have created an increase in national income of $250m.

However, the multiplier process ***does not continue indefinitely*** **since** ***after each round of increase in real national income, the additional induced consumption generated becomes smaller and smaller due to leakages in the economy in the form of savings, taxes and imports.*** The whole rippling process continues until the cumulative sum of withdrawals equal the initial increase in injections.

Table 1: The multiplier process, triggered by a rise in investment of $100m, and MPC = 0.6 and MPW= 0.4

Time Period (Number of Rounds)	Increase in National Income ($m)	Induced Increase In Consumption ($m)	Increase in Withdrawals ($m)
1	$100	$60	$40
2	$60	$36	$24
3	$36	$21.60	$14.40
:	:	:	:
Total	**$250**	$150	$100

From the above, we can see that the change in national income is 2.5 times the initial change in investment. Thus, $\Delta Y = \Delta I \times$ multiplier (k). Hence,

k = ΔNY / Δ autonomous AD

= 1 / MPW OR 1/ [1–MPC]

In short, the multiplier bears a direct relationship with MPC and an inverse relationship with MPW. In other words, the larger the MPC, the larger will be the size of k. Conversely, a higher leakage leading to a larger MPW leads to a smaller size of k.

- In a 4-sector economy (including government and foreign sector)

k = 1 / [MPS + MPT + MPM]

where

- MPS is the marginal propensity to save (change in savings in response to change in national income).
- MPT is the marginal propensity to tax (change in tax paid in response to change in national income).
- MPM is the marginal propensity to import (change in import expenditure in response to change in national income)

Note:
MPW (marginal propensity to withdraw) is the sum of MPS, MPT and MPM.

4.1.2 The multiplier process explained with the AD-AS Approach

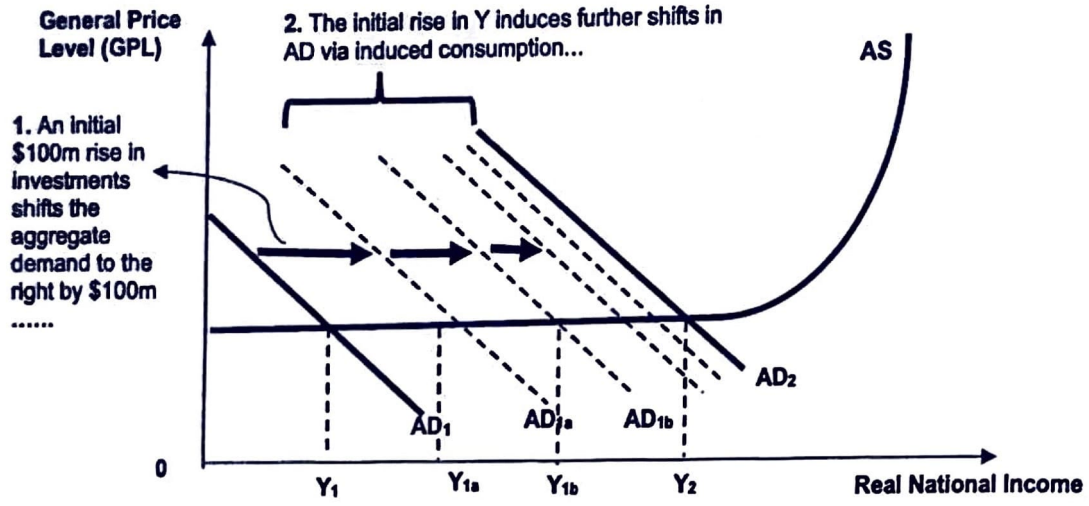


Figure 11: The Multiplier Effect using AD-AS graph

Applying the same example of an increase in investment by \$100m, there will be an equivalent increase in aggregate demand. Diagrammatically, the AD curve shifts to the right from AD_1 to AD_{1a} by \$100m as shown in Figure 11. To meet this rise in AD, the firms affected by the rise in investment expenditure will need to produce more output and hire more factors of production. Firms will then pay out income to the factors of production in return for the output produced. Hence, real national output/income will increase by \$100m from Y_1 to Y_{1a}. Note that this also corresponds to the Round 1 of national income and output from Table 1.

Note:
The multiplier process can be triggered by a change in any component of AD such as autonomous consumption, government expenditure and export expenditure. In addition, a *fall* in AD will spark off the *reverse* multiplier process.

Households spend a proportion of this increase in income on buying domestically produced goods and services, and this proportion is based on the marginal propensity to consume. This increase in induced consumption (\$60m) causes AD_{1a} to rise to AD_{1b}. Again, in response to rising AD, production and thus income increases by \$60m (Y_{1a} rises to Y_{1b}), and this second round of income induces further consumption (\$36m), and subsequently increasing AD and income again. This process whereby expenditure generates income creates cycles of spending and respending. However, the multiplier process **does not continue infinitely because of the presence of withdrawals** in the form of savings, taxes and import expenditure. This causes the additional increase in spending and income to be a fraction of the previous addition to the circular flow. This means that the rightward shifts in the AD curve become smaller and smaller with each successive round. Eventually when the cumulative sum of withdrawals equals the initial increase in AD, the multiplier process will stop.

Note:
The multiplier process ends when the initial autonomous increase in AD is fully withdrawn.

Since k=2.5, then national income would rise by 2.5 times given the autonomous increase in investment. In other words, Y_1Y_2 should be 2.5 times greater than AD_1AD_{1a}.

Note that for the full multiplier effects to be achieved, the following assumptions must be made regarding the state of the economy: (1) High degree of spare capacity; (2) Constant general price level and (3) Constant technology.

Hence, from Figure 11, holding the above assumptions, the overall increase in AD is from AD_1 to AD_2 and the multiplied increase in real national income is from Y_1 to Y_2, represents **actual economic growth**, and reflects a higher quantity of output has been produced with the employment of the previously idle resources. Thus, the initial \$100m rise in investment (AD) has resulted in a more than proportionate rise in real national output and income of \$250m.

4.1.3 The multiplier process explained with the Circular Flow Model

Let us now apply another scenario. Suppose the government increases its spending (↑G) on extending the MRT line by \$100m. Here, we assume that MPC = 0.6, while MPW = 0.4, with MPS = 0.2, MRT = 0.1 and MPM = 0.1.

With reference to Figure 12 below, when the government injects the \$100m (at ❶) into the economy, firms providing the construction and related services would earn \$100m. This money will be distributed to the factors of production and become the income of households (at ❷). Households do not spend all their income on consumption, but only a part of it. Since MPC = 0.6, only 60% of their additional income will be spent on consuming domestically-produced goods and services. Therefore, \$60m flows back to the domestic firms (at ❸), while the rest (\$40m) is withdrawn in the form of savings, taxes and imports. The induced consumption of \$60m is 're-injected' back into the economy (at ❹).

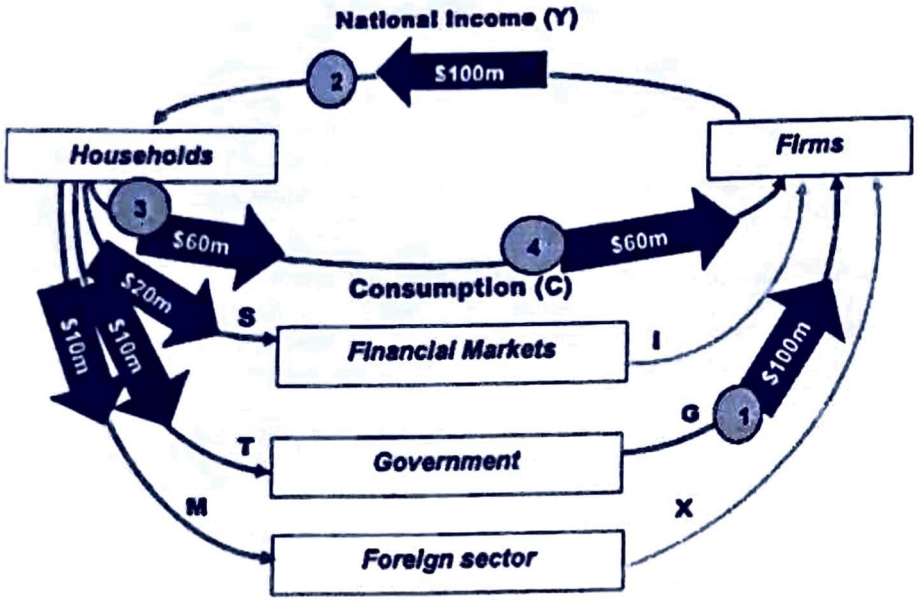


Figure 12

With reference to Figure 13, this induced consumption leads to Round 2 of increase in national income of $60m (at 5) and this, in turn, induces another round of consumption of $36m (at 6). This process whereby expenditure generates income and income induces expenditure is repeated.

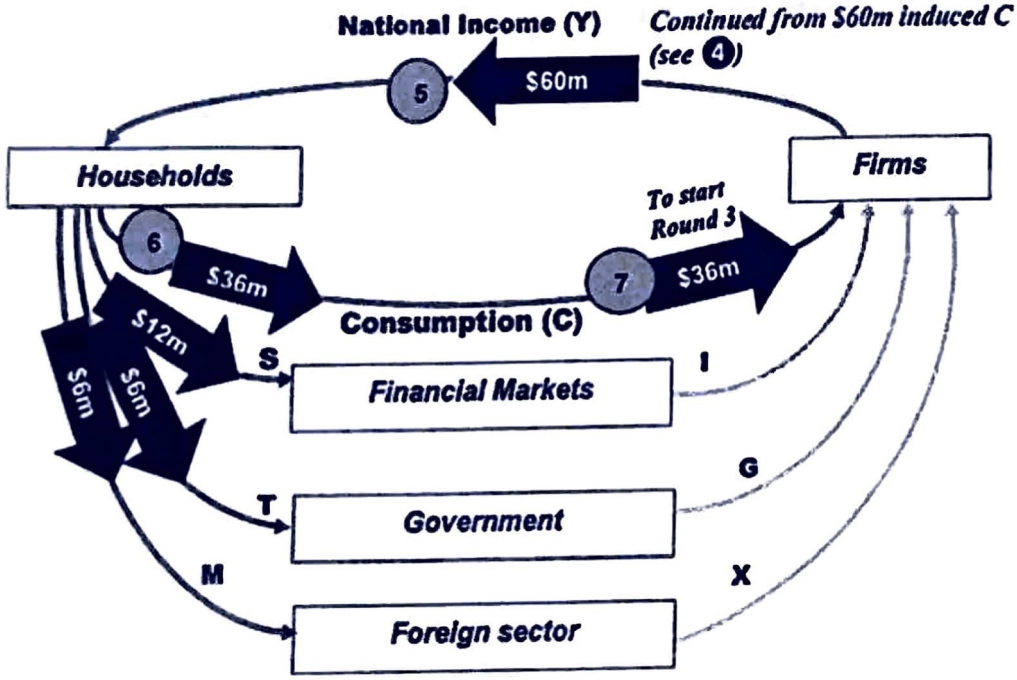


Figure 13

The cycle goes on for subsequent rounds but does not continue indefinitely. At each successive round, the rise in national income and induced consumption become smaller and smaller, due to the presence of leakages in terms of savings, taxes and

import expenditure. Eventually, all the initial injection ($100m) would be withdrawn when the induced increase in consumption falls to zero. The multiplier process ends when the cumulative sum of withdrawals equals to the initial injection.

Recall:
In Section 1 (under Circular flow), equilibrium level of NY is reached when J = W.

4.2 LIMITATIONS OF THE MULTIPLIER EFFECT

- **Size of multiplier *k***

If the MPC is very small (or MPW is very large) in a country, then for a given injection, a very large part of the gain in income will be withdrawn while very little will be spent on induced consumption, so this means very little income will be re-injected back into the economy to generate expenditure and income at subsequent rounds. Hence, a small multiplier size dampens the increase in real national income for a given increase in AD. This has implications on the effectiveness of fiscal policies, which will be covered in *Macroeconomic Policies*.

Key Point:
The size of k is affected by the size of MPS, MPT and MPM.

For instance, Singapore has a very open economy, and it imports most of its factor inputs and finished goods, which implies that its MPM is very high. Also, Singapore has a high savings rate due to the presence of a compulsory savings scheme (Central Provident Fund), implying a high MPS. The high MPM and MPS implies a high value of marginal propensity to withdraw, and this results in Singapore having a small size of multiplier *k*. Any injection of government expenditure is thus not likely to lead to a larger increase in national income. Hence, in Singapore, certain policies such as an expansionary fiscal policy involving government increasing its expenditure to boost its AD might not be very effective in achieving actual economic growth.

- **Level of spare capacity in the economy**

Whether the full multiplier effects on the equilibrium level of real national income can be experienced depends on the level of spare capacity. This is illustrated in Figure 14.

Recall:
The assumptions of the full k-effect includes spare capacity, and constant GPL (p.17).

When the economy is initially operating with significant idle resources (ample excess capacity), each additional unit of output can be produced without incurring higher additional costs. In such a situation, a given increase in autonomous spending where the AD curve shifts right from AD_0 to AD_1 along the horizontal part of the AS curve (Keynesian Range), equilibrium level of real national income increases from Y_0 to Y_1 but the general price level does not increase. The full effects of the multiplier can thus be experienced.

However, if the economy is initially operating along the upward-sloping portion (Intermediate range) of the AS curve, and the AD curve shifts to the right from AD_2 to AD_3, inventories will fall, and firms will step up on production in the next time period. However, as the economy gradually moves towards full capacity (Yf), resources become increasingly scarce. Firms' competition for the increasingly scarce resources will cause the additional costs of producing one more unit of output to increase, and this translates into higher prices of final goods. Thus, GPL will increase (from P_2 to P_3). The increase in the GPL will have a dampening effect on the effects of the multiplier and hence the extent of increase in real output and income will be dampened (real output and NY increases from Y_2 to Y_3, less than the rise in AD). This is because the increase in general price level reduces the level of consumption by households (due to the wealth, i/r, and international substitution effect), which results in a fall in the *level* of AD. While actual growth is achieved, the effects of the multiplier are dampened by the rise in the general price level.

If the economy is initially at full employment (at Yf) and AD curve shifts to the right along the vertical part (Classical Range) of the AS curve (from AD_4 to AD_5), only the GPL will increase (from P_4 to P_5) and there will be no further increase in real national output/income i.e. no actual growth. Any rise in AD will only lead to a rise in GPL, while real output is unable to rise, due to it being constrained at Yf, the maximum productive capacity.

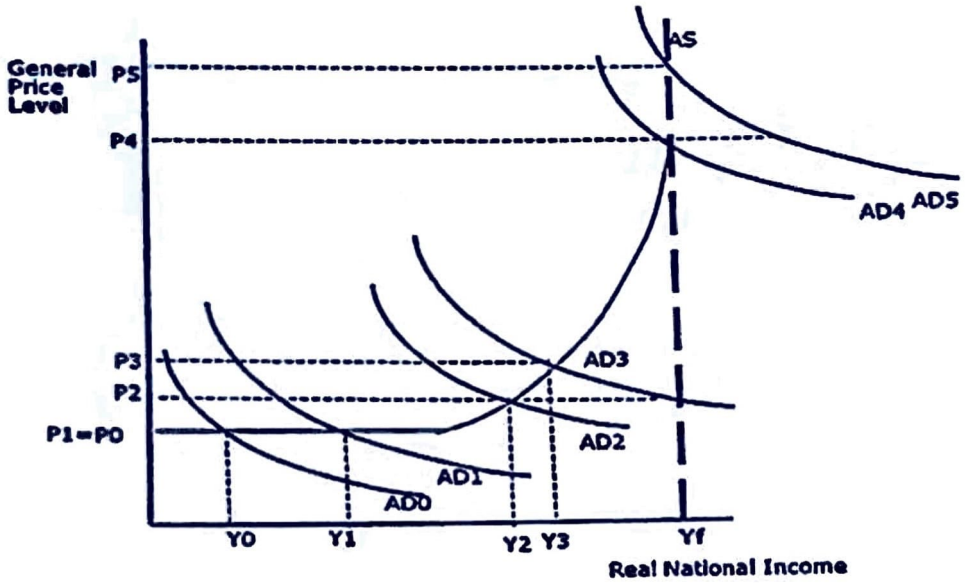


Figure 14: Impact of an Increase in AD on the Equilibrium Level of Real NY and General Price Level depending on the Level of Spare Capacity

- **Time lags**

It takes time for the multiplier to work. In the real world, several weeks, or even months will be required for each successive round of spending to occur. Only a fraction of the multiplier effect will be observed quickly. Most researchers believe that only about one-half of the total multiplier effect will be felt during the first six months following a change in AD.

- **Difficulties in measurement**

The formula for the multiplier is k = 1/(MPM + MPS + MPT). However, it is difficult to precisely measure the MPM, MPS and the MPT. Economists often have figures for the aggregate savings of an economy, or the total amount of import expenditure. However, these are not the same as the MPS and the MPM respectively (see Appendix 2). In addition, either one of the MPM, MPS, or the MPT is often not available, which makes estimating the size of the multiplier difficult.

4.3 THE REVERSE MULTIPLIER

A fall in autonomous C, I, G or X will cause a fall in AD and cause multiple leftward shifts in the aggregate demand curve, which will in turn lead to a more than proportionate fall in real national income.

Assuming that there is a fall in investment. According to the multiplier effect, a fall in autonomous investment will lead to a more than proportionate fall in the equilibrium

level of real national income. The multiplier effect is based on the principle that "one person's spending is another person's income and income stimulates many rounds of increase in induced consumption". In this case, one man's loss in spending is another man's loss in income and less income leads to less spending and the cycle repeats.

The fall in investment will first lead to a fall in AD, resulting in the affected firms to cut down on production and hence reduce demand for factors of production. Consequently, firms would receive less income, and less income will be distributed to the factors of production such as labour from households. When households' income falls, they will decrease consumption expenditure. Induced consumption on domestically produced goods and services will fall, resulting in another contraction of aggregate demand. Again, the affected firms would need to cut down on production and employ less factor inputs from households, hence leading to another round of cutback in national income. This process of fall in income and induced consumption will repeat over many rounds.

However, this process is not infinite. The fall in income and induced consumption become smaller with each successive round as part of the fall in income also leads to decreases of withdrawals in the form of savings, taxes and imports. The presence of withdrawals (savings, taxes and imports) causes subsequent rounds of additional fall in spending and income to be a fraction of the previous rounds. This in turn causes the shifts in AD curve to be increasingly smaller at each subsequent round. Eventually the process ends when the cumulative fall in withdrawals equals the initial fall in aggregate demand. The economy will reach a new and lower equilibrium level of national income. The fall in equilibrium real national income is more than proportionate to the initial fall in investment.

Refer to Appendix 3 for further extension of the multiplier effect: the multiplier – accelerator interaction.

Sectional Summary

- It is important to know the multiplier effect, the multiplier principle and the multiplier process.
- A change in autonomous spending will lead to a more than proportionate change in national income via the multiplier process.
- The multiplier process ends when the initial autonomous increase in AD has totally leaked out as withdrawals.
- The multiplier process depends heavily on induced consumption (on domestically-produced goods and services), and therefore the size of the multiplier depends on the marginal propensity to consume (MPC). The MPC refers to the proportion of additional income spent on consumption of domestically produced goods and services.
- The formula for the multiplier is $k = \frac{1}{1-MPC} = \frac{1}{MPW}$

  such that the smaller the MPC (or the larger the MPW), the smaller the size of the multiplier.

******END****

APPENDIX 1 – The Injection-Withdrawal Approach

The economy is said to be in equilibrium when planned injections (J) equal planned withdrawals (W) from the circular flow. At the equilibrium level of national income, current spending also equals current national output. Hence, there is no depletion of inventories or accumulation of inventories and firms have no incentive to increase or reduce production.

With reference to the figure below, the injections curve J is a horizontal line because injections are autonomous, and do not vary with the national output/income level. Instead, they are exogenously determined by decisions made by the financial sector, government and foreign sector.

On the other hand, the withdrawals vary directly with the national income level. The level of savings, taxes and import spending would rise as income rises, thus, there the withdrawals curve W is an upward-sloping line.

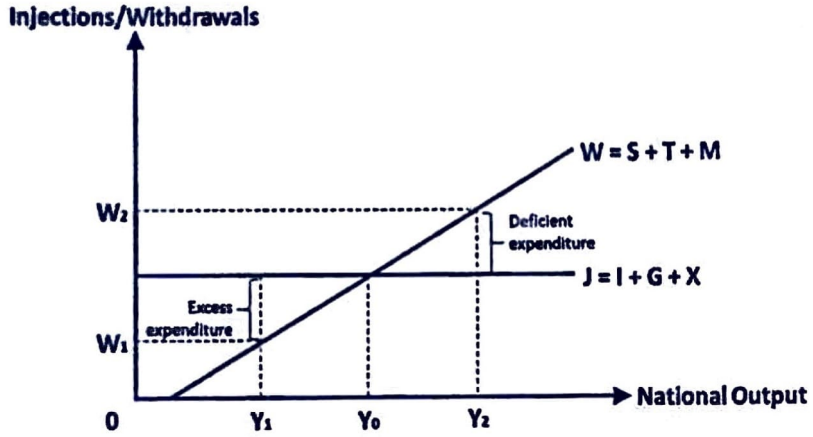


Figure 1: Equilibrium national income using the Injection-Withdrawal model

When planned withdrawals are not equal to planned injections, the circular flow of income is in disequilibrium. This will cause the level of national output to change to meet the unanticipated shortage or surplus. With reference to the figure above

- At Y_1, planned injections exceed planned withdrawals since $J > W_1$. As a result, there is excess expenditure on the economy. This encourages firms to produce more, hence national income increases. As national income increases, withdrawals also increase and there would be an upward movement along the withdrawals curve. The process continues until $W = J$ at Y_0. Thus, the equilibrium level of national income rises.
    - When planned injections exceed planned withdrawals, national income rises.

- At Y_2, planned withdrawals exceed planned injections since $W_2 > J$. As a result, there is a deficiency in demand in the economy. National production and hence national income falls. As national income decreases, withdrawals also decrease and there would be a downward movement along the withdrawals curve. The process continues until $W = J$ at Y_0. Thus, the equilibrium level of national income falls.
    - When planned withdrawals exceed planned injections, national income falls.

Thus, when the injections and withdrawal curves shift, a disequilibrium will be created. Firms and households will react to the disequilibrium and result in a new equilibrium.

APPENDIX 2 – Average and Marginal Propensities

Average and marginal propensities are different but related concepts. Although marginal propensities are more useful concepts for understanding and explaining the multiplier effect, they are difficult to measure. Average propensities are relatively easier to measure.

The average propensity to consume (APC) refers to the proportion of total income spent on consumption, and is given by the formula

$$APC = \frac{C}{Y}$$

where C = consumption expenditure and Y = national income. Since data on consumption expenditure and national income is relatively easier to obtain, the APC can be measured in a straightforward manner.

One the other hand, the marginal propensity to consume (MPC) refers to the proportion of **additional** income spent on consumption. It is given by the formula

$$MPC = \frac{\Delta C}{\Delta Y}$$

where ΔC = the *increase* in consumption expenditure and ΔY = the *increase* national income. To measure the MPC, a change in national income should be measured and its isolated effect on the level of consumption given should be measured as well. This is difficult to measure because many other factors contribute to the change in consumption.

Note that in the computation of the size of multiplier (k), only C_d (i.e. consumption on domestically-produced goods and services) is considered. Recall that $k = 1/(1-MPC_d)$. However, in practice, it is very difficult to collect data just on APC_d and MPC_d, since consumers do not report their expenditures on domestically produced and imported goods and services separately. When data on private consumption expenditure (C) is collected, C includes both expenditures on domestically produced and imported goods.

The average and marginal concepts also apply to savings, taxes, and imports.

$$APS = \frac{S}{Y} \text{ and } MPS = \frac{\Delta S}{\Delta Y}$$

$$APT = \frac{T}{Y} \text{ and } MPT = \frac{\Delta T}{\Delta Y}$$

$$APM = \frac{M}{Y} \text{ and } MPM = \frac{\Delta M}{\Delta Y}$$

Average propensities, while different from marginal propensities, tend to be a proxy for marginal propensities. When the average propensity is high, the marginal propensity is likely to be high as well.

For a four-sector economy, its income (Y) should be the sum of Cd, (consumption expenditure on domestically-produced goods and services), S (savings), T (taxes) and M (import spending). Mathematically,

$$APC_d + APS + APT + APM = 1$$

$$MPC_d + MPS + MPT + MPM = 1$$

APPENDIX 3 – Application of the multiplier effect to the business cycle

The multiplier shows how an increase in AD can lead to a more than proportionate increase in national income. It helps to show how the economy can steam-roll its way into an expansionary phase of a business cycle following an initial increase in injection.

Keynesian economists believe that a market economy, if left to its own devices, is unstable and likely to experience prolonged periods of recession. They emphasised the destabilising potential of an autonomous change in AD powered by the multiplier. An increase in investment, for example, magnified by the multiplier, will lead to an expansion in employment and a rapid growth in income. In turn the higher income will led to greater sales and production. Unemployment will decline to a low level as the economy experiences a boom.

When the economy approaches full employment, the shortage of factors of production will lead to slower growth in the economy. This dampens the optimism of the producers and causes them to reduce investment. The multiplier then magnifies the impact of the decrease in investment and leads to a greater fall in national output, and through the multiplier-accelerator interaction, the economy faces a fall in induced investment, aggravating the economic contraction. This, the Keynesians believed, helped to explain what happened during the Great Depression in the 1930s, with the added observation that investments were highly volatile.

In a nutshell, according to the Keynesians' view of the business cycle, upswings and downswings tend to feed on themselves. The theory suggests that a market-directed economy will tend to fluctuate between recessions and booms. Keynesians argue that government should attempt to 'smooth out' these fluctuations by using active stabilisation policies, in particular, fiscal policies.

The multiplier interacts with the *accelerator* to explain the business cycle. You may wish to refer to *economics textbooks* for more details on the multiplier-accelerator effect.

APPENDIX 4 – Paradigm Shifts: Changes in the Main Schools of Thought

1. The Classical School

The classical school dominated macroeconomic thinking before the 1930s. Until the Great Depression, classical economists steadfastly believed that market economies automatically gravitate towards full employment.

Belief in the assumption that markets clear

Jean Baptise Say, a 19th century French economist, believed that the very act of production create an equivalent amount of demand. Say's Law asserts that supply creates its own demand, i.e. savings create investment; taxation creates government spending; imports create exports etc. The very act of producing requires resources to be hired and paid, which in turn leads to resource owner's income being spent on other goods.

Classical economists also assume that any imbalances in savings or investments will be eliminated by changes in interest rate (Loanable Funds Theory). The Quantity theory of money states that the level of prices is directly related to the quantity of money in the economy. Wages, prices and interest rates are assumed to be flexible. Labour is also assumed to be mobile. Classical economists believe that markets would always adjust and quickly direct the economy towards equilibrium and full employment. If unemployment was temporarily high, wages would fall, which would reduce costs and lower prices until the excess supply of labour is eliminated.

According to Say's Law, the production of goods and services will generate expenditures sufficient to ensure that they are sold. There will be no deficiency of demand and no need to lay off workers. There will be full employment.

When firms produce goods, they pay out money either directly to other firms or as factor payments to households. The incomes received by households will then partly be paid back to firms in the form of consumption expenditure (Cd), via the 'inner' flow of the circular flow model. But any withdrawals by firms or households are also fully paid back to firms in the form of injections, since S=I, M=X, T=G. Thus all incomes generated by firms' supply will be transformed into demand for their products, either directly in the form of consumption, or indirectly via withdrawals and then injections. There will be no deficiency in demand.

Of course, although AD might equal AS, consumers may shift their demand away from some industries in favour of others. Unemployment may then temporarily occur. But then wages would fall in the declining industries and rise in the expanding industries. Equilibrium would be restored. Unemployment would be eliminated. The restoration of equilibrium and thus the correction of this temporary unemployment will be quicker, the more flexible are the wages and the greater the labour mobility. *(Source: Sloman, Economics, 4th Ed, 2000)*

Implications

There may exist short periods of excess demand (and inflation) or excess short term supply (and unemployment), but the economy always return to full employment. Classical economists essentially view that markets should be left on their own. Intervention is argued on pragmatic grounds, that is when markets fail.

Classical theory teaches that the price level is directly related to AD, which in turn depends strictly on the money supply. Thus, classical reasoning supports a stable money supply as the key to price-level stability, precluding significant inflation or deflation.

2. The Keynesian School: 1930s

The Wall Street crash occurred in October 1929. This led to the Great Depression of the 1930s. Between 1930 and 1933, real GDP in the United States fell by more than 30 per cent. In 1933, nearly 25 per cent of the U.S. labour force was unemployed. The depressed conditions continued throughout the decade. Most economists were baffled by the momentum and depth of the Great Depression. This set the stage for development of a theory to explain involuntary unemployment.

Challenging the Classical School's Assumptions

The first economist to challenge the classical schools' assumptions that all markets will clear is John Maynard Keynes. His work 'General Theory of Employment, Interest and Money' turned Say's law upside down. Keynesian theory concluded that "demand creates its own supply".

Keynes' Important contributions

Keynes believed that prices are sticky downwards (especially wages) whereas the level output is flexible. Fluctuations in the economy's output is demand-led (i.e., firms produce only what people want). Interest rate is determined by demand and supply of money (Liquidity preference theory of interest). Investment decisions by firms are relatively interest-inelastic. Other factors, namely expectations of future economic conditions, play an important part in determining investment.

Implications

According to Keynes, insufficient AD can exist. When AD<AS, firms will cut production and unemployment occurs. A fall in AD would not simply lead to a fall in wages and prices and a restoration of full employment equilibrium. Instead there will be demand deficit unemployment which might persist. Thus Keynes advocated for the adoption of demand-management policies such as expansionary fiscal policy, which involves government deliberately increasing its expenditure to increase AD so as to raise real national output and to lower unemployment.

3. Monetarism (Late 1960s: Milton Friedman)

The failure of the Keynesian theory to explain the sustained levels of unemployment and inflation (stagflation) in the West in the late 1960s led to the rise of Monetarism. Monetarists argued that there is a close relationship between the rate of growth of money supply and the rate of inflation. To them, disturbances within the monetary sector are the principal cause of instability and recommended that a steady money growth will best stabilize the growth of AD. They asserted that a budget deficit financed by borrowing from the banking system will lead to an increase in the price level. That is, there is no point for the government to manipulate AD to solve a recession.

Essentially, this reverts to the classical school's emphasis on micro-economic foundations.

4. New Classical School developed in the 1970s

This school of thought shares many views with the Monetarists. They believe in rational economic agents who maximise satisfaction and make rational decisions. Here, individuals act rationally to pursue their self-interest. Rational expectations mean that people make statistically the best predictions of the future with the best available information. This implies that people will eventually come to understand whatever government policy is being used, and thus it is not possible to fool most of the people all the time or most of the time.

Markets are thus highly competitive and adjust rapidly to changing conditions. The implication is to leave the economy alone!

5. New Keynesian School developed in the 1970s

This school of thought places greater emphasis on micro-economic foundations to explain macro-economic disequilibrium while incorporating rational expectations. They seek to explain the downward stickiness of real wages and the resulting persistence of unemployment.

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Section A: Structured Questions

1. Using the AD/AS model, illustrate with a diagram what is likely to happen to the general price level and national income when:

a) Government decreases taxes

b) Imports increase while exports remain unchanged

c) Consumer confidence has increased

d) Trade partners abroad experience an economic recession

e) There is a fall in interest rates

2. Using the AD/AS model, illustrate with a diagram what is likely to happen to the general price level and national income when:

a) Wages increase faster than labour productivity

b) OPEC successfully increases oil prices.

c) Labour productivity increases dramatically.

d) R&D brings new efficiency to industry

e) A shrinking labour force

f) Liberal immigration policies result in an influx of low skilled foreign labour

3. Answer the following questions using the data provided.

Extract 1: No Plan B for the UK economy?

The government should manage the economy and let the public finances look after themselves. That was the advice that Keynes gave during the Great Depression of the 1930s and, if he were alive today, it would surely be the advice he would be giving to the UK Chancellor of the Exchequer.

The years since the UK entered a financial and economic crsis in the summer of 2007 have seen the biggest fall in output since the Second World War. It is now thought that it will take until 2014 or 2015 for the conomy to get back to where it was before the recession started in the early 2008.

The UK currently has the largest-ever peacetime public sector deficit (situation where government spending exceeds tax revenue). The current government's strategy of austerity measures, cutting government expenditure and raising taxes is based on the proposition that the economy would become less dependent on consumer and government spending for its growth; instead, low interest rates, a weak pound and action to tackle the public sector deficit would encourage firms to invest and export.

Things so far have not happened like that. Consumers have been reluctant to spend, and although government capital spending cutbacks have started to bite, recession has lowered government tax revenue and raised government spending on welfare benefits. The debt crisis in the Eurozone and a

sluggish global economy have made exporting difficult, whilst many businesses have delayed investment projects until growth starts to recover. So all four elements that contribute to growth in demand are struggling.

Two options in particular are being urged on the government. One is more drastic cuts to public spending, allowing some tax cutes that would then prompt a private sector recovery. A second is what might be called the Keynesian option – a package of tax cuts and government spending increases designed to get the economy moving; the gaps between government spending and tax revenue would get worse in the short term, its supporters admit, but would then improve long term as growth would strengthen.

The government, though, rejects both of these alternatives; the current strategy is the only viable one, it argues. There is no Plan B!

(a) With reference to Extract 1,
  (i) Identify the four elements that 'contribute to growth in demand'. [2]
  (ii) Use AD/AS analysis to explain the 'Keynesian option' in order to 'get the economy moving'. [6]

(b) Comment on the use of lowered interest rates as a means of increasing the level of private investment. [6]

Section B: Case Study Questions

Question 1: Looking forward: Singapore's economic performance in 2018

Table 1: Singapore's Consumer Price Index

Year	2009	2010*	2011	2012	2013	2014	2015	2016
CPI	97.27	100	105.2	110.0	112.6	113.7	113.2	112.6

*Base year: 2010

Source: *Worldbank* Data

Table 2: Gross Domestic Product (GDP) and its Components in Singapore (% of Total), 2017

GDP (purchasing power parity) US $ billion	513.7
GDP - per capita (PPP) (US$)	90,500
Composition:	**%**
Private consumption	34.7
Government consumption	11.4
Gross fixed investment	23.5
Exports of goods and services	179.2
Imports of goods and services	-150.6
Gross National Savings	45%

Source: *CIA World Factbook*, accessed on 2 Feb 2018

Extract 1: How much additional revenue can Singapore get from raising GST and other taxes?

With social and healthcare spending expected to continue rising as the Singapore population ages, the Government has to find new sources of revenue to fund ever-growing investments including in public infrastructure.

An increase in the GST could bump up the government's tax revenue the most, compared to other sources of tax revenue. Each increase of 1 percentage point would net an additional S$1.5 billion to S$1.8 billion per year, experts estimate. Experts have said they expect the GST to be raised by 2 percentage points to 9 per cent — translating to additional tax revenue of between S$3 billion to S$3.6 billion a year. For the latest financial year, the Inland Revenue Authority of Singapore (IRAS) collected S$11.1 billion in GST revenue. The government may also be increasing individual income tax by 1 to 3 percentage points for the top earners, which could boost its coffers by up to S$100 million, according to NUS Business School Associate Professor of Accounting Simon Poh.

Prof Poh: "Given that our current personal income tax regime is still very competitive and with a generally higher acceptance of a more progressive tax structure by the general public, such a moderate increase should not dent our international competitiveness."

Source: Adapted from *Today*, 23 Jan 2018

Extract 2: Singapore 2018 GDP outlook more stable but growth likely to slow, say analysts

The Singapore economy expanded 3.1 per cent in the last three months of 2017, lifted once again by robust manufacturing growth. The latest numbers come after Prime Minister Lee Hsien Loong said in his New Year message that the economy expanded 3.5 per cent for the whole of 2017 - more than double initial forecasts.

As identified by the MTI, the slowdown in China's investment is a big risk. Nevertheless, we expect strength in the US and EU economies to offset the moderate slowdown we expect from China's domestic demand and also electronics production this year" said Michael Wan, Credit Suisse economist.

Prime Minister Lee Hsien Loong also highlighted that government's expenditure is expected to rise rapidly in the coming years. With that, there seems to be talks of higher taxation in the form of a tax

hike in the Goods & Services tax. The consumption tax hike could be seen as timely by the government as the economy is growing better and expected wage growth could be higher in 2018.

The recent lowering of US corporate income tax should also boost business investment in the US. Given the strong historical relationship between US investment spending and regional exports, this should lend support to Asian and Singapore export growth this year.

"We also expect domestic demand to improve. Private consumption will likely accelerate further in the coming months, driven by an improving labour market, the lagged impact of strong export performance and strength in the property market, notwithstanding any potential tax hikes in the pipeline" said Wan.

Source: *The Straits Times*, 2 Jan 2018

Questions:

(a) Calculate and interpret the inflation rate in Singapore for 2016. [2]

(b) With reference to Table 2, comment on the size of the multiplier for Singapore. [5]

(c) Extract 1 suggests that the government may be "increasing individual income tax by 1 to 3 percentage points". [6]

Using the concept of the circular flow of income, explain how such a change will affect the equilibrium level of national income.

(d) Using AD/AS analysis, discuss whether the Singapore economy is likely to achieve a higher rate of economic growth in 2018. [8]

Section C: Essay Questions

1. The rate of unenemployment in more than 50 of the world's countries, including several European countries, exceeds 10%. Governments face a difficult decision about whether income tax rate cuts are the most effective policy measure to reduce unemployment to more acceptable levels.

   (a) Explain how a reduction in the rate of income taxes paid by workers and firms might have consequences on an economy's aggregate demand and aggregate supply. [10]

2. A low value of the multiplier is one of several reasons why an expansionary fiscal policy might be considered an inappropriate method of controlling aggregate demand in an economy.

   (a) Explain the concept of the multiplier. [10]
   (b) Discuss why the value of the multiplier might differ between countries. [15]

3. (a) What factors influence investment? [10]

   (b) In November 1992 it was reported that the French government reduced basic interest rates in the hope of stimulating investment in a weak economy. Assess the likely effects on an economy of stimulating investment. [15]

Note: 2b can be revisited after monetary policy is covered

Optional Question

3. The following data relate to the Singapore economy in 2011.

	$ billion
Private Consumption Expenditure	129
Gross Fixed Capital Formation	77
Government Consumption Expenditure	34
Exports of Goods & Services	531
Imports of Goods & Services	444
GDP	327

   (a) Economies consist of several key sectors such as household, firms, government and the rest of the world. Explain the relative importance of these key sectors of the circular flow of income in determining the national income of Singapore. [10]

   (b) Discuss the likely effect on Singapore's national income and its components when its exchange rate appreciates. [15]