

ST ANDREW'S JUNIOR COLLEGE JC2 H2 ECONOMICS 2024

CIRCULAR FLOW OF INCOME AND AGGREGATE DEMAND & AGGREGATE SUPPLY MODELS

In your previous set of lecture notes, Standard of Living and Key Economic Indicators, we looked at how four key indicators are commonly used to measure an economy's performance.

In this set of notes, we will look at the models of the circular flow on income and the Aggregate Demand (AD) and Aggregate Supply (AS). These models help us understand how national income in a country is determined. The AD and AS are very important concepts as they will also be used to analyse economic problems, effects and policies subsequently.

Important concepts and tools and analysis

- ♥ Circular flow of income
- ♥ Aggregate demand
- ♥ Determinants of C, I, G and (X-M)
- ♥ Aggregate Supply
- ♥ Determinants of Aggregate Supply
- National Output
- ♥ General Price Level
- Multiplier Effect

Key questions to consider

- 1. How are households, firms, the government and the foreign sector related to each other in an economy?
- 2. In the circular flow of income model, why does national output equal to national expenditure?
- 3. How does national output change when there are changes in households, firms, the government or foreign sector's behaviour (they buy or produce more or less)?
- 4. What comprises the Aggregate Demand (AD) and how is AD affected by changes in the determinants of C, I, G and (X–M)?
- 5. How is Aggregate Supply (AS) affected by its determinants?
- 6. How does the interaction between AD and AS determine the equilibrium level of national output and general price level?
- 7. How do changes in the components of AD have a multiplied effect on national income?

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How are households, firms, the government and the foreign sector related to each other in an economy?

1. Circular Flow of Income

The circular flow of income is an interactive model that involves households, firms, the government and the foreign sector.

The circular flow of income illustrates the flow of money as well as goods and services between producers and consumers in an economy. It is a very useful as a theoretical model for understanding the workings of an economy. It shows how different economic agents (households, firms, government and foreign sectors) are inter-related and how a country arrives at a certain level of national output, expenditure and income.

("Flow" refers to any activity that occurs over time. For example, income is a "flow" concept that occurs per week, per month or per year. Production and consumption too are "flow" concepts.)

1.1. The Circular Flow Model (2-Sector Closed Economy)

In its simplest form, the Circular Flow Model comprises only two economic agents, firms and households. Firms and households are linked together through the product market and the resource market. The model explains how income and payment flows between firms and households:

- * Firms are producers of goods and services and also employers of factors of production.
- Households are consumers of goods and services and also suppliers of factors of production.



Figure 1: 2 Sector Circular Flow of Income (Inner Flow)



In the circular flow of income model, why does national output equal to national expenditure?

In return for the use of their resources such as labour services, land, capital and entrepreneurship ability, households would receive payments in the form of wages, rent, interests and profits respectively. Since it is a closed economy with only households, the total payments to households in this economy is thus the *national income* for this economy.

The *national output* in this economy would be the total value of the goods produced by the firms.

Households use all the income they receive to consume the goods the firms produced. This amount of income spent on consumption would then be the <u>national expenditure</u> of the economy.

Based on the explanation above, we can see that the concept of a circular flow of income involves 2 principles:

- 1. In every economic exchange, the seller receives the same amount that the buyer spends. i.e., income = expenditure.
- 2. For every real flow of goods and services (i.e., physical goods and services) from firms to households or factor services (i.e., land, labour, capital and entrepreneurship) from households to firms, there is a corresponding money (payment) flow in the opposite direction. i.e., output = income = expenditure.

Therefore, this model shows how the interaction of both product and factor markets generates a circular flow of expenditure and income. This is also known as the inner flow.

In reality however, the circular flow of income is more complex as consumers do not necessarily spend all the income they earn, and firms' income can come from outside of consumer expenditure. This is known as withdrawals (leakages) and injections.

1.2. Withdrawals (W)

Withdrawals are any part of income of households and/or firms that are not passed on within the circular flow of income. They are leakages from the circular flow of income.

1.2.1. 3 forms of withdrawals:

- 1. Savings (S)
- Savings is the part of income that households choose not to spend but to put aside for the future.
- This is normally deposited in financial institutions such as banks.
- Savings could also be a portion of profits that firms choose not to pay out as dividends¹ to shareholders or not re-invested into the firm.

¹ A **dividend** is a distribution of a portion of a company's earnings to its shareholders, which can be issued as cash payments, as shares of stock, etc.



2. Taxes (T)

- There are two main types of taxes that are paid to the government and hence not used by households to pay for more goods and services.
 - **Direct taxes** are taxes imposed on income and profits (e.g., personal income tax and corporate income tax).
 - Indirect taxes are taxes imposed on goods and services (e.g., sales tax).
- 3. Import Expenditure (M)
- Households spend part of their income on foreign goods and services.
- Firms also spend on imported raw materials and machinery
- Import expenditure is a withdrawal from the circular flow of income since this amount is paid abroad for the purchase of goods and services produced by them.

Total Withdrawals (W) = S + T + M

1.3. Injections (J)

Injections are any additions to the circular flow of income which do not come from the expenditure of households [or factor payments of domestic firms.]

1.3.1. 3 forms of injections:

- 1. Investment (I)
- Expenditure on production of goods not meant for current consumption.

Investment expenditure includes:

- Fixed capital formation
 - Expenditure on buildings, machinery and equipment.
- Additions to stocks and work in progress
 - Considered as circulating capital which includes stocks of new materials for use in future production, stocks of semi-finished goods and stocks of unsold finished goods.
- 2. Government Expenditure (G)
- Governments spend on goods and services directly (e.g., building roads, hospitals).
- 3. Export Earnings (X)
- Foreigners purchase domestic goods and services which results in export earning by domestic producers.

Total Injections (J) = I + G + X



1.4. The Circular Flow Model (Open Economy)

The figure below shows an economy which consists of *Households*, *Firms*, *Government* as well as the *Foreign* sector. The circular flow of income below includes all withdrawals from and injections into the economy.



Figure 2: 4 Sector Circular Flow of Income

- a) (1) in the diagram above shows the flow of national income (Y) from firms to households. This consists of payments (wages, rents, interest and profits) for use of factor services (labour, land, capital and entrepreneurship) that are owned by the households.
- b) This national income is then distributed by households into four flows. (2) shows the flow of consumption expenditure (C) on goods and services that goes back to the firms as a demand for their output. Thus, the inner flow of the diagram depicts a process whereby



firms produce output, which generates an equal amount of income to the household sector. When workers in the household sector earn income, this will in turn increase the demand for goods and services or output produced.

- c) However, not all national income returns directly to the domestic firms as a payment for goods and services. There are three other flows out of the household sector in addition to consumption expenditure to the firms. These are the savings (S) flow labelled as (3), the flow of tax (T) payments to the government (4) and the imports (M) flow to the foreign sector (5).
- d) If we regard the flow linking the households and the firms as the main income-generating and output-generating mechanism, the savings, tax and imports flows are withdrawals (W) from this inner flow.
- e) Moreover, not all expenditure to the domestic firms comes from the domestic consumers. Some are injected from outside the inner flow in the form of investments by firms (I), government expenditure (G) on goods and services and purchase of exports (X) by foreigners. I, G and X are called injections (J).
- f) Injections (J) refer to any income accruing to the domestic producers that do not arise from domestic households.
- g) Withdrawals (W) refer to any part of household income that is not spent on goods and services produced by the domestic firms. It is thus not returned to the circular flow. The three forms of withdrawals are savings (S), taxes (T) or import expenditure (M).
- h) It should be noted that at equilibrium level of income, the sum of injections should equal the sum of withdrawals. However, that does not mean that savings are equal to investments, taxes are equal to government expenditure, and import expenditure are equal to export earnings.



How does national output change when there are changes in households, firms, the government or foreign sector's behaviour (they buy or produce more or less)?

1.5. Equilibrium in the Circular Flow of Income and the Four Macroeconomic Objectives

An economy is said to be in equilibrium only when total injections are equal to total withdrawals,

i.e.,
$$I + G + X = S + T + M$$

1.5.1. What happens if injections are not equal to withdrawals?

This disequilibrium will initiate a process to bring the economy back to a state of equilibrium where injections are equal to withdrawals.

Consider the case when injections exceed withdrawals, for instance, due to an increase in I, G or X or a decrease in S, T or M:

- Firms will demand more factors of production (FOPs) to meet the increase in demand for goods and services.
- Thus, firms will increase their factor payments to the FOPs in exchange for their services, and as a result, more factor income continues to flow into households.
- Households would not only consume more domestic goods and services, but they will also save more, pay more taxes and buy more imports.
- ♣ Hence, withdrawals will start to rise².
- When withdrawals have risen to match the injections, i.e., till injections equal to withdrawals, equilibrium will be restored, and national income and employment would have increased.

1.5.2. What is the effect on the four macroeconomic objectives?

- Economic growth will take place. National income or output will rise by a *multiplied* amount (i.e., an amount greater than the initial increase in aggregate demand). The greater the initial excess of injections over withdrawals, the bigger will be the rise in national income.
- Unemployment will tend to fall as firms take on more workers to increase production to meet the increased demand.
- Inflation tends to occur as firms find it increasingly difficult to increase production due to capacity constraint and stiffer competition for factors of production.
- Imports will tend to rise due to higher demand since domestic inflation makes exports less competitive and imports relatively cheaper compared to domestic goods. Imports will rise while exports will fall and this will result in a worsening of the Balance of Trade position.

² Withdrawals may require multiple rounds to increase to equal the injections.



Just like the AD/AS framework (which will be covered in the next section), the circular flow of income framework is very useful as it shows how changes in the various flows can affect the four macroeconomic objectives.

Try Try

Try to answer the following question:

Explain what happens when withdrawals exceed injections? This can happen due to a decrease in I, G or X or an increase in S, T or M.

- Firms will demand fewer factors of production (FOPs) as the demand for goods and services decreases.
- Thus, firms will decrease their factor payments to the FOPs in exchange for their services, and as a result, fewer factor income flows into households.
- Households consume fewer domestic goods and services, and they will also save less, pay less taxes and buy less imports.
- Hence, withdrawals will start to fall.
- When withdrawals have fallen to match the injections, i.e. till injections equal to withdrawals, the equilibrium will be restored and national income and employment would have decreased.



How would an A-level question that requires the use of the circular flow of income look like? How should you structure your answer? Have a look at the following essay question.

Using the circular flow of income, explain the effects on national income when a country implements expansionary fiscal policy*. [10]

*[An expansionary fiscal policy is one where the government increases government spending and/or reduces taxation.]



2. The Aggregate Demand (AD) / Aggregate Supply (AS) Model

Besides the model of circular flow of income, the Aggregate Demand (AD) and the Aggregate Supply (AS) model is another approach to assess an economy's performance. It helps us understand how the general price level, national output and employment level of an economy are determined. AD and AS are important concepts as they will also be used to analyse economic problems, effects and policies subsequently.

What comprises the Aggregate Demand (AD) and how is AD affected by changes in the determinants of C, I, G and (X-M)?

2.1. Aggregate Demand (AD)

Definition: Aggregate demand (AD) refers to the total demand for all the goods and services produced for a given general price level, where the components are consumption expenditure (C), investment expenditure (I), government expenditure (G) and net exports (X-M)

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

AD reflects an *inverse* relationship between the general price level and aggregate quantity demanded for goods and services and hence, it is downward sloping.

- As such, when other factors remain constant, the higher the general price level, the lower the quantity demanded of goods and services.
- ♣ In Figure 1 below, the increase in general price level from 0P₁ to 0P₂ results in a fall in total aggregate quantity of goods and services demanded from 0Y₁ to 0Y₂.



Figure 3: Aggregate Demand Curve

- The Y-axis in the AD/AS framework is <u>General Price Level</u> and not Price.
- The X-axis in the AD/AS framework is <u>Real National Income</u> and not just National Income as it has discounted for price changes. In other words, any changes in the x-axis for e.g.,



from Y1 to Y2, would only reflect changes in real value of quantity of goods and services demanded/produced.

2.1.1. Why does the AD curve slope downwards?

The AD curve is downward sloping because:

- 1. At higher general price levels, the total aggregate quantity of goods demanded will be lower.
- 2. As the general price level becomes higher, a country's exports become less competitive. There will also be an increase in imports since they are relatively cheaper than domestic goods. Higher import spending and lower export revenue will reduce the total aggregate quantity of goods demanded.

For more details on why the AD curve is downward sloping, refer to <u>Appendix A</u>.

A change in *general price level* would cause a change in the *aggregate quantity of output demanded* in the economy. This causes a movement along the AD curve.

2.1.2. Determinants of Aggregate Demand

<u>AD shifts</u> due to <u>changes in factors other than the change in general price level</u> that change the level of consumption, investment, government expenditure, exports and/or imports.

<u>Components of AD</u>

- a) Consumption (C)
- b) Investment (I)
- c) Government expenditure (G)
- d) Net Exports (X M)

a) Consumption

The demand for non-durable consumer goods and services are relatively steady as their purchase cannot be postponed for long. However, the expenditure on durable consumer goods is less steady and are therefore more likely to cause changes in its expenditure than the expenditure on non-durable goods and services. Household consumption tends to be the largest component of aggregate demand and hence changes in this consumption by households tends to have a greater impact on national income.

The level of consumption is determined by income and non-income determinants. Induced consumption refers to consumption expenditure that is affected by the level of income. Autonomous consumption refers to consumption expenditure that is affected by factors other than income.



Note: To explain the **multiplier effect**, it is important to note that there must first be an <u>autonomous change in expenditure</u> (see Section 3.2).



ai) Marginal Propensity to Consume (MPC)

Consumption is likely to change when real income changes. This type of change is known as a change in induced consumption. The marginal propensity to consume (MPC) is the proportion of each additional dollar of income that is spent. In other words, it is the amount by which consumption changes when income increases by one dollar ($\Delta C/\Delta Y$).

Different income groups will have different marginal propensities to consume (MPC). Generally lower income groups spend a larger proportion of their rise in income on consumption (higher MPC) than the higher income groups. This is because:

- Lower income households have more unmet consumption needs and spend most/all of their rise in income on consumption of necessities.
- Higher income households tend to save a relatively larger proportion of additional income they receive and spend a relatively smaller proportion of that additional income on consumption of necessities.

aii) Factors Affecting Consumption

Factors other than the general price level/income could also affect level of consumption and these factors would cause a shift in AD curve. Examples of these factors that could affect consumption are as follows:

- Availability of Credit and Level of Interest Rates
 - Many consumer goods, especially 'big ticket items' such as cars and houses, are purchased with borrowed funds, either bank loans or hire purchase credit³. If banks are able to grant more loans to the consumers, the consumers would have greater ability to spend more on big-ticketed items, causing the level of autonomous consumption to increase.
 - Another factor that would affect autonomous consumption is the level of interest rates. A fall in interest rate would mean that it is relatively cheaper to borrow from banks. The lower cost of borrowing would encourage autonomous consumption. In addition, savings become less attractive as the fall in interest rate would also mean that reward of savings is now lower i.e., opportunity cost of consumption is now lower.
- Consumers' Expectations about Employment, Prices and Income (i.e., Consumer Confidence)
 - Autonomous consumption is influenced by expectations regarding future changes in income, employment and prices.

³ Many economists have blamed the excessive levels of consumption and high levels of debt among American consumers on the years of low interest rates and 'easy credit' promoted by the Federal Reserve (central bank of the US) prior to the Global Financial Crisis 2008-09.



- If consumers expect lower levels of employment and income, they might save more now for rainy days ahead (precautionary motive for saving), resulting in a fall in consumption (and a rise in savings). This is likely the case in times of recession (e.g. 2008-09 Global Financial Crises).
 - When consumers save more, it will lead to a contraction of the circular flow and hence national income. This leads to households becoming poorer and would end up saving less. Keynes termed this problem as the 'Paradox of Thrift'.
- If prices are expected to rise, consumer spending will rise in the current period to avoid spending more in future (i.e., purchase more goods and services at current prices before prices increase), resulting in an increase in current autonomous consumption. However, for people who save for some definite target, such as the deposit for a new house, or for retirement, expectations of rising prices could cause them to save more and spend less, leading to lower consumption.

Government Policies

- Government policies like personal income tax will affect disposable income and thereby consumption. If government lowers direct tax, households' disposable income would increase. The higher the level of disposable income, the higher is the purchasing power and the higher the level of consumption.
- A redistribution of income from the higher to the lower income groups (at the same level of national income) will raise disposable income and increase the total consumption out of a given income of a nation. As lower income groups have a higher marginal propensity to consume than higher income groups, a redistribution of income from higher income groups to lower income groups will lead to a rise in consumption expenditure. Marginal propensity to consume is the proportion of each additional dollar of income that households spend on domestic goods and services. E.g., Government can raise the taxes of the higher income group and increase transfer payments to the under-privilege segments of the society in the form of unemployment and disability benefits.
- ✤ Tastes and Attitudes
 - If households have a 'buy now, pay later' mentality, they are likely to have a higher level of autonomous consumption than if they are anxious to avoid getting into debt.
 - Similarly, if households have a desire for more consumer goods, they will spend more than if they were more frugal.
 - Households in western countries like the USA, tend to prefer spending while most Asians tend to save more. Thus, at the same level of national income, consumption would tend to be higher in western countries than Asian countries.
- Households' Net Wealth
 - Households' net wealth refers to the value of all assets (e.g., money in the bank, shares, houses) owned by households minus any liabilities, or debts owed (e.g., mortgage, car loans).



- Other things being equal, the more wealth that households have accumulated, the more they will spend and the less they will save out of any level of current income.
 - E.g., prior to the Global Financial Crisis in 2008-09, there was a property boom where price of houses kept increasing in many parts of the world, like Spain and the USA. This caused many homeowners to see their wealth increase rapidly and hence willing to splurge or consume more. Many of them turned to putting down a mortgage for additional properties, which led to a property boom. This resulted in an increase in autonomous consumption.
 - Conversely, during a burst of the property market bubble (when prices plummet after a dramatic peak), owners of these assets will generally feel poorer and hence cut back on their consumption levels since their wealth has been reduced. This resulted in a fall in autonomous consumption.
- Demographic changes
 - Changes in the demographics of a country would affect the level of consumption.
 - With an ageing population, the number of people who are leaving the labour force exceed the number of people entering the labour force. Those who are leaving the labour force lose their source of income and thus will consume less and save more, while those entering the labour force will gain a source of income if they are employed and thus increase their consumption. Since the number of people leaving the labour force exceeds the number of people entering the labour force, the value of consumption expenditure lost exceeds the value consumption gained. This leads to a fall in consumption expenditure in the economy.
 - If an economy experiences a growing middle class, this means that the income of households is rising. As such they will increase their consumption of goods and services, leading to an increase in consumption expenditure.
- Technological changes
 - o Advancements in technology may facilitate an increase in consumption expenditure.
 - The rise of e-commerce platforms such as Shopee, Amazon and Taobao makes it easier for households to consume goods and services without leaving their homes.
 - Firms make use of the data collected from consumer behaviour on the internet to push advertisements of goods and services to the consumers which may in turn result in further increase in consumption.

Note: There is a difference between wealth and income. Wealth is a 'stock' concept while income is a 'flow' concept; we 'own' wealth but we 'earn' an income.

e.g., In times of inflation when general price levels are increasing, employees on fixed incomes (e.g., pensioners) would see their real incomes fall (i.e., the same amount of monthly wages can purchase less goods and services as prices increase). However, they might see their wealth increase as the value of their properties and other assets might be increasing.



b) Investment

Definition: Investment refers to the acquisition of new fixed capital assets (including housing, plants and machinery) and accumulation of inventories (raw materials, semi-finished goods and finished goods held by the producer).

- Economists usually term them as 'fixed capital formation' and 'changes in physical stocks/inventory stocks'.
- Investment goods are meant to build up productive capacity, raise productivity and hence contribute to economic growth.

Now that we know how Economists define investments, we should consider why firms would want to undertake investments? Some of the possible reasons are as follows:

- To take advantage of higher expected profits from expanding output.
- To generate a rise in productive capacity to meet increased demand.
- To improve efficiency via technological progress.
- ***** To exploit economies of scale.
- As part of a long run process of capital/labour substitution; perhaps in response to changes in the relative prices of the factors of production. Higher wages costs relative to capital costs could encourage this strategy.
- As a barrier to entry some investment projects give firms significant cost advantages. This
 may deter potential competitors from entering a market.

bi) Types of Investment

- Fixed Investment by Firms
 - Fixed capital or investment in plant and equipment:
 - Plant and equipment are considered fixed capital for the firm.
 - Besides inventories, firms build plants or factories and buy equipment to run their businesses.
 - Fixed capital can be used repeatedly to produce goods and services, while inventories cannot.
- Investment in Inventories or Stocks by Firms
 - Inventories refer to stocks of unsold finished goods and semi-finished goods:
 - E.g., Pharmaceutical firms need to stock up on chemicals. A bubble-tea shop needs to stock up on cups, syrups and toppings. Until they are sold off to consumers, such stocks of unsold goods are technically inventories or business capital of the firm.
- Residential Investment
 - Construction of <u>new homes</u> by consumers is considered an investment item even though these are not used by firms for production.



- \circ In theory, new homes cannot be included under consumption expenditure.
- Residential housing is an important part of the nation's capital stock. Just as an oil-drilling rig will continue to provide oil-drilling services for many years, a home will likewise be able to continue to provide housing services into the future.
- Foreign Direct Investment (FDI)
 - FDIs refer to a foreign firm's fixed capital.
 - Foreign firms can build plants or factories in another economy.
 - E.g., Dyson moved its global headquarters to Singapore
 - E.g., French aerospace, defence and transportation solutions firm Thales launched an Innovation Hub in Singapore to come up with products in the fields of maritime security, smart city solutions, and air traffic management.
- ♣ Gross Investment, Replacement Investment and Net Investment
 - Gross investment refers to the total investment made by the firm. (Note: The I component in AD refers to Gross Investment)
 - o Replacement investment refers to investment on replacement of depreciated capital.
 - E.g., replacement of machines that have suffered from wear and tear.
 - Net investment refers to new investment which adds to the capital stock of a country to increase productive capacity.
 - E.g., buying more machines or replacing existing machines with even more advanced ones to increase productive capacity.

Net Investment = Gross Investment – Replacement Investment (i.e., Depreciation)

bii) Factors Affecting Investment

Investment is determined by interest rates and non-interest rate factors:

- ♣ Interest Rates
 - Changes in interest rates will cause a movement along the Marginal Efficiency of Investment (MEI). MEI is a concept that can be used to measure the expected rate of returns from an additional unit of investment on capital goods.
 - According to the MEI schedule, there is an inverse relationship between interest rate and the level of investment undertaken by firms. The lower the rate of interest, the cheaper it is for firms to finance investment, and the more profitable the investment will be. Hence, the level of investment will rise.

Definition of interest rate: Interest rate refers to the cost of borrowed funds used for investment.

It represents the opportunity costs of using the funds for investment.





According to MEI curve, a firm will only invest if the expected rate of returns on investment (MEI) is greater than the current rate of interest.

 E.g., A firm would like to upgrade its current machines to yield 10% returns. However, the firm would need to borrow from the banks at an interest rate of 2%. This investment is considered profitable because the MEI (10%) is greater than the interest rate of 2%. The expected net profitability or returns is 8%. This return is in excess of the cost of borrowing. Thus, the firm will undertake the investment.

There is an inverse relationship between the interest rate and the level of investment expenditure (I).

- $\circ~$ With reference to Figure 4, when interest rate falls from R_1 to $R_2,$ investment increases from I_1 to $I_2.$
- This is because projects that were previously unprofitable are now more profitable as the costs of interest payments falls. As such, firms will undertake more projects, resulting in an increase in investment.
- Conversely, an increase in interest rate would cause level of investment expenditure to decrease.

Hence a change in interest rate would lead to a movement along the same MEI curve but would cause a shift in AD via a change in investment.

In Singapore, it is believed that firms in the manufacturing sector may be relatively less affected by changes in local interest rates because the sector is dominated by multinational corporations which rely on their own sources of funds, e.g., from head offices of their home countries (therefore more responsive to prevailing interest rates in their home countries). In contrast, firms in the building and construction sector may be more severely affected as they are local companies and are more reliant on local bank borrowing.



Note: FDIs are not affected by domestic interest rates of the country it is investing in, but by their own country's interest rates. For example, interest rates in the UK—would affect Dyson's decision to invest in Singapore.



* Non- Interest Rate Determinants

Non-interest rate determinants of investment cause a shift of the MEI schedule.



Investment per period

Figure 5: Increase in investments resulting in a rightward shift in MEI

The non-interest factors affecting demand for investment are as follows:

• Business Expectations or Sentiments

Since MEI is based on *expected returns* from an additional unit of investment, business expectations and sentiments naturally play a key role in determining its value. This is probably the most important factor because the profitability of investment depends on being able to sell the output. Business expectations may in turn depend on:

i) Current Demand and Expected Future Demand

- If current demand for the goods produced by the firm is good and has always been good for some time, future prospects probably look bright and investment increases (MEI would shift to the right), ceteris paribus.
- On the other hand, when current demand or sales are falling, businessmen would expect that there would be bad times ahead and they would invest less (MEI would shift to the left). For example, during the 2008-09 Global Financial Crisis or the global Covid-19 pandemic.

ii) Political Situation

- With increased political stability, ceteris paribus, the expected return of investment would increase, and this would in turn encourage investment.
- On the other hand, if there is worsening political instability, there will be increased anxiety and pessimism. The expected return on investment would then be reduced and this would in turn discourage investment. For example, political instability due to massive protests in Hong Kong in 2019 caused business sentiments to deteriorate and MEI to shift to the left.
- The position of the MEI curve is determined by businessmen's expectations of an uncertain future.
- Keynes believed that the 'animal spirits' (or business sentiments) of businessmen are the most important determinant of the level of aggregate demand in an economy.
- He believed business sentiments to be extremely volatile and hence can cause erratic shifts of the MEI curve.



• Level of Technology

When technology advances, ceteris paribus, more output can be derived from a given amount of input (e.g., more sophisticated machines can allow a single worker to produce a greater amount of output in the same amount of time). The expected return from investments would most probably increase. As a result, MEI shifts to the right (i.e. a higher level of investment at every interest rate level).

- Government Policies
- i) If the government decides to increase corporate tax, the expected rate of after-tax return on investment would fall.
 - MEI would then shift to the left as investment is discouraged with the fall in its expected return.
- ii) Governments could provide grants to new investment projects which will reduce the cost of capital.
 - o This will encourage investment and hence MEI will shift to the right, ceteris paribus.
 - When cost of capital is being subsidised, it makes capital relatively cheaper than labour.
 - This encourages firms to substitute more capital for labour and hence increases their investment.

c) Government Expenditure

Definition: Government Expenditure constitutes government spending on final goods and services.

These include spending on public goods like defence for the nation, for economic growth (e.g. spending on education), for social needs of the population (e.g. building of community centres and homes for the aged).

Government expenditure includes the following:

- Recurrent expenditures such as the salaries for civil servants, operating costs of social services, such as schools and hospitals.
- Public investment or social capital/infrastructure such as the expenses incurred when expanding expressways, building new MRT lines, upgrading public schools.

ci) Factors Affecting Government Expenditure

- Government Policy
 - $\circ\,$ Level of government expenditure is often determined by political, social and economic reasons.
 - Government expenditure is likely to rise if the government decides to pursue an expansionary fiscal policy to stimulate economic activities in the economy.
 - Government expenditure is likely to fall if government instead decides to pursue a contractionary fiscal policy to reduce demand-pull inflation in the economy.



Governments can change their spending level regardless of the national income. Hence, government spending is regarded to be independent of national income (i.e., autonomous).

d) Net Exports

Definition: Net exports (X – M) are expenditures by the foreign sector on domestically produced goods and services minus expenditures by the domestic sector on foreign-produced goods and services.

Exports are sold abroad to foreign countries and therefore independent of domestic income levels. They are affected by trade policy, quality of goods and services, tastes and preferences, etc.

While imports can also be affected by factors such as trade policy, quality of goods and services, tastes and preferences, etc, an increase in domestic income will increase demand for imports and therefore import expenditure.

ai) Factors affecting Net Exports

Changes in Real National Income

Demand for exports and imports and therefore net exports may be affected by changes in real national incomes in the domestic and trading partner countries.

- If foreign national income rises, they may buy more imports (demand for imports increase), causing export revenue of the domestic country to rise. This will result in an increase in (X–M), ceteris paribus.
- If domestic income rises, demand for imports increase, the domestic country's expenditure on imports is likely to rise. This will result in a fall in (X–M), ceteris paribus.

Important tip to avoid commonly made mistakes: It is insufficient to state only 'export' or 'import'. Be specific in stating which aspects of import and export you are referring to. For example, export revenue / import expenditure; export price in foreign currency/import price in domestic currency; export/import volume; export/import competitiveness; demand for exports/imports.

- * Changes in Relative Prices
 - Changes in prices of exports and imports could be due to many reasons. Two of these reasons are:
 - Changes in exchange rate appreciation and depreciation of a country's currency can affect net exports. As the domestic currency depreciates, foreign goods become more expensive in terms of domestic currency whereas exported goods become cheaper in foreign currencies. The domestic country will cut back on imported goods while the demand for its exported goods increases. The overall effect on (X-M) and AD will depend on the



summation of the price elasticity of demand for exports and imports. Assuming Marshall-Lerner condition⁴ holds i.e. $|PED_x+PED_M|>1$, net exports will increase.

- Changes in relative inflation rates between countries can affect net exports. Assuming that a country's domestic inflation rate falls relative to world inflation rates:
 - This causes the country's domestically produced goods to be relatively cheaper compared to foreign goods from the rest of the world.
 - As a result, the country's residents will reduce demand for imports from the rest of the world (as they prefer to buy the relatively cheaper domestic goods) while demand for the country's exports by the rest of the world will increase.
 - The country's total expenditure on imports will fall and total revenue from exports will increase. This leads to an increase in net exports.

✤ Changes in Quality

- If quality of domestic goods falls, ceteris paribus, the demand for domestic goods in foreign markets will fall and the demand for foreign goods in the domestic market will rise.
- \circ As a result, import expenditure will rise and export revenue will fall, resulting in a fall in the (X M) component of AD.

2.2. Aggregate Supply (AS)

Definition: Aggregate Supply (AS) is the total output of goods and services that is produced in an economy for a given general price level.

It is represented by the AS curve, which describes the relationship between general price level and the quantity of output that firms are willing to produce.

In constructing the AS curve, the following assumptions are made:

- Fixed input prices
- Fixed technology & resources for the country

⁴ The Marshall–Lerner condition (named after economists Alfred Marshall and Abba P. Lerner) is the condition that an exchange rate devaluation or depreciation will only cause a balance of trade improvement if the sum of the price elasticities of demand for exports and imports is greater than 1.



2.2.1. Why is the AS curve shaped like a 'J'?

In general, the AS curve represents a <u>positive</u> relationship between general price level and aggregate quantity of goods and services firms are willing to produce.



Figure 6: Different Ranges along the AS Curve

We can think of the AS curve as one that comprises of <u>three segments</u>:

a) Horizontal (Keynesian) Range:

- * This corresponds to a point within the PPC.
- Factories are operating at less than capacity and many individuals are unemployed (i.e. there are plenty of idle factors of production).
- It is possible to increase output level without any pressure on prices because there are enough resources for all producers and hence there is little need for producers to compete and bid up prices of resources.

b) Upward Sloping (Intermediate) Range:

- This corresponds to a point within and close to the PPC.
- Most available factors of production have been utilised; only some excess/spare capacity in certain parts of the economy.
 - Only prices of certain goods/services will increase.
 - o Beginning of supply constraints, reaching bottle-neck capacity.
- Firms have to start using less efficient resources, which results in an increase in cost of
 production per unit of output.
 - Hence firms will only be induced to increase output if they can be compensated with higher prices to cope with higher unit costs of production.



c) Vertical (Classical) Range:

- * This corresponds with a point on the PPC.
- ♣ Absolutely no excess/spare capacity
 - All factors of production are already fully utilised; there are no more idle resources.
- \clubsuit Thus, the economy is at full employment, $Y_{\rm F}$
- Impossible to increase production of goods and services.
 - Any further increase in AD will only lead to an increase in general price level i.e. demand-pull inflation.

How is Aggregate Supply (AS) affected by its determinants?

2.2.2. Determinants of Aggregate Supply

Different factors will affect AS differently. There is a need to distinguish between:

- Short-run changes in *cost of production* (with no change in productive capacity)
 - \circ $\;$ Shifts the Keynesian and Intermediate range of the AS curve.
- ✤ Long-run changes to the <u>productive capacity</u>
 - \circ $\;$ Shifts the Classical and Intermediate range of the AS curve.
 - o These will also cause an outward/inward shift of the PPC.

The short run is defined as the period of time in which the prices of factors of production (and hence the costs of production) are fixed. For example, in the short run, the building of factories would not be completed to increase productive capacity. However, in the short run you can increase the utilisation of existing factors of production, e.g., workers doing overtime.

Hence, the short run aggregate supply curve (SRAS) slopes upwards. This is because the **SRAS** curve is **drawn for a given cost of production**, and thus any rise in the general price level increases profit margins encouraging an increase in output. Any **change in costs of production** will **shift the SRAS** curve.

In the long run, the prices of factors of production can change. Assuming that the prices can adjust to bring about equilibrium in the markets for factors of production; in the long run, all resources are fully employed, and the economy will operate at full capacity regardless of the general price level of the economy. Hence, the Long Run Aggregate Supply curve (LRAS) can be drawn as vertical.

The LRAS is determined by the productive capacity of the economy which is in turn determined by its quantity and quality of resources (e.g. size of the workforce, size of capital stock, labour productivity). Any change in productive capacity of an economy would shift the LRAS.

a) Factors shift the SRAS (i.e., factors that cause a change in Cost of Production)

ai) Price of Factor Inputs

Cost of production can change due to changes in price of oil (adverse shocks), labour (wages), capital, rental etc.



- For instance, an increase in the price of oil will have an impact on SRAS since it affects many firms' costs of production given that it is used for transportation, to generate electricity and as raw material for many products.
- Hence an increase in the costs of production leads to a fall in SRAS and this is represented by an upward / leftward shift (fall) of the AS curve.
 - This is because at each general price level, firms are only willing and able to sell a lower quantity of real national output.

aii) Government Policies: Subsidies/Grants

 Lowering of GST or provision of subsidies and grants to firms will lower cost of production and will therefore increase AS shifting the AS curve to the right / downward.

aiii) Expected Rate of Inflation

- A change in the expected rate of inflation not only affects AD, but also AS in the short run.
 - If producers expect an increase in prices, they will be less motivated to sell their products at lower prices in the current period. After all, goods that they do not sell today can be stocked up as inventories and made available for sale in the future at even higher prices. This will reduce AS and cause AS curve to shift to the left/ upward.
 - If the expected rate of inflation is higher, trade union leaders may also ask for more wage increase. This is so that employees can cope with the price increases. Higher wages increase cost of production, which causes AS curve to shift to the left / upward.

b) Factors shift the LRAS (i.e., factors that cause a change in Productive Capacity

- A Quantity of Resources Capital, Entrepreneurship, Land, Labour
 - A greater quantity of resources at the disposal of the economy allows it to attain a greater maximum full employment level of national income/output, thus shifting AS curve to the right.
- Labour
 - For instance, a more liberal policy of immigration—by encouraging more foreigners to take up citizenship and/or issuing more work permits to foreigners— would a larger quantity of labour, which can produce a greater amount of output, compared to the original situation, ceteris paribus.
 - This may explain the rationale for Singapore's aim of increasing its population in light of an aging and shrinking population. An ageing and shrinking population would cause a long-term contraction of productive capacity.
- 🌲 Capital
 - A greater volume of investments undertaken by businessmen boosts the AD in the short-run.
 - This also leads to an increase in AS in the long run as these investments add on to the quantity of capital (also known as capital stock) if there is net investment in the economy.

- The economy now has a greater capacity to produce more goods and services and hence to attain a greater maximum full employment level of national income/output, shifting AS curve to the right.
- This also explains Singapore's pro-active policy of attracting Foreign Direct Investments (FDI) from multi-national companies, often re-inventing itself as an investment haven.
- ♣ Land and Natural Resources
 - \circ ~ Land reclamation from the sea and desert can add more land for economic activities.
 - For example, land is currently being reclaimed for further expansion of Changi Airport
- Discovery of new natural resources would expand productive capacity of the economy.
 - E.g., Improvements in technology allowed mass commercial fracking which allowed countries, such as USA, to tap into their shale gas reserves to generate energy since the late 1960s.
 - E.g., Constant improvements in technology have allowed countries to access oil reserves in deep seas that were once impossible or too expensive to access.
 - E.g., Singapore opened its first Liquefied National Gas (LNG) Terminal in 2013 that allows it to purchase LNG shipped via maritime bunkers from all over the world so that it can expand its energy sources beyond crude oil and LNG that have been piped from Indonesia and Malaysia.
- ♣ State of Technology

The state of technology, which drives the efficiency of the production processes of firms, has a significant impact on the maximum output attainable. Technology can improve the QUALITY of FOP.

- Research and Development (R&D) initiatives to improve the state of technology will improve the quality of capital which thus increases the productivity of the capital.
- This will increase the maximum amount of goods and services that the economy can produce, as reflected by a rightward shift of the LRAS curve.
- Advancements in technology can also lower the cost of production faced by firms in the economy, resulting in an increase in SRAS.

Enterprise Singapore uses the Enterprise Development Grant (EDG) to help local companies adopt technology and innovative processes, and grow their overseas presence:

https://www.enterprisesg.gov.sg/financial-assistance/grants/for-local-companies/enterprise-development-grant/overview

Productivity Level of Workers

Productivity refers to the level of output that can be produced with a given level of input, ceteris paribus. When the QUALITY of FOP increases, productivity increases. For instance, labour productivity is typically measured by dividing total output over total labour hours.



Higher productivity levels of workers increase the output produced for a given level of inputs, ceteris paribus.

- By investing in human capital via education and training, this will increase the skill of labour and thus quality of workers.
- This will increase the maximum amount of goods and services that the economy can produce, as reflected by a rightward shift of the LRAS curve.
- Technology can also be used to augment their productivity.
 - E.g., Many restaurants have started to use iPads for patrons to submit their orders or for their staff to take orders. This allows less staff to help a greater number of patrons in a given amount of time. Such improvements in efficiency raise the level of output for a given level of input and hence raise the productivity level of workers.

2.3. Usefulness of the AD/AS Model

The AD-AS framework captures, in a snapshot, what happens to three of the internal key economic indicators: inflation rate (changes in GPL), unemployment rate (changes in employment) and economic growth (changes in national output), when there is a change in AD and/or AS in the economy.

- E.g. A fall in AD will result in a fall in national income (which can be inferred from the X-axis), in turn an increase unemployment and reduce GPL; whereby a rise in AD will result in higher levels of real national income, in turn higher employment because firms must hire more labour to produce more, and higher GPL.
- The AD/AS model will also help us to explain the mechanism of maroeconomic stabilisation policies which will be covered later on:
 - Demand-management policies to adjust AD.
 - Supply-side policies to adjust AS.

How would questions that require you to make use of the AD-AS model look like? Look at the following question for a possible example. This corresponds to **CSQ 1** (Singapore economy and the pandemic (Adapted from 2022 HCI Prelims)) of your Circular Flow and AD/AS Tutorial package.

Explain the likely impact on an economy's aggregate demand and aggregate supply in 2020 based on the information found in Extract 6.



How does the interaction between AD and AS determine the equilibrium level of national output and general price level?

3. The Equilibrium Level of National Output & General Price Level

The equilibrium level of real national income in the economy occurs when AD is equal to AS at price level 0Pe and output level $0Y_e$.



Figure 7: Equilibrium level of Real National Income and General Price Level

- If the general price level and real national output deviate from this equilibrium, pressures on firms and consumers will move the economy back toward point *e*.
 - For example, if the general price level was initially at 0P₁, excess demand for goods and services would run down inventories. Producers would respond by hiring additional workers, resulting in greater employment and output. However, this puts an upward pressure on prices as producers compete among themselves to utilise existing resources. As such, firms will only be willing to increase quantity supplied if they receive a higher price.
- $\label{eq:eq:energy} \textbf{Hence, the general price level will tend towards $0P_e$ as real national output tends towards $0Y_e$.}$
- Thereafter, there is no tendency for real national income and its corresponding general price level to change, unless the equilibrium is disturbed.



What would happen if general price level were at 0P2?

3.1. Effects of changes in AS

3.1.1. Changes in SRAS

With reference to Figure 8, a fall in SRAS leads to an upward shift of the Keynesian and intermediate sections of the AS curve with no change in the productive capacity (potential growth capacity) of Y_f . This is likely to be due to a rise in the costs of production such as the spike in the price of oil. This results in a fall in real national output from $0Y_0$ to $0Y_1$ while general price level increases from $0P_0$ to $0P_1$.

General Price Level



Figure 8: Fall in SRAS



Illustrate a rise in SRAS and identify the factors that could cause SRAS to increase.

3.1.2. Changes in LRAS

From Figure 9, an increase in LRAS from AS1 to AS2 reflects a rise in productive capacity from Y_f to Y_f ". This is due to the determinants of AS that lead to a rise in the economy's potential output level. This type of an increase is generally referred to as an increase in long run AS (LRAS). For example, any increase in the quantity and/or quality of resources in the economy, holding all other factors constant, will result in an increase in LRAS. When there is an increase in LRAS, both actual and potential output increases from Y_0 to Y_1 and Y_f to Y_f " respectively with a fall in general price level from $0P_0$ to $0P_1$.





How do changes in the components of AD have a multiplied effect on national income?

3.2. Effects of changes in AD

A change in AD could be due to a change in any of its components. It can be due to a change in the level of consumption, investment, government expenditure, net exports.

When there are autonomous changes in AD, this will lead to a multiplied increase in real national income due to the <u>multiplier effect</u>. Below we will explain how the multiplier process takes place.

3.2.1. The Multiplier Effect

- * Numerical Explanation of the Multiplier Process
 - The explanations below consider how the multiplier effect leads to an increase in national income. These numerical examples can be useful if the focus of the question is on the multiplier process.

Step	What we're doing	Exemplar				
1	Defining multiplier process.	The multiplier process is the process by which national income changes by k times the change in autonomous spending. k is the size of the multiplier. The multiplier process is initiated by an increase of autonomous spending (identify whether it is autonomous C, I, G or X) in the circular flow of income by firms.				
2	Stating increase in autonomous spending.	Assume an initial increase in Government Spending (G) of \$100m, and a marginal propensity to consume (mpc) of 0.5. The mpc is the proportion of change in income spent on consumption of domestic goods and services.				
3	Illustrating multiplier process.	Round 1 2 3 Total change	ΔY +\$100m +\$50m +\$25m +\$25m +\$200m	ΔC +\$50m +\$25m +\$12.5m +\$100m	ΔW +\$50m +\$25m +\$12.5m +\$100m	
4	Explain first round of the multiplier process. (Useful to follow the arrows of the	With reference to the table above, in Round 1, when the government injects \$100m into the economy by building roads, the \$100m spent will be paid to owners of factors of production (land, labour, capital, entrepreneurship). This leads to an initial increase in national income of \$100m (Δ Y).				



	circular flow of income.)	Households that receive the \$100m will spend a portion of the increase in income on consumption of domestic goods and services (e.g. food and clothes). Since the mpc=0.5, the increase in induced consumption is \$50m (Δ C). The remaning \$50m is spent on withdrawals (savings, paying taxes, and purchasing imports)(Δ W).
5	Explain second round of the multiplier process.	In Round 2, the additional \$50m in induced consumption will again be paid to firms, who will pay owners of factors of production, leading to a second increase in national income of \$50m. Of this \$50m, \$25m will be spent on consumption as mpc=0.5, and \$25m will be spent on withdrawals.
6	Explain equilibrium.	As the above process continues, the increase in income becomes smaller and smaller. The multiplier process ends when the total increase in withdrawals is equal to the initial increase in injections (G).
7	Summarise total increase in Y.	Total increase in national income will be k times the initial increase in autonomous spending, where $k=1/(1 - mpc)$. Since $mpc=0.5$, $k=2$. The rise in national income is 2 times the initial rise in autonomous spending.

Diagrammatic Illustration of the Multiplier Process

• Initially the economy is at equilibrium where national income is at Y0.



 \circ Suppose the government decides to undertake an increase in government expenditure by \$100 million. Ceteris paribus, this would lead to an increase in aggregate demand (AD) from AD₀ to AD_{0a} due to the increase in government expenditure (G) as shown in Figure 1 above.



- \circ To meet this rise in AD, firms affected by this increase in G will draw down from their inventories causing an unplanned fall in the level of inventories. To meet the planned level of inventories, firms will have to increase their level of output and thus hire more factors of production. In return for the output produced by the factors of production, firms will pay out income to the factors of production. This causes real national income to increase by \$100 million from Y₀ to Y_{0a}.
- Households that receive the \$100 million will spend a portion of the increase in income on consumption of domestic goods and services (e.g., food and clothes). Assuming the MPC=0.5, the increase in induced consumption is \$50 million (Δ C). The remaining \$50 million will be spent on withdrawals (savings, paying taxes, and purchasing imports) (Δ W).
- The increase in induced consumption (\$50 million) causes AD_{0a} to increase to AD_{0b} . In response to this increase in AD, production and thus income increases by \$50 million (Y_{0a} increases to Y_{0b}). This second round of increase in income induces further consumption by \$25 million (\$50mil multiplied by MPC=0.5) and subsequently increasing AD (AD_{0b} to AD_{0c}) and income (Y_{0b} to Y_{0c}) again.
- This process whereby expenditure generates income creates cycles of spending and re-spending is known as the multiplier process. However, this multiplier process does not carry on indefinitely due to the presence of withdrawals which causes the additional increase in spending and income to be a fraction of the previous round of spending. Diagrammatically, this means that the rightward shifts in AD curve becomes 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.
- \circ As such, the initial increase in G would cause AD to increase from AD₀ to AD₁ and hence real national income would increase from Y₀ to Y₁.



Step	What we're doing	Exemplar				
1	Defining multiplier process.	The multiplier process is the process by which national income changes by k times the change in autonomous spending. k is the size of the multiplier. The multiplier process is initiated by an decrease of autonomous spending (identify whether it is autonomous C, I, G or X) in the circular flow of income by firms.				
2	Stating increase in autonomous spending.	Assume an initial decrease in Exports (X) of \$100m, and a marginal propensity to consume (mpc) of 0.5. The mpc is the proportion of the change in income spent on consumption of domestic goods and services.				
3	Illustrating multiplier process.	Round 1 2 3	ΔY -\$100m -\$50m -\$25m	ΔC -\$50m -\$25m -\$12.5m	ΔW -\$50m -\$25m -\$12.5m	
		 Total change	 -\$200m	···· -\$100m	 _\$100m	
4	Explain first round of the multiplier process. (Useful to follow the arrows of the circular flow of income.)	With reference to the table above, in Round 1, when other countries consume \$100m less exports, the income paid to owners of factors of production (land, labour, capital, entrepreneurship) will be reduced by \$100m. This leads to an initial decrease in national income of \$100m (Δ Y). Households that receive \$100m less income will reduce consumption of domestic goods and services (e.g. food and clothes). Since the mpc=0.5, the decrease in induced consumption is \$50m (Δ C). The remaning decrease in \$50m is achieved through a fall in withdrawals (savings, paying taxes, and purchasing imports)(Δ W).				
5	Explain second round of the multiplier process.	In Round 2, the reduction of \$50m in induced consumption paid to firms will lead to firms paying owners of factors of production \$50m less. This leads to a second decrease in national income of \$50m. Of this \$50m, \$25m less will be spent on consumption as mpc=0.5, and \$25m less will be spent on withdrawals.				
6	Explain equilibrium.	As the above process continues, the decrease in income becomes smaller and smaller. The multiplier process ends when the total decrease in withdrawals is equal to the initial decrease in injections (X).				
7	Summarise total decrease in Y.	Total decrease in national income will be k times the initial decrease in autonomous spending, where $k=1/(1 - mpc)$. Since $mpc=0.5$, $k=2$. The fall in national income is 2 times the initial fall in autonomous spending.				

Situation: A decrease in autonomous spending (I, G, X or autonomous C)

* Simplified Explanation of the Multiplier Process (when explaining changes in AD)



Whenever you are explaining autonomous changes in AD leading to economic growth, an analysis of the multiplier process is required. You can explain using the diagram and accompaning explanation above, or using a brief explanation such as the versions below.

Situation: Rise in AD

The initial increase in AD (due to the increase in C/I/G/(X-M)) will lead to a rise in output and NY. The rise in output represents a rise in factor incomes as more factors of production are employed. This will cause households to increase their consumption. This subsequent rise in induced C will lead to a further rise in AD and hence NY, which leads to further rounds of increases in induced C. Therefore, there is a more than proportionate rise in NY via the multiplier effect. This process stops when the initial increase in AD (injections) equals the total increase in savings, taxes and spending on imports (withdrawals).

Situation: Fall in AD

The initial fall in AD (due to the decrease in C/I/G/(X-M)) will lead to a fall in output and NY. The fall in output represents a fall in factor incomes as less factors of production are employed. This will cause households to decrease their consumption. This subsequent fall in induced C will lead to further decreases in AD and hence NY, which leads to further rounds of decreases in induced C. Therefore, there is a more than proportionate fall in NY via the multiplier effect. This process stops when the initial decrease in AD (injections) equals the total decrease in savings, taxes and spending on imports (withdrawals).

3.2.2. What affects the size of the multiplier?

Since at each stage of the process, as income is earned through additional spending, some will leak out of the circular flow of income in the form of S, T and M, the size of the multiplier (k), is determined by the rate of leakages/withdrawals from the economy.

The value of the multiplier (k) can be calculated as the ratio of the change in national income (Y) to the change in injection (J) that brought it about:

$$\mathbf{k} = \Delta \mathbf{Y} / \Delta \mathbf{J}$$

The value can be calculated as:

k = 1/mpw = 1/mps +mpt +mpm = 1/(1-mpc)

MPW is the marginal propensity to withdraw comprising the marginal propensity to save (proportion of each additional dollar of income which is saved), propensity to import (proportion of each additional dollar of income that is spent on imports) and marginal propensity to tax (proportion of each additional dollar of income that is taxed i.e. marginal rate of tax)

MPC is the marginal propensity to consume (proportion of each additional dollar of income that households spend on domestic goods and services)



Hence, the larger the MPC (or the smaller the MPW), the larger the multiplier size (k).

For more details on the derivation of the formula for k, refer to Appendix B.

3.2.3. What determines the effect of change of national income and general price level?

The effects of changes in AD on the general price level and real national output will depend on where the country is operating along the AS curve. The following section will show the different effects.



Figure 11: Shifts in AD and impacts on Real NY and GPL

- ♣ Keynesian Range of AS curve Only Output Changes (Range between P₁ and a)
 - State of economy: substantial unemployed resources available.
 - When real GDP is less than Y_a, there is a great deal of unused productive capacity or resources; high levels of unemployment.
 - E.g., idle plant and equipment, unemployed labour in the economy.
 - \circ If there is an increase in aggregate demand (e.g., from AD₁ to AD₂), there will be a larger rise in output and employment from 0Y₁ to 0Y_a due to the multiplier effect, while the general price level remains unchanged at 0P₁.

Note: There will be a multiplied increase in nominal national income which will be equivalent to the increase in real national income. In other words, the increase in nominal national income is due to the increase in real output and not general price level.

- Intermediate Range Both Price Level and Output Change (between 'a' and 'b' of the AS curve (i.e. upward sloping portion))
 - State of economy: Close to full employment.
 - Firms are operating closer to full capacity.
 - \circ A rise in AD (e.g. from AD₂ to AD₃ in Figure 11) increases output and employment.



- Increasing output may require the use of less efficient standby machines and plants and less efficient marginal workers. As such, even though input prices are constant, the cost per unit of additional output increases due to the utilisation of less efficient resources.
- To induce firms to increase their production, prices must rise; firms also bid higher for the increasingly scarce resources available.

Note: There will be a multiplied increase in nominal national income, but real national income (which may also increase by a multiplied amount) will increase to a smaller extent compared to that when AD is at the Keynesian Range. This is due to the limited resource an economy faces when AD is approaching the Classical range of AS (Full employment of resources). Some of the increase in nominal national income is due to an increase in general price level.

- Classical Range Only Price Changes (Range between b and c)
 - State of economy: Full employment/inflation/over-heating.
 - $\circ~$ The AS curve is vertical at point 'b' and the economy has reached full employment level of output, $Y_{\text{F}}.$
 - \circ Over this "classical" range, any increase in AD (e.g., from AD₃ to AD₄ in Figure 11) will not lead to a rise in real GDP as nothing more can be produced.
 - The excess demand will cause the general price level to rise.

Note: There will be a multiplied increase in nominal national income, but there will be no change in real national income as the economy has already utilised all its resources and achieved maximum production. The increase in nominal national income is due purely to an increase in general price level.

> How would questions that require you to explain the multiplier effect look like? Have a look at the following two essay questions. The questions correspond to EQ1(b) and EQ5(a). (2011 PJC H1 Prelim and 2020 ACJC H2 Prelim) of your Circular Flow and AD/AS Tutorial package.

2011 PJC H1 Prelim

1 (b) Discuss the view that economic growth is determined by a rise in [15] aggregate demand.

2020 ACJC H2 Prelim

5 (a) Using the circular flow of income, explain why an increase in government [10] spending may lead to larger changes in the national income of some countries compared to others

4. Conclusion

Often the causes of problems in the macro economy may be due to changes in AD, AS or both. The AD/AS model as well as the Circular Flow of Income can be used to illustrate the causes of problems, the consequences of the problems on the economy as well as the effect of policy measures that can be used to deal with the problems.

Over the course of the year, as we look more closely at Macroeconomics, we shall make use of these models to analyse causes, consequences and policy implications as we move on to the next segment on Macroeconomic Aims, Issues and Policies.



Appendix A

There are 3 effects responsible for the downward-sloping nature of AD:

i) <u>Interest Rates Effect</u>:

- With a *higher general price level*, there will be an increase in demand for money as economic agents need to spend more on their purchases
- Households are also less willing and able to deposit money (save) in financial institutions as the value of money is depreciating. Households may choose to purchase assets that appreciate in value when prices increase (e.g. property) instead of saving
- With less deposits (savings) from households, there will be a fall in supply of loanable funds in financial institutions coupled with an increase in demand for money, resulting in an upward pressure on cost of borrowing (i.e. interest rates increases)
 - This makes it more expensive for households to make purchases on credit (i.e. borrow to spend) and
 - Firms are also reluctant to borrow from banks to finance additional investments
- Therefore, \uparrow general price levels $\rightarrow \uparrow$ interest rates $\rightarrow \downarrow C$ and $\downarrow I$

ii) <u>Wealth Effects or Income Effect</u>:

- With a higher general price level, real income falls resulting in a fall in wealth.
- The fall in wealth will result in consumers *buying fewer goods and services* resulting in a fall in national income earned from the sale of fewer goods and services.
- Therefore, \uparrow general price levels $\rightarrow \downarrow$ real income $\rightarrow \downarrow C$

iii) <u>International Substitution Effect</u>:

- With a *higher general price level*, domestic goods would be relatively more expensive compared to foreign goods.
- As a result, domestic consumers buy more foreign goods resulting in *fewer domestic goods* being purchased and thus national income earned from the sale of fewer goods will fall.
- Therefore, \uparrow general price levels $\rightarrow \uparrow M \rightarrow \downarrow (X-M)$ and $\downarrow C$



Appendix B

Derivation of a Formula for the Keynesian Multiplier

$$\mathbf{Y} = \mathbf{C} + \mathbf{I} + \mathbf{G} + (\mathbf{X} - \mathbf{M})$$

To find k, we want to determine the impact of a change in autonomous AD (e.g. G) on real GDP. In other words, we want to find the change in Y that occurs when G changes. Any change in Y must come directly from a change in G or indirectly from a change in C, I or X-M.

Covert the above identity to change form:

 $\Delta \mathbf{Y} = \Delta \mathbf{C} + \Delta \mathbf{I} + \Delta \mathbf{G} + \Delta (\mathbf{X} - \mathbf{M})$

Assume there is an increase in G of \$100 billion. For convenience, we assume no changes to I and X-M. Remember induced consumption changes when there is a change in income. How much induced consumption changes depends on the marginal propensity to consume (MPC). If we assume MPC = 0.6, this means that for every additional dollar increase in income, consumption increases 0.6 times.

- 1. $\Delta Y = \Delta C + \Delta I + \Delta G + \Delta (X M) \rightarrow$ Equation A 2. $\Delta G = \$100$ billion 3. $\Delta I = 0$ 4. $\Delta (X - M) = 0$
- 5. $\Delta C = 0.6 \ge \Delta Y$

We can remove ΔI and $\Delta(X - M)$ since they are 0. Replace ΔC on the right hand side of the Equation A:

 $\Delta \mathbf{Y} = 0.6 \mathbf{x} \Delta \mathbf{Y} + \Delta \mathbf{G}$

 $(1-0.6) \Delta Y = \Delta G$

This results in:

 $\Delta Y / \Delta G = 1 / (1 - 0.6) = 2.5$

Hence, with an MPC of 0.6, the multiplier size is 2.5.

The formula for multiplier is thus: k = 1/(1-MPC)