THERON GROUP OF TUTORS

AN OVERVIEW OF THE SOUTH AFRICAN MACROECONOMIC ENVIRONMENT

MODULE: ECS2602

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Introduction

According to ECS 2602 STUDY GUIDE, Macroeconomics deals with the economy as a whole and not the behaviour and decisions of individual consumers, households and firms, as in microeconomics. Furthermore, macroeconomics involves determining and exploring the relationship between aggregate concepts (variables), and not determining the prices of individual goods and services through the interaction of demand and supply.

As per study guide, in this course we are going to focus on understanding on how different models determine the level of output and income, as well as the impact of fiscal and monetary policy on the level of output and income. Instead of focusing on the structural policies this module concentrates on the stabilisation policies.

Overview of the South African Macro-Economic Environment

- ***The economic crisis*** – the 2008 to 2010 is the example of the worst economic crisis that has ever happened. Economic crisis includes different economic conditions that include decline in economic growth, accompanied by increase in the level of unemployment, falling business confidence as well as increase in price level or deflation depending on specific country conditions. The down grading of the credit rating of the South African economy is one of the good reasons of a country to fall into a recession.
- ***Economic growth*** – economic growth refers to the increase in the total output, which is sometime called the total income of the economy. Put in another way, economic growth is the increase in the gross domestic product of the country, which must be the real gross domestic product after taking inflation into account. Since increase in GDP without taking inflation into account might lead to misleading results. Real GDP can be calculated using the following formula**,** which state that GDP of the current year minus GDP of the base year divided by the GDP of the base year, multiplied by 100.

$$\frac{GDPt - GDPt-1}{GDPt-1} * 100$$

- ***Gross Domestic Product*** – this is the total value of goods and services produced within the boundaries of a country, during a specific period. Besides being country specific GDP calculations can be provincial based, like the Gauteng GDP. According the ECS2602 study guide, GDP is the broadest, best-known and most frequently used measure of economic activity. Calculation of GDP as we know from the previous studies only include the final goods produced, which also includes goods produced to replace worn out facilities. This implies that intermediate goods are not included in the GDP calculations. Intermediate goods are goods used in the production of other goods, all the inputs required in the baking of bread, oil in the manufacturing of petrol. We can conclude and say that GDP only measure new goods and services produced, therefore goods produced last year and sold this year cannot be included in the

calculation of GDP. There are several ways which economists use when measuring GDP, GDP at factor prices can be used, or GDP at market prices, as we studied in ECS1601.

- ***Nominal GDP versus real GDP*** – normal GDP is the GDP measured at current prices. The nominal GDP of the country may increase due to increase in the quantity of goods produced in the country or due to increase in the price levels in the economy. Increase in quantity of goods and services have the potential of improving the quality of life, while increase in GDP due price increase may lead to decline in the quality of life.
- ***Real GDP*** – real GDP is the GDP of the country that has been adjusted to the level of inflation. This implies that the effects of inflation have been removed in the calculation of GDP, in order to get to real GDP. ECS2602 study guide defined real GDP as GDP measured at constant prices, rather than current prices. By removing the effects of inflation real GDP measures the exact increase in the production volumes. Often, the GDP deflator formula we have above is used in calculating the real GDP from nominal GDP. The previous year is used as the base year, in the calculation of GDP deflator, where t-1 means GDP the previous year, however, take note that the previous year can be number of years away from now.
- ***Real per capital GDP*** – this measure of economic growth seeks to identify if the general population of the economy is benefiting from the increase in GDP, and thus tend to incorporate increase in population into account. Real per capita GDP is measure of economic welfare, in the South African economic context, the cake of the economy is not well distributed, such that only the 5% of the economy takes the 90% of the increase in GDP. Besides this as the measure of GDP, there are other various problems associated with the use of GDP as the measure of economic welfare. For example, increase in GDP, maybe a result of increase in defence expenditure which does not have a direct impact in improving the lives of people.
- ***Inflation*** – this is the consistent increase in the general prices in the economy, such that increase in prices which is not consistent does not equate to inflation, also increase in prices in one sector of the economy does not explain inflation. In the AS-AD model the effects of expectations on future price levels on the price level in the economy is analysed. However, take note in the IS-LM model price levels are assumed to be fixed and a short-run period is assumed, implying that there is no inflation in this analysis.
- ***Stabilisation policy*** - this module emphasise the use of monetary policy and fiscal policy in stabilising the economy rather than analysing the determinants of economic growth. Two main polices are used in the stabilisation of the economy, namely the fiscal policy or the monetary policy.
  - ✓ ***Fiscal policy*** – an expansionary or contractionary fiscal policy maybe used by the government to influence or stabilise the economy. Fiscal policy involves the use of tax and government spending and borrowing to alter the economic activities. It is important to remember that, budget of the country, from the treasury is the main fiscal policy instrument, while taxation and government spending are the main policy variables. Expansionary fiscal policy which involves

those policy variables aiming at increasing economic performance through increase in consumption, production and investment**.** Expansionary fiscal policy variables include reduction in taxes and increase in government spending, while in contractionary fiscal policy the aim is on calming an overheated economy through the use policy variable instruments like increase in taxation and reduction in government spending. Sometime the fiscal policy is called the demand management policy, instead of stabilisation policy, both can be used interchangeably.

- ✓ ***Monetary Policy*** – this is the deliberate action by the monetary authorities to influence the level of economic activities, using interest rates, exchange rates, availability of credit. Monetary policy will either increase or decrease the demand of money which will also either increase or decrease the demand of goods and services in the economy and altering the balance of payments. There is a difference between expansionary or contractionary monetary policy. Expansionary monetary policy will involve reduction in interest rates and increasing monetary policy to increase aggregate output. While on the other hand, contractionary monetary policy involves increase in interest rates and reduction in the money supply with a goal of cooling an overheated economy.
- ✓ ***Unemployment*** – among other economic objectives, unemployment tends to be a major or number economy problem. Unemployment is the number of people who don't have a job but are actively looking for one. The labour force of the economy involves those who are employed and those who are unemployment. $\boldsymbol{Labor\ force = employed + unemployed.}$ the unemployment rate of the economy is the ratio of the number of people who are unemployed to the number of people in the labour force. The following equation can be used to calculate unemployment rate.

$$\boldsymbol{unemployment\ rate = \frac{unemployment}{labour\ force}}$$

Two conditions need to be met in identifying who is unemployed, first the person should not have a job and should be actively looking for a job. A person is considered unemployed if he or she does not have a job and has been looking for a job in the last four weeks. Therefore, those who do not have a job and are not looking for one are counted as not in the labour force. Those who gave up in looking for a job, and discouraged ones cannot be counted as unemployed.

The Goods Market

Chapter Two: learning unit 2

Introduction

This part of the module seeks to study the theoretical model that influences the demand for goods through the fiscal policy, using the policy variables that includes changes government spending and taxation. The demand of goods is important to a country like South Africa, because it is the source of employment opportunities, that arise from consumer spending, investment spending, government spending and increase in exports. The barriers in addressing the problem of unemployment using the fiscal policy will also be discussed in this chapter as well.

The chain of events will be in analyzing how the fiscal policy can be used as a stabilizing policy, how fiscal policy can be used in increasing the level of employment in the economy. Lastly limitations of the goods market will be explained, as well as the factors that limit the use of stabilization policies in addressing the unemployment in the South African context.

The Demand for Goods

The demand for goods components refers to the components that we use in determining the level of income in an economy, or used when calculating GDP, and these include consumption, government spending, investment and net exports. Therefore, the demand for goods not only consider the local demand, rather it takes into account foreign demand through exports. Here the demand for goods refers to the total demand for goods and services in the whole economy put together in the goods market, this is differentiated from individual demand we studied in micro-economics.

The goods market is sometimes called the real sector, because it is composed of with the study of real things of the economy, namely production and consumption. This is the area of economics where the economic questions from first year are answered. The questions which states what to produce, how to produce, and how consumers decide what and how much to consume. Taking for instance, in an unemployment environment consumption levels with be dampened, and inventories will rise and firms will be forced to cut production. On the other hand, in inflation environment the consumer purchasing power will fall at a faster rate, and thus force consumers to cut their levels of spending, don't production will fall as well. Thus, answering what to consume and how much, what to produce and for whom.

The general theory of employment, interest and money that has been advocated my Keynes provides us with the basics point of departure in analysing the how the level of income and output is determined in the real sector (the goods markets). In this theory of employment, interest and inflation we are going to acknowledge that there are several factors that influence the different components of demand for goods and services, and thus influence the level of national income and output. In analysing the goods market, it is importance to release that demand for goods involves demand from foreign counties on top of local demand. From this arise the differences between the GDP and gross domestic expenditure (GDE).

Differentiating GDP from GDE

The between GDP and GDE is that, GDP is the total level of spending on goods and services produced within the borders of South Africa, and tend to include the exports but excludes imports, while GDE refers to total value of income from spending within South African boarders excluding exports but including imports. By looking on the word expenditure we can acknowledge that, in order to reach GDE from GDP we have to remove exports, since they resemble expenditure by foreigner on our goods, (but these is expenditure by foreign consumers). The formula below is used to calculate South African GDE.

$$\text{SA GDE} = C + I + G$$

From the above equation, C represents consumption spending by households, I investment expenditure from firms, (private sector), and G government spending (the public sector). These three components include imports in them, since imports refers to the expenditure we have made, by spending our income on foreign goods. For instance, the purchase of iPhones, iPads, will form part of this expenditure component. Now how can you try to answer multiple choice questions from this explanation. There is a relationship between these two components, and this make is easier to calculate one from the other. Given GDP we can calculate GDE from GDP by adding imports and subtracting exports, the same applies when you are given GDE, one can then calculate GDP by adding exports and subtracting imports from GDE. From here we are going to look on the four major spenders in the South African economy.

Four major spenders in South African economy

Consumption by households(C), government (G), private sector (represented by investment I) and the foreign sector (X-M) are the major four spenders in the economy. The contribution of each component to the size of GDP differs from one country to another. In other countries, the foreign sector is bigger, while in South Africa the household consumption is the greatest component, with a 66.47% in relation to the total expenditure measured in the year 2013 (ECS2601 study Guide). Due to its size, the consumption component plays a greater role in the South African economy, and any small change in consumption will be felt in the economy.

- ***Final Consumption Expenditure by household*** – final consumption by households include the consumption on durables, semi-durable and non-durable goods and services. Examples of these goods include expenditure on cars, computers and cell phones.
- ***Final consumptions expenditure by government*** – this involved the expenditure by the government at central level on public goods and services, which include purchase of textbooks, building of schools, hospitals, roads and other forms of infrastructure. The services provided by the government includes provision of defence, police and other public services you might think of. May take note of the fact that payments of interest, transfer payments, pensions payments, child grants, disability grants and old age grants will not be included in the calculation of the financial consumption by the government because they do not consist any form of purchase of final goods and services by the government.
- ***Gross capital formation*** – this involves spending on residential and non-residential capital goods by the households, private sector and the government sector. Gross capital formation removes the depreciation on capital goods, and a distinction is also drawn between gross fixed capital formation and inventory investment.
- ***The foreign sector*** - exports refers to the products that are produced in South Africa, but purchased by foreigners. Gold represents the greatest export earning product in South Africa. Import refers to the goods that we purchase from other countries like iPhones, computers even technology. Before leaving this part of the learning unit 2, it is important to show the difference between an open economy and a closed economy, as well as the components of the good markets in each type of these economies.

Open economy and Closed economy

An open economy is an economy that engages in international trade through buying and selling activities with other countries, while a closed economy does not engage in international trade, instead it operates within its boundaries. In reality, there is no a closed economy in this world. The equations for an open and closed economy are shown below.

Open Economy

$$\mathbf{Z = C + I + G + X - IM}$$

Closed Economy

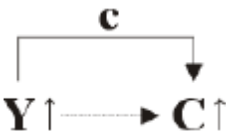
$$\mathbf{Z = C + I + G}$$

Here Z is substituted for GDP, and the above equation are called identities. Therefore, the one above is an open economy identity, and the one below is a closed economy identity.

Consumer Expenditure

In the South African economy context consumer expenditure consist the greatest component of GDP, and it's worth more of our attention. Our focus area in this part of discussion is on the consumption behaviour of households, defining the marginal propensity to consume and the marginal propensity to save. In describing these terms, it important to acknowledge that there is a positive relationship between consumption level and the level of income. As the income increases the level of consumption also increase, but consumption level will increase at a smaller rate. This smaller increase in consumption as income increases, is called marginal propensity to consume. The reason why consumption will increase with a smaller percentage is that part of the income is going to be saved. A 50 million increase in income will lead to a less than 50 million increase consumption.

- ***Marginal propensity to consume*** – refers to a smaller increase in consumption due to increase in income, represented by a smaller (c). This is represented by the following chain of events, illustrating that increase income will lead to increase in consumption C. The above c, which is marginal propensity to consume, will determine by how much consumption will increase, due to increase in income. The smaller c, which is marginal propensity to consume will have a value between 0 and 1.



Increase in income or decrease in household income arise from rewards towards the factors of production, which include (natural resources, labour, capital, and entrepreneurship). It is these rewards they use for consumer spending. These factors of production are used to produce goods and services, which the consumers spend on.

Total income and total production

Of importance to the study of this module is that there is a relationship between income, production, employment and unemployment. The firms' total production equals the total income, because firms pay to the factors of production as income, which is equal to the value of total production. As total income increases, the levels of employments increase as well, with the levels of unemployment going down. As a result, the goods market model can be used to determine the level of employment and unemployment. As having been said above, part of the income earned by households is saved. From this we can depict marginal propensity to save, which is the proportion of increase in income that will be saved, since the income is saved after consumption, marginal propensity to save will be equal to 1-c. marginal propensity is represented by a smaller s. Now we are going to analyse the consumption function.

Describing the consumption function

Household behaviour can be represented by the following consumption function, $C = co + cY0$. This function suggests that, consumption is equal to autonomous consumption c_o plus a proportion of disposable income. In other words, we can say consumption function is autonomous consumption plus induce consumption.

Disposal Income (Y_D), taxes and consumption

Income that the households earn as rewards of factors of production I taxed first before the households consume that income. As a result, it is the disposable income of the households that determine the consumption spending. Disposable income being the income earned as rewards for factors of production less taxes paid to the government. This can be presented in the following function, Y_D = Y-T. If the taxes in the economy amount to R20 million, in an economy with total production of R100. The disposable income will be R80 million, which is R100-R20. Y_D = Y-T, = R80M = R100M-R20M.

Increase in taxes reduces the disposable income, while decrease in taxes increases the disposal income. As a result, the increase in taxes will lead to decrease in consumption spending due to decline in the disposal income. While on the other hand, a decrease in taxes will lead to an increase in disposal income, hence and increase in the consumption spending. The chain of events that will represent this is shown as follows, T↑→ Y_D ↓→C↓, for an increase in taxes, while a decrease in taxes will be represented by the following chain of events,

T↓→ Y_D↑→C↑.

It is important to remember that, there are numerous factors that influences disposable income other another tax. Some of these factors include changes in the level of output and income. An increase in income (Y), will increase the disposable income. You know that income is synonymous to production, so when a multiple-choice question states that increase in production, it implies the same thing as income. Thus, the higher the production the higher is the income households receive as rewards to factors of production, and the higher is their disposable income, as well as the level of consumption. This can be represented by the following chain of events,

$Y\uparrow \rightarrow Y_D\uparrow \rightarrow C\uparrow$.

Activity 2.5 from the work book

Impact of Marginal Propensity to Consume

Marginal propensity to consume is the proportion of consumption that arise from every increase in income. The amount which households consume is equal to the marginal propensity to consume multiplied by their disposable income. Given the information above, with a country producing R100m, with R20m taxes, and disposable income of R80m. The consumption of the economy will be R64m given a marginal propensity to consume of 0.8. Thus 0.8*R80M. If the marginal propensity to consume increases the consumption spending will also increase, like if the marginal propensity increases from 0.8 to 0.9, the consumption spending will increase from R64M to R72M (0.9*R80m).

Impact of Taxes on Induced Consumption

A decrease in the taxes by the government will increase the disposable income of the households, which will also lead to increase to induced consumption. Reduction in taxes will increase the induced consumption arising from reduction taxes by an amount equal to the reduction in taxes or less than amount, depending on the marginal propensity consume. Assuming a R10m reduction in taxes by the government, households will increase the induced consumption spending by an amount of R10M, or less than R10M, depending on the households' marginal propensity to consume. With the marginal propensity to consume of 0.8, the induced consumption will be 0.8*R10M, which is equal to R8m. The increase will always be less than 1.

Activity 2.7 from the Workbook

Autonomous consumption (c_o) and consumption spending (C)

Autonomous consumption is that part of consumption which is not influenced by the level of income. It is represented by the symbol c_o. this statement illustrates that there are other factors that influences the consumption in the economy, other than income. Some of these factors include wealth, interest rates, past saving, income distribution, availability of credit and hesitance. People without income today can borrow in-

order to consume, or use their past savings. Increase in the consumer confidence increases the autonomous consumption which can be represented by the following chain of events. co↑→ C↑.

Activity 2.9 from Workbook

Consumption function and saving function

There is an inverse relationship between consumption and savings. The money spend is the money not spend, and money spend is not money saved. However, both consumption and savings have a positive relationship with output and income. The higher the output and income, the higher the level of consumption and level of savings. The inverse relationship between consumption and savings is represented by the following two functions,

$C = c_o + cY_{D.,}$ representing the consumption function, with $S = -c_o + (1-c)Y_D$. Take note that the marginal propensity to save is represented by (1-c). The higher the marginal propensity to save the lower is the marginal propensity to consume.

Activity 2.9 from the Workbook

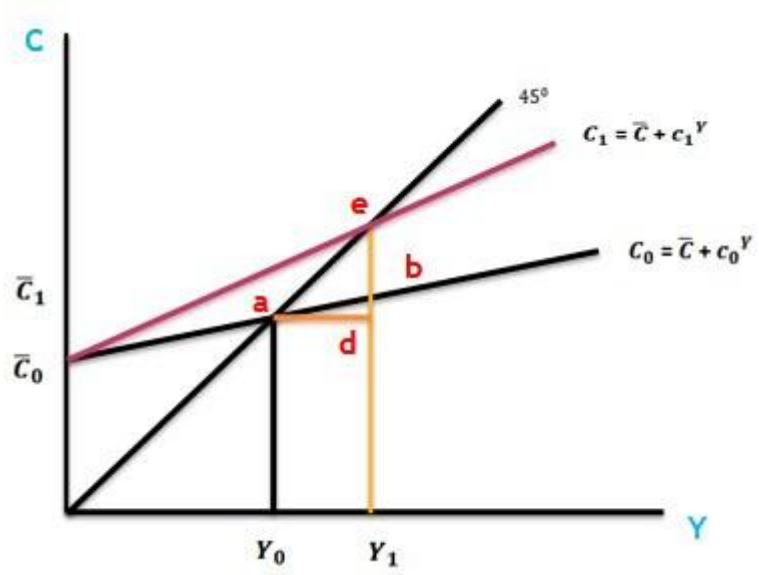
Consumption function as a diagram

The diagram below shows the consumption function, which measures the consumption spending on the vertical axis, with disposable income Y_D on the horizontal axis. The level of consumption which is not dependable on the level of income is shown by the point c_o on the graph, illustrating autonomous consumption, on the vertical intercept. The main characteristic of the consumption function is that it is upward sloping, illustrating that as the income increase is the consumption spending in the economy. As highlighted above on the discussion of marginal propensity to consume, the increase in consumption shown on the vertical side is smaller as compared to the increase in the income represented on the horizontal side. Increase in income from Y_D1 to Y_D2 is greater than the increase in income from C_1 to C_2. Another important characteristic of the consumption function is that, it has a slope that is determined by the marginal propensity to consume. The size of increase in consumption is determined by the marginal propensity to consume.

Activity 2.10 from the Workbook

A change in marginal propensity to consume

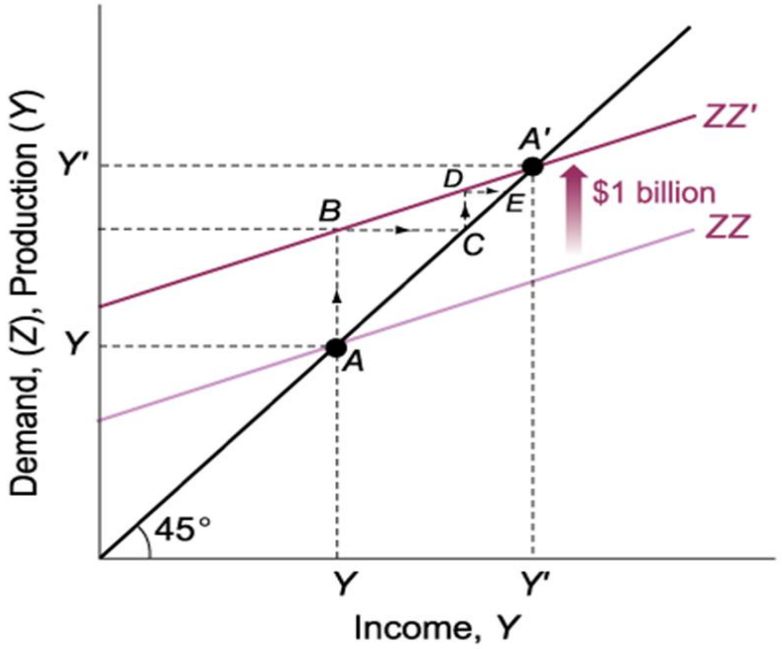
The change in the marginal propensity to consume is the one that changes the slope of the consumption function (curve). Increase in the marginal propensity to consume lead to a steeper consumption curve, while and decrease in the marginal propensity to consume lead to a flatter consumption curve. Increase in the marginal propensity to consume means that the marginal propensity is decreasing, while a decrease in the marginal propensity to consume means that marginal propensity to save is increasing. Take note that this only leads not to shift on the consumption curve, rather only a change in the slope of the curve. The diagram shows the effects of the change in the marginal propensity to consume.



Activity 2.11 from the Workbook

A change in autonomous consumption

As compared to change in marginal propensity to consume, a change in the autonomous consumption leads to shift of the curve. Increase in the automatous consumption will lead to an upward shift of the consumption function, while a decrease in the autonomous consumption leads to a downward shift in the consumption curve. The diagram below, show the shifts that arise from changes in the autonomous changes in consumption. Increase in autonomous consumption lead to increase in vertical intercept, while decrease lead to decrease in the vertical intercept. An increase in autonomous spending has a more than one-for-one effect on equilibrium output.



It is very important to take note that the slope of the consumption does not change due to the change in the autonomous consumption. The slope only changes when the marginal propensity to consume changes.

Activity 2.12 from the Workbook

Movements or shifts along the consumption curve

As just explained above, the shifts in the consumption curve only arise due to the change in the autonomous consumption, while the movement along the consumption do occur due to changes in the disposable income. Using the diagram from the study guide, increase in disposable income from Y_D1 to Y_D2, leads to increase in consumption from point C_1 to C_2. Always recognized that the change in consumption is less than change in income, as shown by the diagram below.

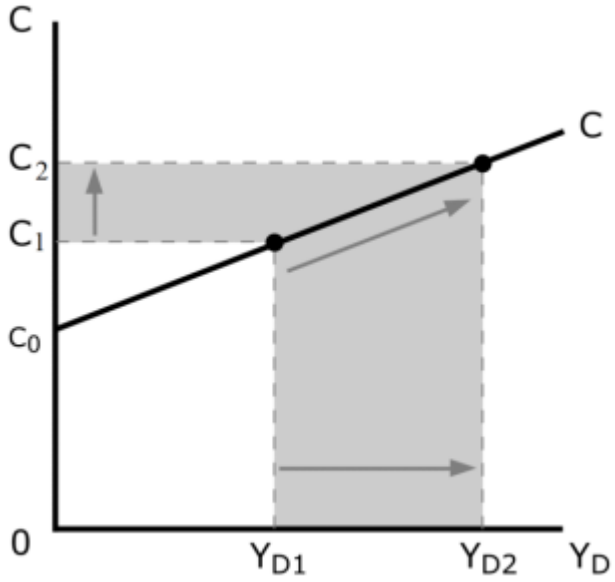


Diagram 2.4: Change in income

Activity 2.13 from workbook

Exogenous and endogenous variables of the consumption function

Exogenous variable is the variable that is determined by the forces outside the model. Any change in these variables is regarded as autonomous, and examples of these exogenous variables include investment,

government spending and exports. While endogenous variables include the variables that are determined inside the module, and some of these factors which are influenced inside the model include income, consumption and imports. Exogenous are autonomous while endogenous variables are induced.

Examples of exogenous variables in our model include wealth, investment and government spending. Investment function in the model is independent of income level and is determined by forces outside the model like interest rate.

Another interesting observation here is that, exogenous variables leads to shift of the Y intercept, while the endogenous variables leads to change in the slope of the consumption curve.

Activity 2.14 from the Workbook

From income to consumption to spending (demand) to income

This part seeks to illustrate the circular like relationship among the variables in the model. The relationship suggest that output and income determines the consumption spending (C) and consumer spending, in turn, is among the factors that influences the demand for goods in the goods market and do influence the output and income in the end. The chain of events here, states that Y Influences C, C influences Z, Z influencing Y, and Y Influencing C.

Activity 2.15 from the Workbook

Investment Spending

In the study of economics, there is a difference between financial investment and real investment, and you need to take note of this. Real investment refers to the additions to the capital stock of the country, which involves the buying or building of new machinery, construction of infrastructure like roads and rail. On the other hand, financial investment includes the purchase in the bonds and shares or other financial instruments. Financial investment is very important to the economy however, it does not directly create a production capacity. Real investments are done with a goal of making future profits. Economists talk of investments when there are talking of real investment. There are several reasons why investments are an important component of the economy, let's have a look on the importance of investment.

- ***Creates production capacity*** - real investment is very important to the country because it creates production capacity, that increase the country future production and thus creates more employment opportunities.
- ***Creates demand for goods*** – another advantage of investment is that it creates a demand for goods and services. Through the relationship among consumption and income, the GDP of the country will increase, through the multiplier effect.

In 1936 Keynes argued that additional spending is needed to make sure that there is a sufficient demand for goods to ensure that total production of the economy is taken up. In a close economy, this additional spending will arise from government spending and investment spending. There are several determinants of investment in an economy. Examples of these factors that influences the level of investment in a country include, the internal rate of return of the project and the interest rates in the economy. When the internal rate of return is greater than the interest rates, it will be worthwhile for a country to venture into investment, however, when the interest rates are greater than the internal rate of return it is not worthwhile for investor to engage in investment.

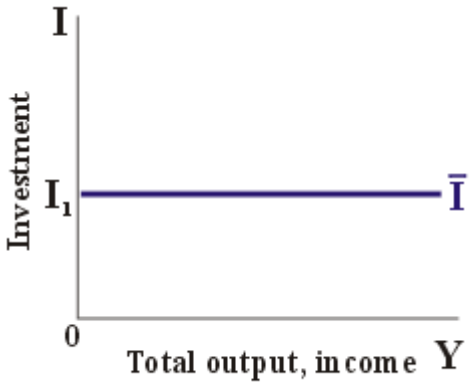
Investment as an autonomous variable

In the meantime, we are going to assume that investment is an autonomous variable that is determined by exogenous factors such as, interest rates, expectations of the economy, business confidence, regulations. Let's take a moment to explain these terms.

- ***Interest rates*** – higher interest rates discourage the desire for investments, in many various ways. Firstly, higher interest rates, makes it difficult for potential investors to get funds at an affordable rate. Cost of borrowing is higher when interest rates are high.
- ***Expectation*** - expectations of better future economy conditions, increase future investments.

- ***Business confidence*** – increase in business confidence, increases the level investment in the economy and decrease in business confidence also lead to decline in the level of investment in the economy as well.

As we can see above, we can conclude that the level of investment in the economy is not determined by the level of output and income, which implies that investment is an endogenous variable in our goods market model. The investment function is I = I, and is represented graphically with the following graph, where it is a horizontal graph, with I on the vertical axis.



A change in autonomous investment changes the vertical intercept, increase in investment will lead to increase in the vertical intercept and thus shifting the autonomous investment curve upwards. This can be represented by the following diagram.

Investment and saving

Among the unresolved chicken and egg issue in economics, is on whether investment is the driving force behind savings or if saving is the driving force of investment. In the Keynesian model, savings are not a determinant of investment. Despite, the factor that for investment to take place, savings are needed and for an equilibrium to be reached savings should be equal to investment, it does not follow that the decision to save and the decision to invest are not two sides of the same coin.

In the Keynesian model, it is the investment that creates savings. Keynes argued that increase in investment lead to increase in increase in demand for goods, which lead to increase in output and income. As income increases, savings increases on the bases that savings are a positive function of income. This statement supports the statement that states that investment creates its own savings.

Activity 2.18 from the Workbook

Government Spending

The model is very important in the study of Keynesian model, because the government influences the economic activities through government spending, transfer payments and taxes. These various can be used to determine the level of income and output in the economy. Government spending directly influences the demand for goods,

since we stated that this is an exogenous component of the model, while taxes influences the demand for goods in an indirect way, through the consumption function by altering the disposable income.

Government Spending and taxes are exogenous variables

Both government and taxes are exogenous variables, implying that there are autonomous variables. However, the treatments of taxes as an exogenous is debatable, in the sense that the tax revenue is determined by the level of income in the economy, an increase in the income in the overall economy leads to increase in the tax revenue of the economy. In recession periods, the tax revenue is very small.

Fiscal Policy

Fiscal policy is the policy used by the government in trying to achieve its objectives using taxes, government spending and government borrowing. The main instrument of the fiscal policy is the budget and the two policy variables are government spending and taxes. The policy instruments used in influencing the level aggregate demand, output and income in the economy are taxes and government spending. Through its spending policy, the government can run a budget deficit or budget surplus.

A budget deficit occurs when the expenditure of the government is greater than the revenue of the government from tax revenue. While budget surplus refers to a situation where the tax revenue of the government exceeds the government expenditure. In the sections above we have differentiated between an expansionary policy and contractionary policy, it is important to understand these concepts in the study of macro-economics.

Activity 2.19 from the Workbook

The determinants of equilibrium output

Equilibrium output occurs when the income is equal to consumption plus investment plus government expenditure in a closed economy, while in an open economy we have add exports and subtract imports and taxes as well. This will be represented by the demand equation in the equation below.

$$Z = C + I + G$$

Where C is the consumption function, which consists of C = $C = c_o + c(Y-T)$, I is the autonomous investment function, and G is the government function. These functions can be substituted into the above function and obtain the following.

$$Z = c_o + c(Y-T) + I + G.$$

This equation can further be broken down as follows.

$$Z = c_o + cY - cT + I + G$$

A further refinement of the function will allow us to separate the exogenous variables from endogenous variables. Remember we have said that Z = Y.

$$\mathbf{Y = (c_o + I + G – cT) + Cy}$$

The first part then represents the autonomous spending components.

Activity 2.20 from the Workbook

Equilibrium condition in the goods market

In our model of goods market, equilibrium occurs when the level of output and income Y is equal to the demand for goods, this can be written as Y = Z. We have already established that Z = Y, where Z = c_o + cY – cT + I + G, implying that

$$Y = c0 + \bar{I} + G – cT + cY.$$

Having said, we can see that there are two like terms on both sides of the equation, and it will be good if we make this item a subject of the formula. To make this variable Y the subject of the formula, take cY to left side of the equation. As follows:

$$Y - cY = c0 + \bar{I} + G – cT$$

Now we must make factor our Y on the left side, as follows,

$$Y (1- c) = c0 + \bar{I} + G – cT$$

To make Y the subject of the formula we then have to divide both side by (1-c), to obtain the resulting equation,

$$Y = \frac{1}{1-c} * (c0 + \bar{I} + G – cT)$$

The $\frac{1}{1-c}$ is the famous multiplier formula.

Activity 2.21 from the Workbook

Calculating the equilibrium level of output and income

Give the values for variables on the right side you can calculate the equilibrium income point, take for example, c = 0.8, co = 500, I = 300, G = 400, T = 300. The equilibrium income will be as follows;

$$Y = \frac{1}{1-0.8} * (500 + 300 + 400 - 0.8[300]) = 4\,800$$

Autonomous spending (c0 + Ī + G – cT) and the marginal propensity to consume c, determine the equilibrium in the goods market model.

Causes of the changes in the equilibrium level of output and income

The determinants that determine the equilibrium level, are the factors that influence the changes in the equilibrium level of output and income. These determinants are marginal propensity to consume, and the variables of autonomous spending which include government spending, consumption and taxation.

Activity 2.22 from the Workbook

Adjustments to equilibrium

Excess demand for goods leads to decline in inventories, in the goods market, which forces the firms to respond to this through increasing the level of production. This increase in production will call for employment of more factors of production. As more factors of production are employed, household income will increase, which will increase consumption spending. This process will continue until a new equilibrium point is reached. Through chain of events this can represented by the following;

$$Z > Y: Y\uparrow \Rightarrow C\uparrow \Rightarrow Z\uparrow$$

The above chain of events suggests the demand for goods is greater than the income, which will lead greater demand for factors of production, which call for more employment of factors of production, which brings more income to households, who will increase their consumption and lead to increase in demand for goods again.

There is an opposite situation to this one, where the demand for goods is less than the level of output and income, which leads to excess supply of goods and services. Excess supply of goods and services will force firms to cut their production levels. Through cutting of the production levels, less factors of production will be employed, and as a result household income will fall, consumption will fall as well, thus Z will fall and continuous fall in income and demand will force the economy to move towards equilibrium, even if it means that the point equilibrium is not the full employment level.

Equilibrium in the goods market as a diagram

The equilibrium equations we have demonstrated above can also be illustrated by the graph below. Remember our condition which states that Z = Y. cementing this, you may release that the Z, which is the demand for goods is represented on the vertical axis and income which is Y is represented on the horizontal axis. The 45^0 line, indicate possible equilibrium positions. In the diagram below, points a, b and c are possible equilibrium points.

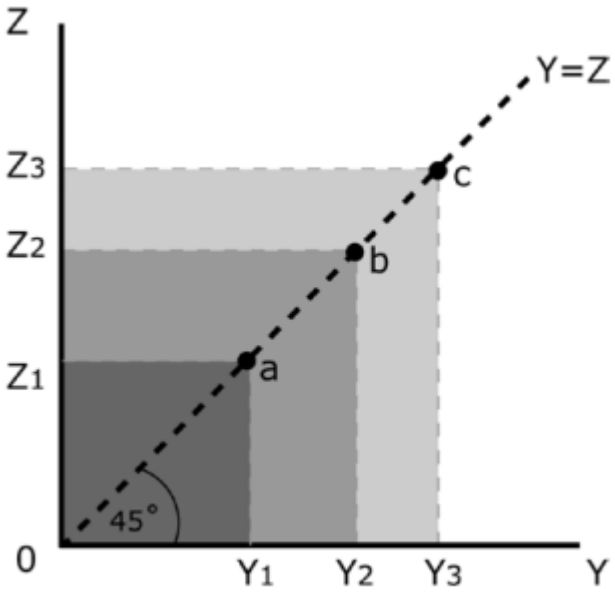


Diagram 2.6: Equilibrium condition

Adding the demand for goods equation to the diagram, the equilibrium point is reached. The demand for goods equation is represented by a curve ZZ. The autonomous spending variables are represented by the vertical intercept at Z_0. The ZZ curve is upward sloping, because an increase in Y lead to increase Z, as indicated by $_C$Y. the slope of the curve ZZ, is less than one, since the marginal propensity to consume is smaller than one, implying that an increase in Y Increases Z, the increase in Z is smaller than the increase in Y.

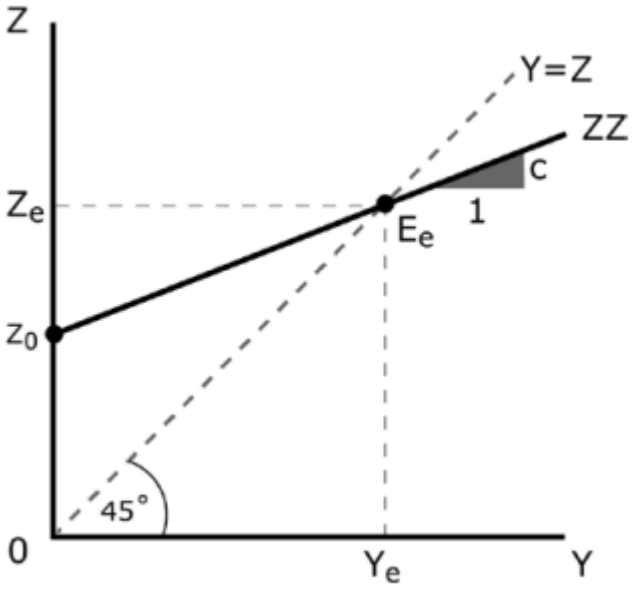


Diagram 2.7: Equilibrium in the goods market

The intersection of ZZ and Y, at point E_e establishes the equilibrium point. Which is the point where the level of output and income is equal to the demand for goods (Z). At point E_e, household consume goods and services in accordance with their income and autonomous consumption and will not change their consumer spending unless their income changes or one or more of the factors that determine their autonomous consumption change.

Adjustment to Equilibrium

All the points to the left side of E_e, illustrates excess demand. Taking for instance at point a, on curve ZZ, the demand for goods exceeds the level of output and income, Y_1. When the economy is at point a, producers will be forced to increase their production, and income will increase from Y_1 closer to Y_e, on the horizontal axis. As the income increases, the demand for goods and services will increase on the ZZ, and move closer to Z_e. The process, will continue until equilibrium is reached at Y_e. This excess demand chain of events is presented below.

$Z>Y: Y\uparrow \Rightarrow C\uparrow \Rightarrow Z\uparrow$

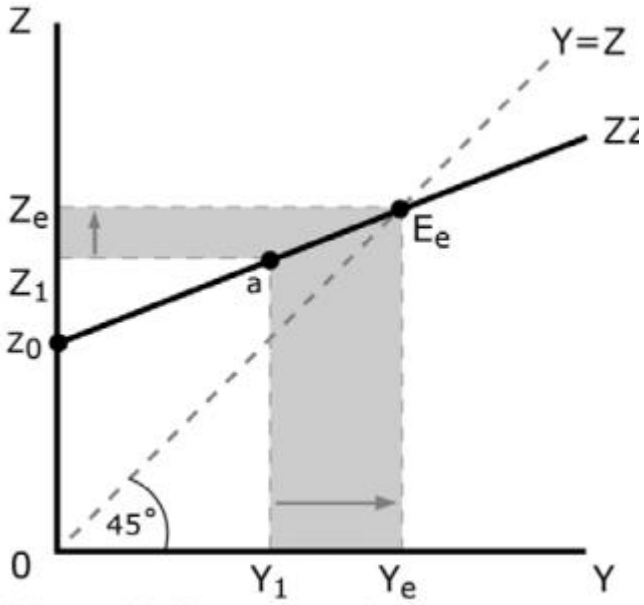


Diagram 2.8: Excess demand

All points on the right of the equilibrium shows the position of excess supply. At point b on ZZ curve, firms will be forced to cut their levels of production. In cutting the level of production, more factors of production will be laid off, which will reduce the households' income. Reduction in the households' income, will lead to reduction in consumption. As this process continues Z, will move downwards, and moving closer to E_e. The condition and chain of events for excess supply will be represented by the following equation,

$Z<Y: Y\downarrow \Rightarrow C\downarrow \Rightarrow Z\downarrow$

Activity 2.26 from the Workbook

CHANGES IN THE EQUILIBRIUM LEVEL OF OUTPUT AND INCOME

As stated by the equilibrium equation for goods market can change due to changes in the marginal propensity to consume (c) and the autonomous spending components ($c0 + \bar{I} + G - cT$). movement or change in these items will lead to changes in the equilibrium.

Activity 2.27 from the Workbook

The multiplier: A change in investment spending and equilibrium level of output and income

Investment is one of the autonomous variables, in the good market model. The changes in investment depends on the interest rate, expectations and business confidence. Assuming an increase in business confidence and expectations in the economy, the equilibrium point will increase to higher value. Reaching the higher equilibrium point will arise from multiple increases in investment. Here we are explaining the effects of multiplier concept. Using the values in the previous example above, let's assume that investment has increased from 300 to 310. We can follow through the calculations below, using c = 0.8, c_0 = 500, I = 300, G = 400, T = 300 and calculate the equilibrium point.

$$\mathbf{Y = \frac{1}{1-0.8} * (500 + 300 + 400 - 0.8[300])}$$

$$\mathbf{Y = \frac{1}{1-0.8} * (500 + 300 + 400 - 240)}$$

$$\mathbf{Y = \frac{1}{1-0.8} * (960)}$$

$$\mathbf{Y = \frac{1}{0.2} * (960)}$$

$$\boldsymbol{Y = 5 * 960 = 4\,800}$$

Taking the increase in investment to 310, our new equilibrium point will increase to,

$$\mathbf{Y} = \frac{\mathbf{1}}{\mathbf{1-0.8}} * (\mathbf{500+ 310+ 400 - 0.8[300]})$$

$$\mathbf{Y} = \frac{\mathbf{1}}{\mathbf{0.2}} * (\mathbf{500+ 300+ 400 - 240})$$

$$\mathbf{Y} = \frac{\mathbf{1}}{\mathbf{0.2}} * (\mathbf{1210 - 240})$$

$$\mathbf{Y = 5} * (\mathbf{970}) = \mathbf{4\ 850}$$

The above calculations show that, an increase in investment spending increases the equilibrium level of income by 50 (from 4 800 to 4 850). Therefore, for everyone unit increase in autonomous spending, output and income increase by 5 units. This is miracle power of the multiplier. Observing the workings above, we can conclude that, the effect of change in autonomous spending on equilibrium level of output and income is equal to the multiplier times the change in autonomous spending.

Activity 2.228 from the Workbook HqtZX5GI

What lies behind this multiplier concept?

The multiplier effect results from the behaviour of households which increase their consumption spending whenever their income increases. Assuming an increase in investment by 100, the Z will increase by 100 and Y will increase by 100 (I↑ ⇒ Z↑ ⇒ Y↑). Increase in income will mean increase in consumption spending, which will be determined by the marginal propensity to consume. The increase in consumption will always be smaller than the increase in income, mainly because the marginal propensity to consume is always less than one. The total increase in the demand for goods will now be 180, the 100 plus the 80. A further increase in the demand for goods will take place as consumption will increase by 80, this will be represented by (C↑ ⇒ Z↑ ⇒ Y↑). this further, increase in consumption will lead to another round of increase in consumption of 0.8*80 64, with chain of events of (Y↑ ⇒ C↑). the increase in the income will not continue indefinitely, instead it will increase until such a point when the increase in income becomes insignificant or equal to zero. The overall increase in income can be calculated by multiplying the increase in investment by the multiplier. The multiplier will be 1/1-MPC, 1/1-0.8, 1/0.2 = 5, therefore the total increase in income will be 5*100 = 500.

A change in marginal propensity to consume

The size of the multiplier is determined by the marginal propensity to consume, such that a change in the marginal propensity to consume, a different MPC, will lead to a different impact on the autonomous spending. The effects of changes in the marginal propensity to consume are shown below through the following calculation, when the marginal propensity to consume increased from 0.8 to 0.9 and autonomous spending of 800.

MPC of 0.8 will lead to a multiplier of 5, while MPC of 0.9 will lead to a multiplier of 10, such that with an MPC of 0.8, equilibrium income will increase to 4000, while with an MPC of 0.9 the multiplier will be 10, and the equilibrium output will increase to 8 000. For instance, a change of 100 in autonomous spending increases output and income by 500, while a change of 100 in autonomous spending changes output and income by a 1 000.

Using a diagram to explain the multiplier

Increase in investment will be used in this explanation, taking note that investments forms part of the autonomous spending. Increase in investment will lead to a parallel shift on the vertical axis, as the spending curve moves from ZZ to ZZ_2. The rise in the demand for goods will cause the increase in income to move from Y_0 to Y_2, but with a large increase as compared to the increase in the autonomous consumption due the multiplier effect. This can be illustrated by the diagram below.

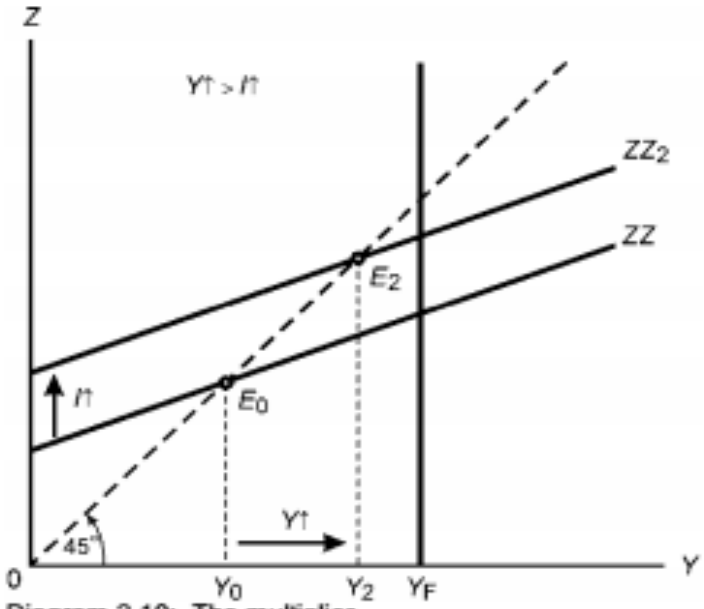


Diagram 2.10: The multiplier

Change in marginal propensity to consume

A larger percentage of income is spending when the marginal propensity to consume increases. As the MPC increases the consumption curve will become steeper, or in other words we can say it will rotate upwards. Using the diagram, below, increase in MPC will lead to the rotation from ZZ to ZZ_1. This increase in the MPC, will also lead to increase in the equilibrium output and income.

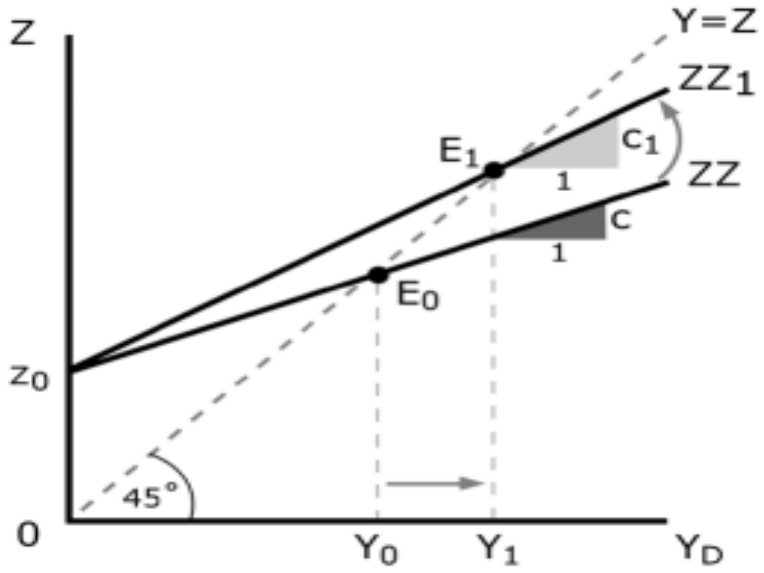


Diagram 2.11: Multiplier and change in marginal propensity to consume

You may have noticed that a change in the marginal propensity to consume will also change the vertical intercept through its effect on taxes. This effect on autonomous spending is so miniscule (as long as there isn't a huge budget deficit) that we ignore it for the purposes of this module.

See the below example, using the following values:

$c = 0.8$, $c_0 = 500$, $\bar{I} = 300$, $G = 400$ and $T = 300$

the equilibrium level of output and income can be calculated as follows:

(500 + 300 + 400 – 0.8 [300]) (960)

then assume the marginal propensity to consume changes to 0.9:

(500 + 300 + 400 – 0.9 [300]) (930)

A change in the marginal propensity to consume from 0.8 to 0.9 only changed autonomous spending by 3% (960 – 930 = 30)**.** Thus, for the purposes of this module**:** a change in the marginal propensity to consume only changes the slope of the curve.

Part 2.4 of the Learning Guide

USING FISCAL POLICY TO INFLUENCE THE EQUILIBRIUM IN THE GOODS MARKET

Fiscal policy influences the goods market through two policy variables, namely the use of government spending and use of taxes. Here we are going to look on the effects of these policy variables on the level of equilibrium in the economy. Firstly, we are going to look on how government spending influences the equilibrium point.

- **Government Spending** – government spending forms part of autonomous spending. The autonomous spending component being shown in the following equation.

$$Y = \frac{1}{1-c}\ (c0 + G - cT)$$

Change in the government spending changes autonomous spending, that will lead to change in the demand for goods as well. Through the multiplier effect, the level of output and income will change as well. Impact of the change in government spending is the same as that for any other change in autonomous spending, because it has a multiplier effect on the equilibrium level of output and income. This increase in the level can be illustrated through the use of diagrams and calculations. Below we are going to look on impact of change in government spending on the equilibrium level of income and output through the use of values or figures.

Using values – remember we are still using the same values we assumed above, where c=0.8, c_0=500, I=300, G=400 and T=300. Then we will want to see the impact of increase in government spending increases from 400 to 450. The equilibrium level of income when G=400 is 4800, however, when G=450 the level of income will increase from 4800 to 5050. Let's prove this through the use of calculations.

Before increase in government spending

$$Y = \frac{1}{1-c}\ (c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\ (500 + 300 + 400 - 0.8[300])$$

$$Y = \frac{1}{0.2}\ (960)$$

$$Y = 0.5(960)$$

$$Y = 4\,800$$

After increase in government spending

In this case the G component is going to change from 400 to 450, and our calculation is just the same as follows,

$$Y = \frac{1}{1-c}\ (c0 + I + G - cT)$$

$$Y = \frac{1}{1-0.8}\ (500 + 300 + \ 450 - 0.8[300])$$

$$Y = \frac{1}{0.2}\ (1010)$$

$$Y = 5 *\ (1010)$$

$$Y = 5050$$

Therefore, the increase in the government spending by 50, has led to an increase in the level of output and by 250, which is the product of the multiplier and the increase of government spending, 5*50. We can also do this through the use of a diagram. The chain of events for an increase in government spending is: G↑ ⇒ Z↑⇒ Y↑.

ACTIVITY 2.36 From the workbook

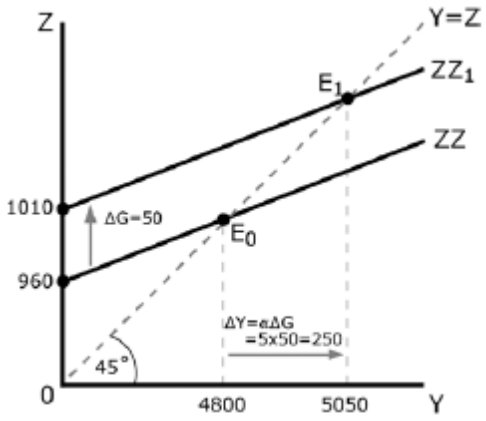


Diagram 2.12: Increase in government spending

ACTIVITY 2.37 From the workbook

Taxes

Using the equilibrium equation, we can acknowledge that, taxes are part of autonomous spending and as such the changes in taxes lead to changes in the autonomous spending, as well as the demand for goods. Through the multiplier effect, changes in taxis will lead to change in the level of output and income. The change in taxes will lead to change in the disposable income. The example below is used to illustrate the change in the equilibrium level of output and income due to changes in the taxes. Assuming MPC = 0.8, c_o = 500, I=300, G=400, T=300, initially before changing to T=250. The calculation and diagram below illustrate the impact of change in taxes on the equilibrium level of output and income.

Assuming MPC = 0.8, c_o = 500, I=300, G=400, T=300, the equilibrium output and income will be calculated as follows.

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 400 - 0.8[300])$$

$$Y = \frac{1}{0.2}\,(960)$$

$$Y = 0.5(960)$$

$$Y = 4\,800$$

After the decrease in taxation of 50, the equilibrium output and income will increase by 200, which we can calculate by saying the MPC*the decrease in taxation*the multiplier of 5. The other way of getting the level of increase is to take the differences, of the equilibrium before and equilibrium after.

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 400 - 0.8[250])$$

$$Y = \frac{1}{0.2}\,(1000)$$

$$Y = 0.5(1000)$$

$$Y = 5\,000$$

These two steps can also be illustrated through the use of diagrams.

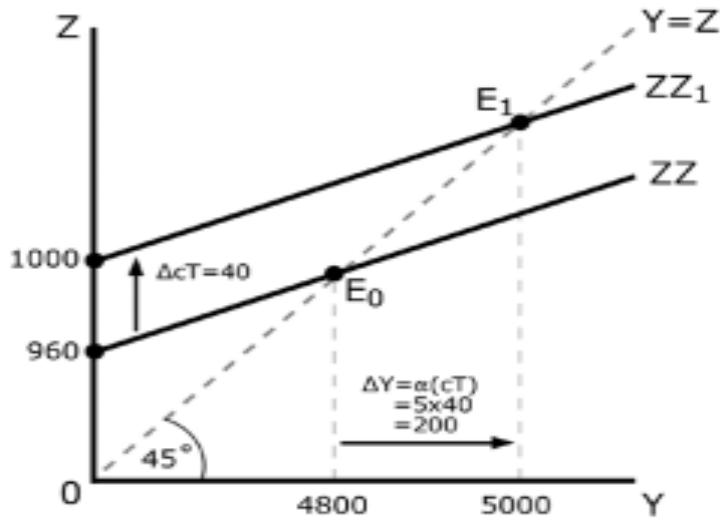


Diagram 2.13: A decrease in taxes

Taxes is part of autonomous spending and a decrease in taxes increases the demand for goods and shifts the demand for goods curve upwards, equal to c(T). The reason is that initial effect of a change in taxes is on the disposable income of households, while a change in government spending directly influences the demand for goods. As disposable income changes, consumption spending changes, but the change in consumption spending is smaller than the change in disposable income because the marginal propensity to consume is less than one. In other words, a decrease of 50 in taxes will initially increase consumption spending by c (50). In this case, the upward shift of the demand for

goods curve is c (50) = 40 and not 50. Consequently, the impact of a change in taxes on output and income is indirect via the consumption function. The vertical intercept is now 1 000. The vertical intercept is higher, and given the new demand for goods function ZZ1, the equilibrium level of output and income increases from 4 800 to 5 000. The equilibrium level of output and income rises more than the decrease in taxation due to the multiplier. In this case the increase in income is 40 times 5 = 200. The chain of events for a decrease in taxation is as follows:

$$T\downarrow \Rightarrow YD\uparrow \Rightarrow C\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

Expansionary fiscal policy

This is the deliberate action by the government to increase government spending and reduce the level of taxation, with the goal of stimulating aggregate demand. The calculation below illustrate the impact of an increase in government spending and decrease in taxes on equilibrium level of output and income, assuming that c=0.8, c_0=500, I=300, G=400, and T=300, then later we will assume that government spending will increase to 450 and taxation declines to 250. The aim here is identifying the impact of these assumed changes.

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 400 - 0.8[300])$$

$$Y = \frac{1}{0.2}\,(960)$$

$$Y = 0.5(960)$$

$$Y = 4\,800$$

After the changes in government spending and taxation,

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 450 - 0.8[250])$$

$$Y = \frac{1}{0.2}\,(1050)$$

$$Y = 0.5(1050)$$

$$Y = 5\,250$$

We can conclude that the effect of the expansionary fiscal policy is to increase the level of output and income by 450. These calculations can also be illustrated through the use of a diagram, where we see in the diagram below that, both reduction in taxation and increase in government spending have

lead to autonomous increase from 960 to 1050 on the vertical side, which will lead to increase in income by a far large increase, due to the operation of the multiplier.

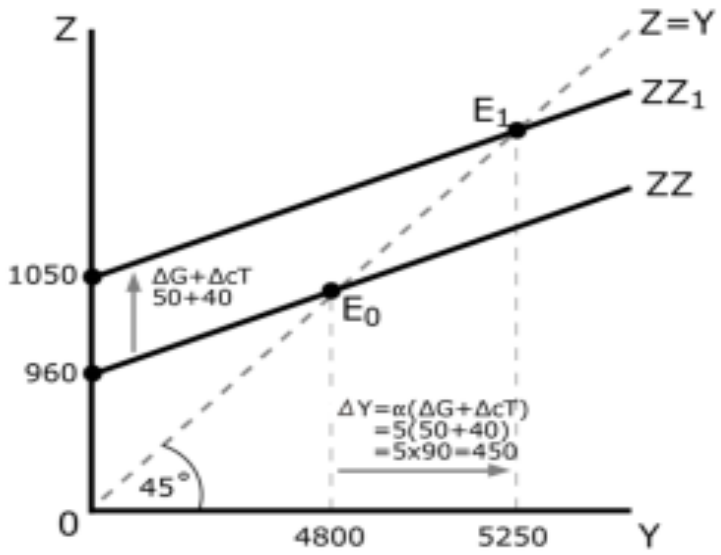


Diagram 2.14: Expansionary fiscal policy

Using the diagram above, the increase in autonomous spending is the increase in G plus cT = 50 + 40 = 90. The upward shift in the ZZ curve is equal to 90 and the vertical intercept is equal to 1 050 and the equilibrium level of output and income rises to 5 250.

Contractionary fiscal policy

This is the opposite of the expansionary fiscal policy, where contractionary fiscal policy if the deliberate action by the government to reduce government spending and increase the taxation, with a goal of reducing the economic activity. The calculation below will illustrate, the impact of reduction in government spending and increase in taxation on the equilibrium level of income and output.

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 400 - 0.8[300])$$

$$Y = \frac{1}{0.2}\,(960)$$

$$Y = 0.5(960)$$

$$Y = 4\,800$$

Then government spending falling from 400 to 350, and taxation increasing from 300 to 350, the equilibrium output and income will be as follows.

$$Y = \frac{1}{1-c}\,(c0 + G - cT)$$

$$Y = \frac{1}{1-0.8}\,(500 + 300 + 350 - 0.8[350])$$

$$Y = \frac{1}{0.2}\ (870)$$

$$Y = 0.5(870)$$

$$Y = 4\ 350$$

The impact of the contractionary fiscal policy is to decrease the level of output and income by 450. The impact of the budget deficit is as follows: Before the implementation of a contractionary fiscal policy the budget deficit was: G – T = 400 – 300 = 100. After the implementation of a contractionary fiscal policy the budget deficit is: G – T = 350 – 350 = 0. The budget deficit therefore decreases by 100 and we have a balanced budget. The graphical presentation of decline in equilibrium output and income is illustrated below.

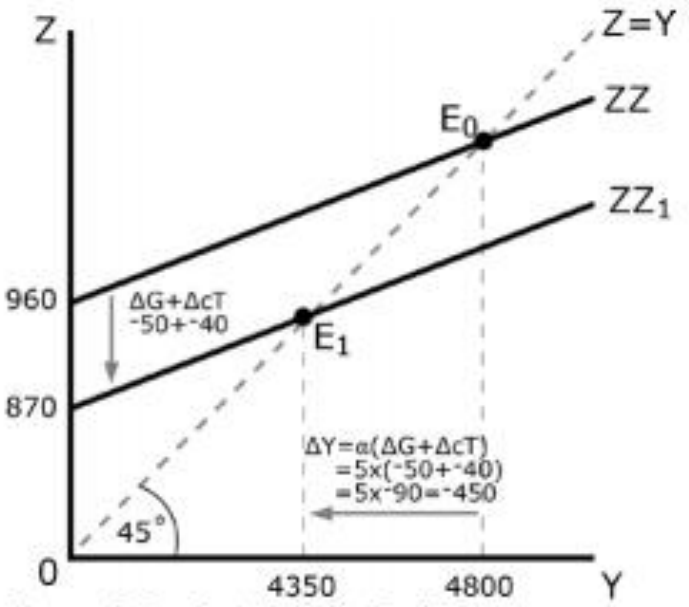


Diagram 2.15: Contractionary fiscal policy

The decrease in autonomous spending is the decrease in G plus cT = 50 + 40 = 90. The downward shift in the ZZ curve is equal to 90 and the vertical intercept is equal to 870 and the equilibrium level of income decreases to 4 350.

Part 2.5 of the Learning Guide

USING FISCAL POLICY TO REACH FULL EMPLOYMENT

The aim of this part is to illustrate how the expansionary fiscal policy can be used in-order to reach full employment. Full employment can be described as a situation in which all available resources (labour, capital, land and entrepreneurship) are used to produce goods and services, and this is one of the macroeconomic objectives. This goal is commonly indicated by the employment of labour resources (measured by the unemployment rate) which, when reached, implies a low level of unemployment which is mainly caused by normal frictions in the economy.

The diagram below shows the equilibrium point Y_0, given the marginal propensity to consume and autonomous spending. The equilibrium output and income is less than the full employment equilibrium output and income. The equilibrium point in the diagram below, illustrate a state of unemployment, represented by the gap between Y_0 and Y_F.

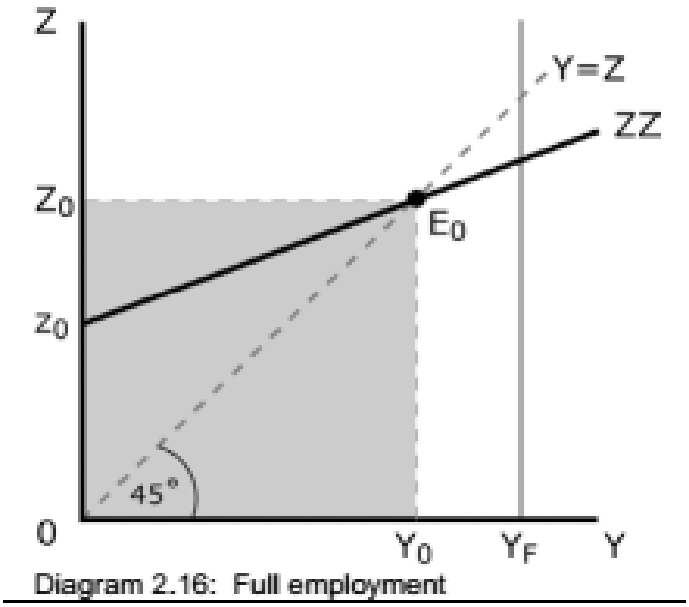


Diagram 2.16: Full employment

ACTIVITY 2.42 From the workbook

Using government spending to reach full employment

Assume that the economy is in equilibrium at an output and income level of 6 000, and that the full employment level is 9 000, while the marginal propensity to consume is 0.8 giving us a multiplier of 5.The gap between the equilibrium level of output and income and full employment is 9 000 – 6 000 =3 000.

By how much should government spending increase to ensure that full-employment is reached? By 3 000, by less than 3 000, or by more than 3 000?

The correct answer is 600. Why 600? Since we have a multiplier of 5 this implies that, for every 1 unit increase in government spending, output and income increase by 5 units. Since the gap is 3 000 units we need to increase government spending by 3 000/5 = 600. This can also be illustrated through the use of the following diagram.

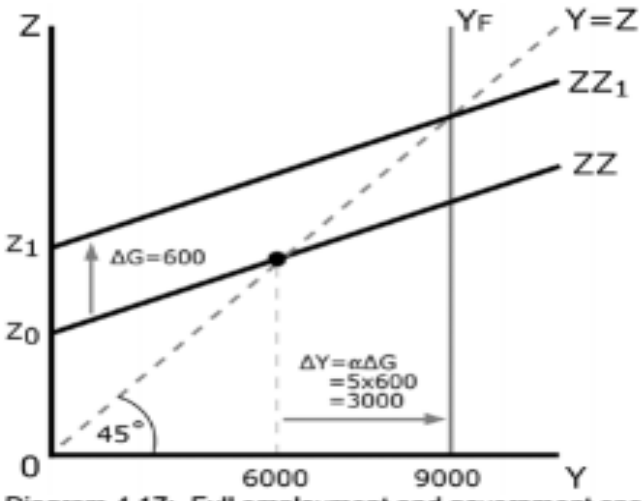


Diagram 4.17: Full employment and government spending

Using taxation to achieve full employment

A decrease in taxation increases disposable income and, as disposable income increases, households increase their consumption spending causing the demand for goods to increase further and a movement closer to full employment takes place.

Using the above example of an output and income level of 6 000, a full employment level of 9 000 and a marginal propensity to consume of 0.8 – which gives us a multiplier of 5 – the question is by how much should taxes decrease to reach full employment. By 600, by more than 600, or by less than 600? The answer is by more than 600 since taxes impacts the equilibrium level of output and income indirectly via the consumption function.

By how much should taxes then decrease to increase the income and output level by 3 000? One way to calculate it is as follows: 0.8(T) = 600**,** T = 600/0.8 = 750 The decrease in taxes should be 750 to ensure an increase in output and income of 3 000.

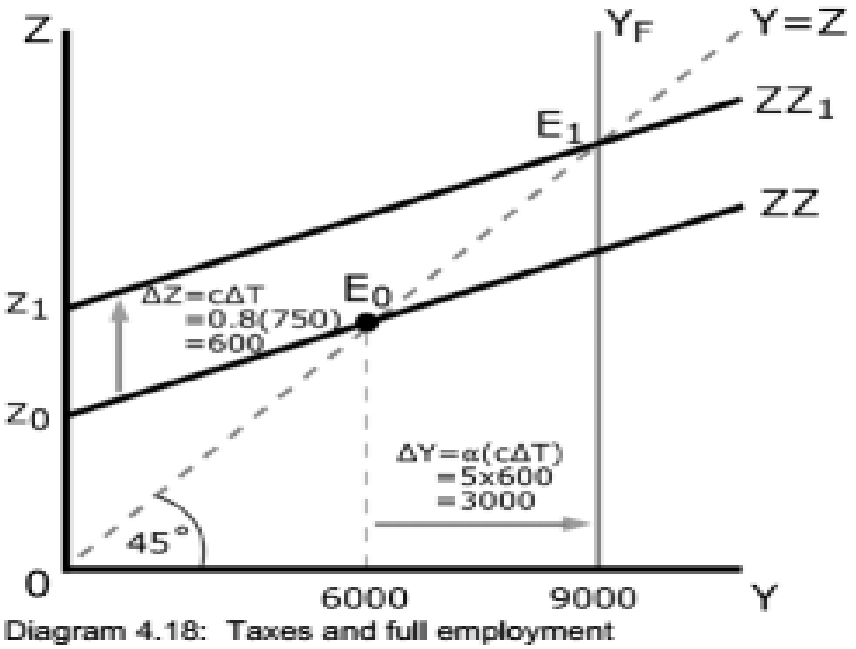


Diagram 4.18: Taxes and full employment

ACTIVITY 2.43 From the workbook

ACTIVITY 2.44 From the workbook

ECS 2602, PART 2.6

Balanced budget multiplier and the paradox of savings

It is very important to recognize that a balanced budget has an expansionary impact on the economy. A balanced budget is a situation that exist when the increase in government spending is equal to the change in taxes. This can be represented by the following function, ($\Delta G = \Delta T$). Our goal from here is to look on how equal increase in government spending and taxes will stimulate the level of output and income.

The reason why a balanced budget has a stimulus effect on the level of output and income is that, the increase in government is greater than the reversal multiplier effect that arise from increase in taxes. Let's have a look on an example to illustrate this concept.

Assume that we are still using the above information, taking a multiplier of 5, a 100 INCREASE in government spending will led to increase in income Y, by 500, which is 5*100, however, an increase taxes of the same amount will led to a decrease in income, with a smaller amount compared to the increase in income, because the multiplier effect will not work on the entire 100 decrease in taxes, instead it will work on cT, c being the marginal propensity to consume and T being taxes, as represented on the output function. This can as well be explained using equations for further illustrations,

Effects of Increase in government spending by 100

$$100 * 5 = 500$$

$$\boldsymbol{Effects\ of\ increase\ in\ taxes\ by\ 100}$$

$$0.8 * (100) * 5\ 400$$

Looking at the above equations, the effect of these two actions is a resultant 100 increases in the level of output and income, which is 500-400. This explanation can also be represented in the diagram below. In the diagram below, increase in government spending of 100, is illustrated by an upward shift in ZZ, from to ZZ1, with a 100 increase in G, shown by the arrow ΔG. This also creates an autonomous increase in the demand for goods market, represented by a shift in the vertical intercept from Zo to Z1. On the opposite side, an increase in taxes by the same amount of

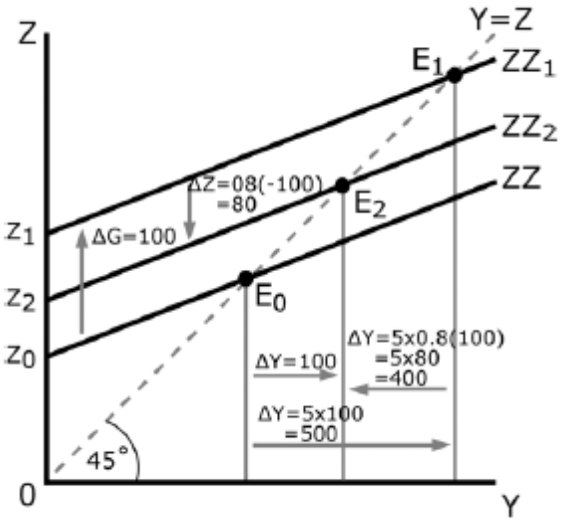


Diagram 2.19: Balanced budget multiplier

100, will force the demand for goods curve ZZ1 to move downwards fromZZ1 to ZZ2, by the value of 80, which is 0.8(100). Looking on the horizontal axes, the 100 increases in government spending will income by 500, while increase in taxes will force the income to decrease by 400 and the net resulting effect will be 100. In conclusion, we are going to say, the balanced budget multiplier is equal to 1, implying that for every 1-unit increase in government spending, output and income increase by 1-unit.

Activity 2.45 from the Workbook

The paradox of savings

The argument behind the paradox of savings is that, if households increase their savings, the level of output will decrease and households will end up with the same amount of savings. The assumptions are that increase in savings can led to decrease in consumption spending. Then the decrease in consumption spending decreases the demand for goods. In the end, the level of output and income will decrease as well. Furthermore, savings will further decrease as income and spending decrease because it is believed that savings is a function of income and output.

Activity 2,46 from the workbook

Part 2.7 of the learning Guide

Unemployment and the limitations of demand policies

The theoretical assumptions of the goods market, suggests that to solve the unemployment problem, the government should increase the level of autonomous consumption level, until the level of full employment is reached. However, there are numerous limiting factors, since unemployment is caused by various factors that require specific remedies.

Structural unemployment requires a different remedy

The remedies for unemployment problem are determined by the type of unemployment the country will be experiencing. However, when the causes for unemployment arise from deficiency in the demand for goods, an increase in demand for goods may be used to address the problem of unemployment. However, most of unemployment problems are not demand deficiency caused instead the causes of unemployment are more structural.

Structural unemployment occurs when there is a mismatch between workers' qualifications and job requirements, or when jobs disappear because of structural changes in the economy. Often, structural unemployment is usually restricted to a certain industries, sectors or categories of workers and is caused by factors such as a lack of education, training and skills, changes in production methods and techniques, changing consumer preferences, foreign competition, structural decline in certain industries and discrimination.

It takes more than an increase in the demand for goods to solve structural unemployment. An increase in demand for goods might create job opportunities, but might also lead to a situation where there are more job opportunities and more unemployed people to fill the available jobs due to lack of skills and training. Lack of appropriate training, qualified and skilled workforce also places a constraint on the ability of an economy to create jobs. The economy will be supply constrained and demand policy alone is not enough to solve this type of unemployment.

Jobless growth

It is not always possible to decrease the level of unemployment, through demand for goods methods, because the demand for goods may increase the level of output and income, that creates more economic growth, but this increase in the level of income and output might not necessarily mean increase in employment opportunities.

Wage increases might upset the chart

The use of demand for goods policies may led to inflation pressures more often when there supply side of the economy is so constrained. Increase in demand policies will force upward movement in the level of wages is the economy.

A Budget Deficit Constraint

Trying to solve the unemployment problem with demand for goods has a tendency of widening the budget deficit of the country, mainly because increase government spending to stimulate the economy might to increase in government borrowing.

Crowding out might occur

Increase in demand for goods as a way of solving unemployment problem may lead to the crowding out effect problem. The problem exists when the general interest rates in the economy increases due

to increase in demand for finance by the government. This will force the private sector to obtain sources of finance at affordable interest rates and thus reduce the demand for goods in the end.

The balance of payments might act as a constraint

Given a situation where the country's' marginal propensity to import is high, the solution of solving the country's' unemployment will not work, because the expansionary policies by the government will just led to increase in the quantity of imports, rather than increasing production in the local economy.

Activity 2.47 from the Workbook

The Financial Market

Learning Number 3

3 Introduction

The goals of this learning unit are to explain in words and by means of chain of events, equations and diagrams, how the interest rates are determined. In addition, we seek to explain in words and by means of a chain of events, equations and diagrams, what causes a change in the interest rate, as well as explaining in words and by means of a chain of events, equations and diagrams, the impact of monetary policy on the interest rate. In short, the South African monetary policy will be explained as well. The portfolio model that illustrate the demand and supply of money will be used to explain and show how the interest rates will be determined in the economy.

3.1 PORTFOLIO DECISONS

In explaining the portfolio theory, it is important to identify the differences between money, income and wealth. In which case money refers to anything that can be used as a medium of exchange and for the repayments of debts, while wealth refers to all the assets that we have and tend to include money we have as well and cars, houses. However, it is important to remember that money is not

wealth. On the other hand, income refers to the rewards of factors of production that which we earn from labour as wages and salaries, rent from land, interest on capital.

Portfolio decisions

These are the decisions in which the economic participants decide on holding more money as the store of wealth or holding other assets rather than money. Some of the assets which the individual may hold include shares or bonds. In deciding to hold more money or less money the individual will be making a portfolio decision. In the portfolio theory, for simplicity sake we are going to assume that there are only two type of assets money and bonds. Such that an increase in the demand for money implies a decrease in the demand for bonds. If a market participant wishes to hold more money, this also implies that he or she wishes to hold fewer bonds and vice versa. Equilibrium in the portfolio theory will be achieved when the demand for money and demand for bonds are all equal, which implies that the supply of the bonds will also be equal to the supply of money.

In analyzing this theory, we are going to look on the factors that determine the individuals demand for money and bonds, by taking a closer look on the determinants of demand for money.

3.2 THE DEMAND FOR MONEY

The determinants of demand for money can sometimes be called the motives of holding money. In short, these motives in economics are divided into two main categories, namely the active balances and the passive balances. According to the prescribed textbook, demand for active balances is influenced by people's need to do transactions, while the demand for passive balances is related to the need to keep wealth in the form of money. When money is used as store of wealth, it is assumed to be a financial asset, which is the most liquid financial asset. And thus, where the theory of liquidity preference arises from.

Demand for active balances

This is the demand for money that is influenced by the desire to hold money for transaction purposes and tend to come in two ways. Transactions are done on daily, weekly or monthly intervals, or sometimes when we uncertain event like sickness or death. From these concepts arise the need to separate the active balances into transactional demand for money and precautionary demand for money. It is important to remember that, the active balance demand for money are influenced by the income of individuals and income of the whole economy.

According to the study guide, the higher the level of output and income in the economy, the more transactions there will be. As the level of output increases, the income of households also increases

and they will want to do more transactions. They will therefore need more active balances and their demand for money will rise. As producers produce more output they will need more money to finance their transactions as well. We all know that income is represented by Y, while the demand for money is represented by M_d, such that we are going to have the following chain of events, as the income in the economy changes.

$$Y\uparrow \Rightarrow \text{active transactions}\uparrow \Rightarrow M^d\uparrow$$
$$Y\downarrow \Rightarrow \text{active transactions}\downarrow \Rightarrow M^d\downarrow$$

The above equations illustrate that as income increases shown by the arrow pointing upwards, the active transactions in the economy will also increase, as well as the demand for money, while the one below shows that the decline in income as shown by the arrow pointing downwards, the active balances will fall, as well as the demand for money as illustrated by the arrow pointing downwards.

Demand for passive balances

The demand for passive balances, like the name states shows that these are weak demand balance. This is the demand for money that is related to the purchase of bonds, when people demand the money so that they can keep their wealth in the form of bonds rather that liquid asset of money. We refer this kind of demand for money as the speculative demand for money. This calls for the introduction of another assumption on top of the assumption of two assets model, which sates that only the bonds are the interest earning assets, in which money do not earn any form of interest. Such that the economic participants will choose to hold money as the most liquid asset but forgoing the interest that could have been earned when the same money could have been used to purchase bonds. Precisely, we will conclude that the higher the interest rates the higher the opportunity cost of holding money as the liquid asset, since it does not earn interest.

From the discussion above, we can now conclude that there is a negative relationship between the demand for money and the level of interest rates in the economy. As stated in the study guide, an increase in the interest rate reduces the quantity of money demanded and a decrease in the interest rate increases the quantity of money demanded, giving us the following chain of events, in regard to the passive demand for money.

$$i\uparrow \Rightarrow \text{passive demand for money}\downarrow \Rightarrow M^d\downarrow$$
$$i\downarrow \Rightarrow \text{passive demand for money}\uparrow \Rightarrow M^d\uparrow$$

Demand for money as an equation

Using the information contained in the above discussion, we can try to represent the demand for money in the following equation, where we argue that, the demand for money is a function of the nominal level of output and income and the interest rate.

$$M^d = RYL(i)$$
$$+ \quad -$$

The RY represents for the nominal income in rands, and the positive sign under the RY, suggests that there is a positive relationship between the demand for money and the level of output and income, while on the other hand the negative sign under i, illustrates the negative relationship between interest rate and the demand for money.

The demand for money diagram

The inverse relationship between the demand for money and the interest rate will be illustrated by the following downward sloping demand curve in the diagram below, where we have the interest rate on the vertical axis and the demand for money on the horizontal axis. The movement along the demand curve, illustrates that the quantity demand changes as the interest rate changes, such that we can conclude that increase in the interest rates from i1 to i2, lead to decline in the quantity demanded for from M1 to M2, as shown by the diagram below.

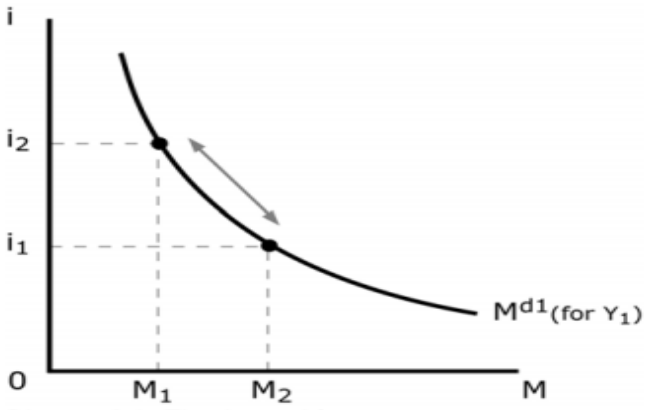


Diagram 3.1: The demand for money

It is important to remember that, the position of the money demand is determined by the positive relationship between the level of output and income and the demand for money. Such that at an output and income level of Y1, the money demand curve is Md1, as shown by the diagram below.

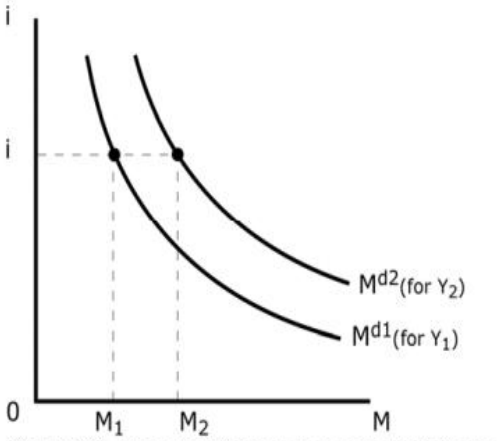


Diagram 3.2: The demand for money and a change in income

As the level of output and income increases from Y1 to Y2, the demand for active balances increases as financial participants wish to do more transactions. At each interest rate the quantity of money demanded is therefore higher and a rightward shift of the money demand curve takes place.

It is also important to remember that there is a difference between the change in money demanded as well as the change in quantity demanded. Change in demand for money firstly, we can say it arise from the rightward shift or leftward shift in the demand curve for money, while the change in the quantity demanded for money is illustrated by the movement on the same demand curve, as the interest rate changes. We can also differentiate between the two by suggesting that, the change in demand shown by the shifts in the curve results from the change in income, rather than the change in the interest rate. Income here is representing an exogenous variable.

3.3 THE MONEY SUPPLY

In this section we are going to discuss the money supply as an exogenous variable, as well as explaining it through the use of an equation and illustrating in the form of a diagram. The notion that money supply is exogenous rest on the assumptions of the traditional view that, the supply of money is controlled by the central bank, calling for a vertical money supply curve as illustrated by the curve below.

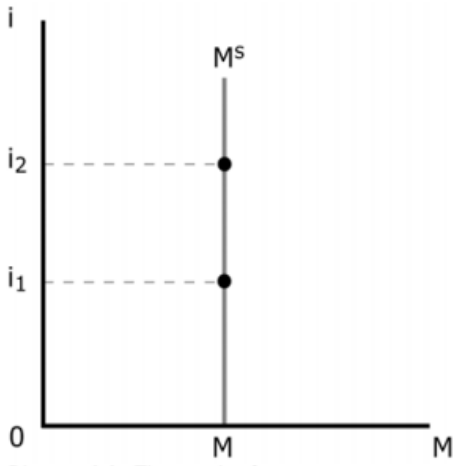


Diagram 3.3: The supply of money

By assuming that it is the central bank that determines the money supply in the form of a vertical demand curve, we are going to have a perfectly inelastic supply curve, shown above, which explains the argument that, the interest rates don't determine the level of money supply in the economy, instead it is the central bank. Such that the rise in interest rate from i1, to i2 did not lead to any change in the supply of money, instead it remained constant at M. An increase in the supply of money is indicated by a rightward shift of the money supply curve M_s showing that at each interest rate the money supply is higher. A decrease in the money supply is indicated as a leftward shift of the supply of money curve showing that at each interest rate the money supply is lower.

On the other hand, we have another theory which suggests that, money supply is demand determined, implying that the demand for money by the non-banking private sector do determine the money supply in the economy. Assuming that the demand for money by the non-banking private sector determines the money supply, we will conclude that the supply of money is endogenous. By saying endogenous we imply that money supply we be determined by inside the model, rather than outside the model by the central bank.

3.4 EQUILIBRIUM IN THE FINANCIAL MARKET

Equilibrium in the financial markets suggests that the amount of money people hold and the bonds they hold, at any given level of output and income and the interest rates are equal. On the other hand, equilibrium will imply that people might be holding too much money and less bonds or that there are holding less money and too much bonds. In this module will explain equilibrium as the point where the quantity of money demanded equals the quantity of money supplied, and this can be represented in the form of equation as shown below.

$$M = M^d$$

In which case, in the above we suggested that, the demand for money can be represented with the following, such when M^d is used to replace YL(I), the equation will be represented by the second equation, moving from the first one.

$$M^d = RYL(i)$$
$$+ \quad -$$

The condition of equilibrium in the financial market states that the quantity demanded for money is equal to the quantity supplied of money, and will be illustrated by the equation below, as has been explained above.

$$M = YL(i)$$

Graphically, this can be represented where the demand curve for money intersect the supply of money graph, to be specific at point a, in the diagram below. At point a, quantity demanded for money and quantity supplied of money is equal, and there is no tendency or desire to move away from this position. The desire to move away from this equilibrium point will only arise when the level of output and income changes, or when there is a change in the money supply. The graph below shows the equilibrium point.

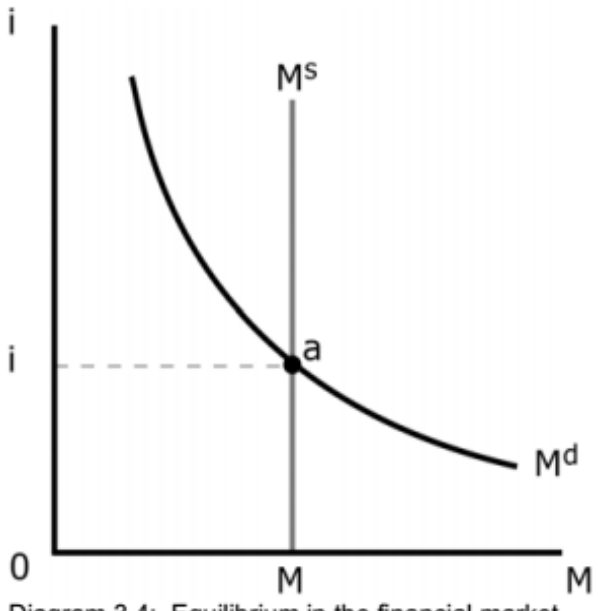
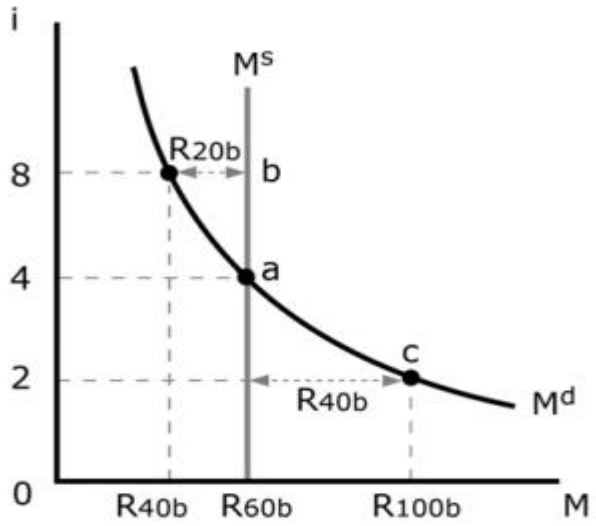


Diagram 3.4: Equilibrium in the financial market

A more detailed graph is used to explain equilibrium in the financial markets, in which case excess demand for money and excess supply of money are all illustrated. It is important to remember the meaning of these concepts, like excess demand for money and excess supply of money.



Excess supply of money exists at interest rate level 8%, such that the excess supply is equal to 20billion, while at interest rate 4% the market is equilibrium and there is no tendency or desire for the markets to move from this position. On the other hand, at interest rate level 2%, there is excess demand for money, which is equal to 40 billion, since people are willing hold less money. In order to go back to the equilibrium position from excess supply point at b, interest rate will have to fall, under equilibrium point is reached again, while on the on the other, from point of excess demand at c, a rise in the interest rate will be required to push the market back to its equilibrium position at a.

The impact of a change in income

According to the study guide, an increase in the level of output and income increases the demand for money. The money demand curve shifts from Md1 to Md2 indicating that, at each interest rate, the demand for money is higher. At the initial interest rate of i1 an excess demand for money occurs, as represented by the distance between point a and point b. This excess demand for money causes an increase in the interest rate and an upward movement along the money demand curve occurs until a new equilibrium is reached at point c with a higher interest rate i2, as shown in the diagram.

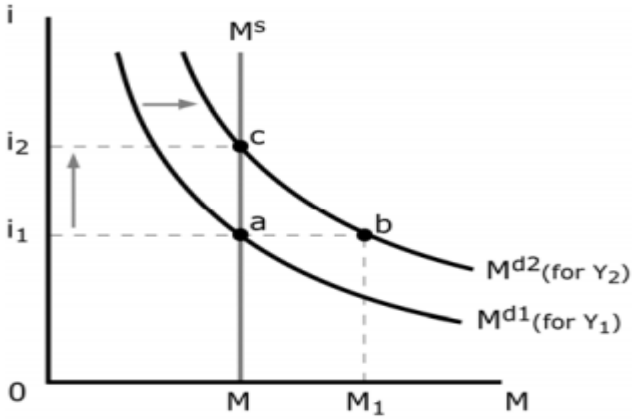


Diagram 3.6: A change in income and the interest rate

An increase in the money supply

In the discussion above, we have stated the supply of money will be determined by the central bank, increase in the money supply is shown below.

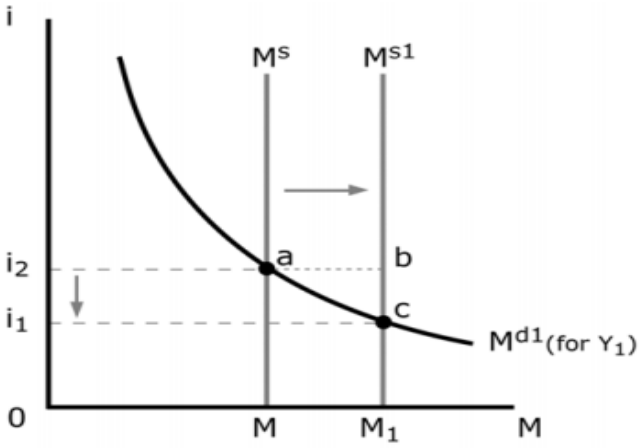


Diagram 3.7: An increase in the supply of money

Increase in the money supply will lead to a decline in the level of interest rate in the economy from i2 to i1, as the money supply increase from M to M1.

3.5 ADJUSTMENT PROCESS IN THE FINANCIAL MARKET

In this part we are going to discuss the relationship between price of bonds and the interest rates, as well as the adjustment in the financial markets that arise due to changes in the demand for money, and the effects of change in supply on the financial markets.

Price of bonds (treasury bills) and the interest rate

In trying to understand the adjustment process in the financial market, it is important to acknowledge that there is an inverse relationship between the level of interest rates and the prices of bonds. Such that the increase in interest rates will lead to a decline in the prices of bonds. On our bonds market, the interest rate is determined through the price of bonds, which are sometimes called treasury bills, Treasury bills are traded on a discounted basis and redeemed at par on the maturity date. "Redeemed at par" simply means that the holder of a treasury bill with a face or nominal value of R100 000 is entitled to R100 000 on the date of maturity. "Traded at a discount" means they are issued on the primary market (the market on which new treasury bills are issued) or traded on the secondary market (the market in which existing treasury bills are traded) at a discount on their face value. In other words, a treasury bill with a face value of R100 000 will be traded for less than R100 000. By how much less will depend on the conditions in the bond market.

While a treasury bill does not promise to pay interest, the price paid for treasury bills determines its rate of return – which is the interest rate in our model. The rate of return on treasury bills serves as a benchmark indicator of financial market conditions and acts as a reference rate for the calculation of

interest rates on many financial market assets. To calculate the rate of return (the interest rate) on a treasury bill, you need the following information:

- The face value of the treasury bill (i.e. the amount it promises to pay)
- The price paid for the treasury bill,
- The time to maturity

Assuming that you buy the bond today and the time to maturity is one year, the formula for calculating the rate of return on this treasury bill is as follows:

$$i = (RPb_{t+1} - RPb_t)/RPb_t$$

Where i, is the interest rate, RBb_t+1 is the price at the end if the period (sometimes called the face value of the bond), RBb_t is price paid for the treasury bill at the beginning of the period. Assuming that the face value of a treasury bill is R100 000, that the price paid for it is R95 000, and that the date to maturity is one year, you can calculate your rate of return as follows:

$$\frac{R100\,000 - R95\,000}{R95\,000} \times \frac{100}{1}$$

$$= 5.26\%$$

Assuming that the price of the bond is R98 000, in the beginning of the period, the rate of return will be calculated as follows,

$$\frac{R100\,000 - R98\,000}{R98\,000} \times \frac{100}{1}$$

$$= 2.04\%$$

Assuming that the price of the same bond was R90 000 beginning of the year, the rate of return of this bond will be equal to 11.11% as calculated below.

$$\frac{R100\,000 - R90\,000}{R90\,000} \times \frac{100}{1}$$

$$= 11.11\%$$

From the above calculations we can deduce that, the chain of events will be as follows, when the price of treasury bills (bonds) increases, the rate of return (the interest rate) on that particular bond will increase, while on the other hand, the decline in the price of the bonds will lead to increase in the interest rate (the required rate of return) on the bonds facing the decline in the price.

$P_B \uparrow \Rightarrow i \downarrow$ $P_B \downarrow \Rightarrow i \uparrow$

Adjustment process: Change in income and the equilibrium interest rate

An increase in the level of output and income increases the equilibrium interest rate. In trying to explain this relationship, we are going to use the following diagram, where an increase in income increases the demand for money for transaction purposes. At the existing equilibrium interest rate (i1), an excess demand for money develops in the economy because people wish to hold more money for transaction purposes than before. To acquire this money for transaction purposes, treasury bills are sold and the supply of treasury bills increases on the market. An increase in the supply of treasury bills reduces the price of treasury bills and increases the interest rate. At this higher interest rate, there is a decrease in the amount of money people wish to hold treasury bills as an asset (movement from point b to point c.

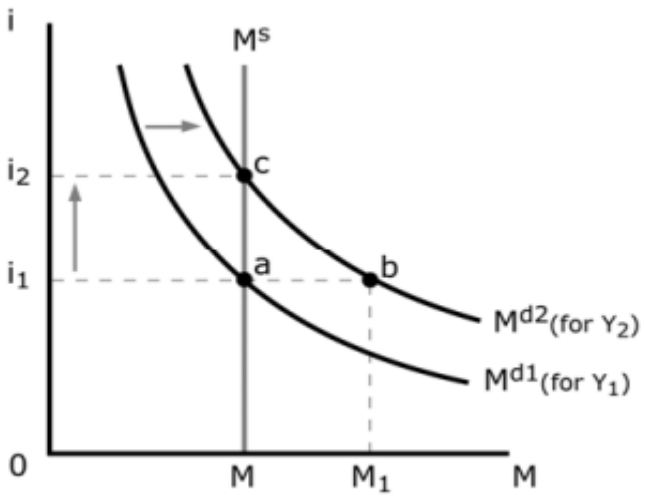


Diagram 3.8: Adjustment to equilibrium

This explanation can also be illustrated through the use of numerical example, which does have the following graph with some figures on it,

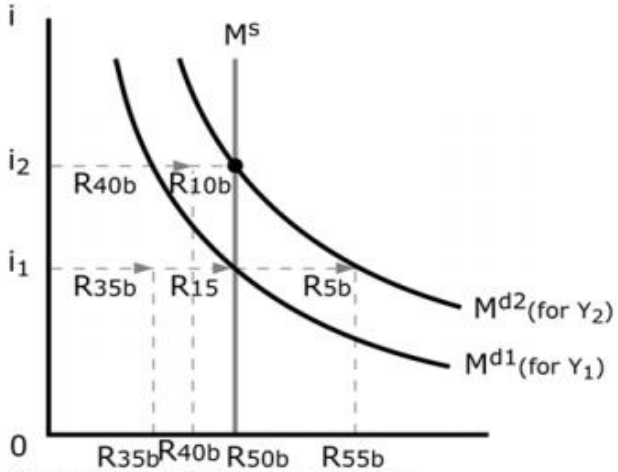


Diagram 3.9: Adjustment to equilibrium

Assume the money supply is R50 billion as indicated in the following diagram. People are holding this R50 billion in order to do transactions to the value of R35 billion (active balances) and the rest, R15 billion (passive balances), as an asset. An increase in income increases the demand for transaction purposes to, say, R40 billion. In order to acquire the extra R5 billion, the people who hold money as an asset need to be convinced to make this money available to the economy since the money supply is fixed. This is done by lowering the price of bonds, which implies a higher rate of return on holding bonds. The opportunity cost of money has increased. The price of bonds and the interest rate will be set at a level that ensures that the R5 billion needed for transactions is made available to the economy. At this new equilibrium position, the money supply is still R50 billion, but the amount that is held as an asset is now equal to only R10 billion, while the rest, the R40 billion, is kept for transaction purposes. The combination of active balance and passive balances has changed. An increase in the interest rate is therefore needed to reduce the amount of money that people wish to hold as an asset.

Chain of events

The increase in the income on the financial market will lead to the chain of events, which suggests that, the increase in income, will increase demand for money, which will lead to decrease in the prices of bonds and then increase in the interest rates, as represented below.

$$Y\uparrow \Rightarrow M^{d}\uparrow \Rightarrow P_{B}\downarrow \Rightarrow i\uparrow$$

Impact of an increase in the supply of money

Increase in the money supply in the financial markets leads to the increase in the money people are holding represented by the distance between a to b. This can sometimes be called excess supply of money, such that people will decide to get rid of this money by buying the bonds. As more people try to buy more bonds, the price of bonds will rise, the general principle of demand which states that increase in demand lead to increase in the prices. As a result, the interest rate on these bonds will fall due to the increase in their prices, as the individuals will be willing to hold more money and this will be shown by the downward movement along the demand curve in the diagram below.

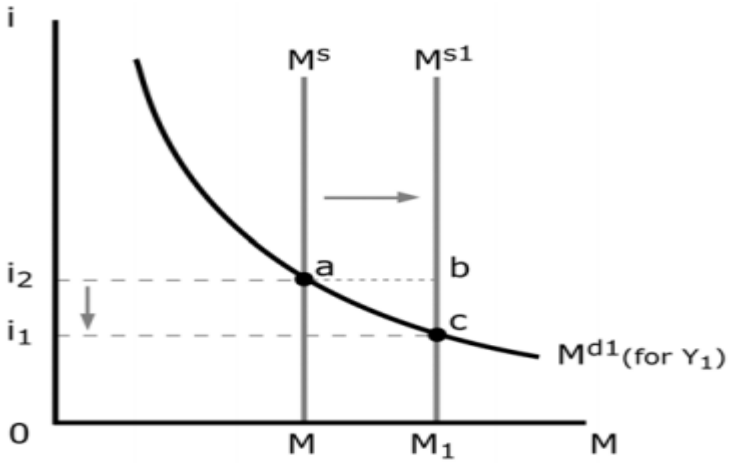


Diagram 3.10: Increase in the supply of money

The chain of events that arise from the increase in money supply will be illustrated as follows, in the sense that, increase in money supply lead to increase in demand for bonds, which will lead to increase in the price of bonds, and thus in the end fall in the interest rates, as shown in the following chain of events.

$$M^s\uparrow : D_B\uparrow \Rightarrow P_B\uparrow \Rightarrow i\downarrow$$

3.6 MONETARY POLICY IN THE FINANCIAL MARKET

Monetary policy can be defined as measures taken by the monetary authorities to influence the quantity\ of money or the rate of interest with a view to achieving stable prices, full employment and economic growth. In South Africa, the monetary authorities are the South African Reserve Bank (SARB) and the National Treasury, with the Governor of the SARB and Minister of Finance as the principal decision makers. This chapter will only concentrate on the use of open market operations in trying to achieve the goals of the monetary policy. In simple terms, open market operations refer to the buying and selling of the treasury bills by the central bank with the aim of influencing the money supply and interest rates in the economy.

How the central bank increases the money supply to reduce the interest rate in the economy

By purchasing the treasury bills from the public, the central bank will increase the money supply, since the central bank will be paying for these bonds with cash and taking away the bonds from the hands of the people, on the other, the selling of the treasury bills by the central bank will lead to decline in the money since the public will be holding the bonds (paper) and thus giving the central bank the money. This explains how the central bank can increase or decrease money supply in the economy.

In trying to reduce the interest rates in the economy the central will offer the public a higher price on the bonds which the public holds. With a higher price being offered, the public will sell their bonds to

the central bank. In the process the money supply will then increase, the interest rate will then fall. This can be represented by the following chain of events, which suggests that the rise in the money supply will lead to increase in the demand for bonds, and increase in the price of the bonds, as the central bank encourage more people to sell their bonds, and in the end the interest rate will fall.

$$M^s\uparrow: D_B\uparrow \Rightarrow P_B\uparrow \Rightarrow i\downarrow$$

How the central bank reduces the money supply to increase the interest rate in the economy

In trying to reduce the money supply in the economy the central bank will need to sell the treasury bills to the public. In sell the treasury bills, the central bank will be taking money from the public and thus reduces the level of money supply in the economy. When the central bank wants to reduce money supply it will convince the public buy the treasury bills, the central bank will lower price of the treasury bills, and the interest rates will rise and more people will hold more treasury bills and less money.

In writing this in the form of a chain of events, we are going to say that, in the bond market, the central bank will lower the price of the bonds to encourage people to buy more bonds, as the people will be buying more bonds, the money supply will be decreasing, with supply of bonds increasing and the price of bonds decline with an end result of increase in the interest rate, as shown by the following chain of events.

$$M^s\downarrow: S_B\uparrow \Rightarrow P_B\downarrow \Rightarrow i\uparrow$$

To reduce the money supply (Ms□), the central bank increases the supply of bonds (SB□), which causes a decrease in the price of bonds (PB□). The interest rate therefore increases (i).

The liquidity trap

The term liquidity trap explains the situation in which the low interest rate level will not influence the demand for money. It is at this moment where, demand for money curve is horizontal or completely elastic. Precisely, one would say that at this point an increase in the money supply will not have an impact on interest rate as shown by the diagram below. Increase in money supply from M2 to M3, will not change the level of interest rate on this region.

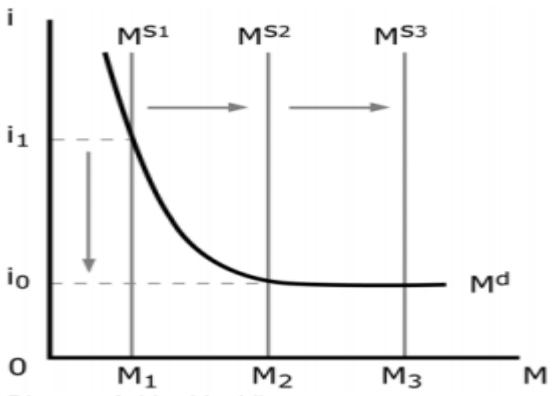


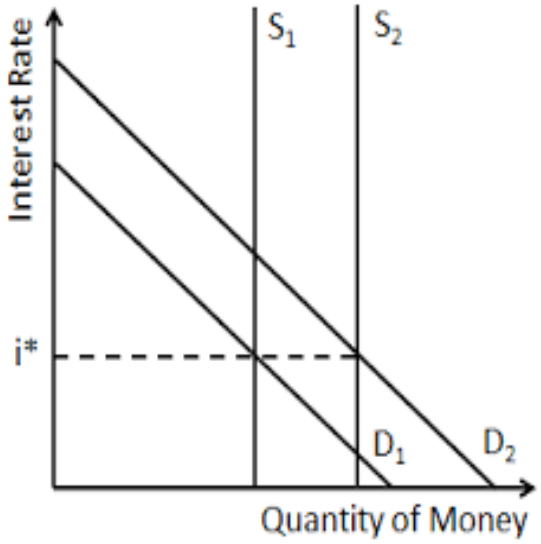
Diagram 3.11: Liquidity trap

3.6 SIMULTANEOUS CHANGES IN THE DEMAND AND SUPPLY OF MONEY

Simultaneous changes in the demand and supply of money will lead to different outcome, more importantly when we compare the effects of a change in one of the variables. As a result, we are going to discuss the decrease in demand for money that will be accompanied by increase in money supply, decrease in both demand and supply money, the increase in demand for money and decrease in supply of money and increase in demand for money and increase in the supply of money.

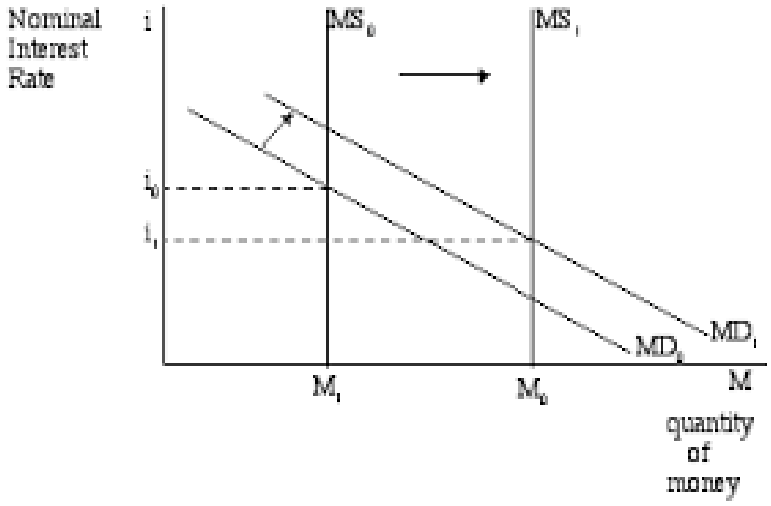
Increase in demand for money and increase in the supply of money

Assuming an increase in the economic growth which will lead to increase in the income and output, will lead to increase in the demand for money for transaction purposes. This increase in the demand for money will then lead to increase in the interest rates. If the increase in interest rates is not acceptable by the central bank, the central will use an expansionary monetary policy to offset the increase in interest rate. This whole explanation suggests that demand for money will increase and shifts to the right due to increase in economic growth, while on the other hand the supply of money will also increase and illustrated by a rightward shift in the supply curve due to the expansionary monetary policy.



The relative interest rate, at the new equilibrium will depend on the relative size of the shifts of the demand curve and supply curve of money. In the case above the relative shift size are equal to such an extent that the interest rate will remain on the same level. If the rightward shift of the supply curve is greater than the rightward shift of the demand curve, then the interest rate will be lower. However, if the rightward shift of the demand curve is greater than the rightward shift of the supply curve, then the interest rate will be higher.

The diagram below shows an increase in both the money supply and the demand for money, however the supply of money increased with a larger percentage as compared to the increase in demand and as a result the interest rate fell from i0, to i1 as shown in the diagram below.

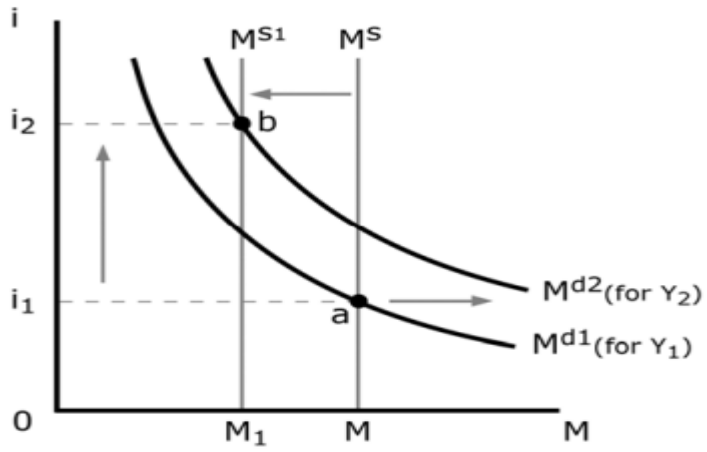


Increase in demand for money and decrease in supply of money

When it comes to the increase in demand for money and decrease in the money supply, the definite answer is the increase in the interest rates. Just like we did in the ECS1601, when we were looking on the simultaneous changes in the demand and supply. The only difference here is that we are

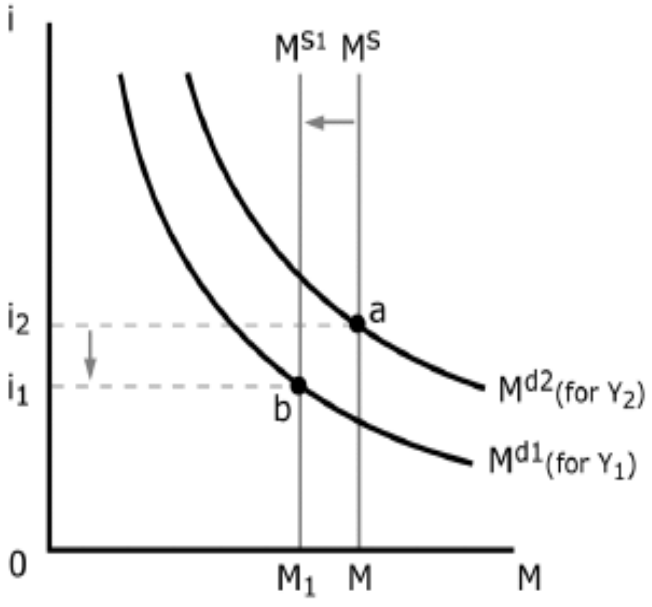
looking on interest rate rather than price. Increase in demand for money leads to the rightward shift in the demand curve, while the decrease in supply of money can be shown through a leftward shift of the supply of money curve as shown in the diagram below.

An increase in the demand for money and a decrease in the supply of money



Decrease in both demand and supply of money

The decrease in both the demand for money and decrease in the money supply will be to an indefinite level of interest rate, instead the rate of interest rate will be determined by the relative size of shifts of the demand and supply curve. Equal shift in the supply curve and demand curve will lead to no change in the level of interest rate, such that they remain the same. According to the study guide, the increase rate will fall, when the leftward shift in the demand curve is greater than the leftward shift in the supply curve. Thus the future interest rate after the fall will be lower compared to the current interest rate. On the other hand, the interest rate will be higher when the; leftward shift of the supply curve is greater than the leftward of the demand curve.



If the relative shift of the demand for money is greater than the shift of the supply of money the interest rate declines

Decrease in demand for money and increase in the money supply

When there is decrease in the demand for money and increase in the money supply, the demand curve for money will shift to the right, while the increase in the money supply will lead to a rightward shift in the supply curve. In this case interest rate will decrease.

3.7 EXOGENOUS AND ENDOGENOUS VARIABLES IN THE FINANCIAL MARKET

This section will assist us in understanding the examples of exogenous and endogenous variables in the economy. In this part we are going to look on the endogenous and exogenous factors that affects the interest rates. Firstly, we assumed that the money supply is determined by the central bank implying that, money supply is exogenous, such that nominal money supply is the exogenous factor that influences the interest rate. On the other hand, we do have other endogenous factors that do influence the demand for money. Endogenous factors that affects the interest grates include the factors that influences the interest rate through the level of output and income in the economy and other liquidity preference considerations.

3.8 THE CONDUCT OF MONETARY POLICY IN SOUTH AFRICA

To understand the conduct of monetary policy in South Africa we need to get rid of some of the assumptions of the above model and add some more information. In this module we use the traditional approach to monetary supply ─ we assume that the central bank controls the money supply in order to influence the interest rate. However in South Africa the South African Reserve Bank (SARB) controls the interest rate by using open market operations to adjust the money supply in order to influence the market interest rate. The major difference between the two approaches is that the traditional approach assumes money supply is exogenously determined by the central bank while the more modern approach used by the SARB assumes that money supply is endogenously determined by peoples decisions to hold currency or deposits. Note that the information that follows is to inform you about the way in which the SARB conducts monetary policy in South Africa, however for the purposes of the financial market model in this module we follow the traditional approach to money supply. The first assumption that must go is that money consists of currency only and the second assumption that the money supply is an exogenous variable under the control of the central bank.

Money consists of both currency (C) and demand deposits (D). A demand deposit is a bank deposit that can be withdrawn without notice ("on demand"). A demand deposit is created when a person deposits a sum of money with a bank, which then creates a demand deposit in favour of that person. Examples of demand deposits are current accounts, transaction deposits, debit cards, and so on. Demand deposits (D) constitute the main share of the quantity of money. It is due to demand deposits that banks are able to create money. To explain how banks create money we first need to look at the balance sheet of a bank.

Balance sheet of a Bank			
Liabilities		**Assets**	
Deposits	R100 million	Cash SARB reserves Loans	R2.5 million R5.5 million R92 million
	R100 million		**R100 million**

The cash that belongs to the bank is an asset for the bank. Deposits made by its clients are regarded as liabilities since it is money that the bank owes to its clients. Against every deposit the bank must keep a certain percentage as reserves with the South African Reserve Bank. These deposits with the South African Reserve Bank are therefore part of the assets of a bank. Loans are regarded as an asset since it is money owed to the bank by its clients.

Money is created by banks when a loan is approved and a demand deposit is created against this loan. If, for instance, you wish to buy a second-hand car for R50 000 and you do not have the cash available, you can approach a bank for a loan. If the bank approves the loan it then creates a demand deposit for you which you can use to pay the supplier of the second-hand car. When a bank creates this demand deposit for you, the money supply increases since the money supply consists of cash (C) plus demand deposits (D).

The money supply is now a function of the creation of demand deposits and is no longer exogenously determined by the central bank. For the central bank to influence the money supply it needs to influence this creation of demand deposits. In South Africa, the South African Reserve Bank does this mainly through the repurchase rate.

The repurchase rate – called the repo rate – is the rate at which private banks borrow money from the South African Reserve Bank. The repo rate in turn determines the interest rate on loans. An increase in the repo rate increases the interest rate on loans and, as the interest rate on loans increases, the amount of loans decline. Consequently, fewer demand deposits are created and the money supply decreases.

The South African Reserve Bank therefore influences the money supply indirectly by influencing the demand for money through changing the repo rate. If it wishes to decrease the money supply it increases the repo rate, and if it wishes to increase the money supply it decreases the repo rate. In this module we follow the traditional approach to money supply, which means that we assume the money supply is controlled by the central bank. A decrease in the money supply (resulting from the central bank selling bonds on the open market) will decrease the real money supply which results in an increase in the interest rate (because the supply of bonds increases on the bonds market, and so the price of bonds decreases and the return on holding bonds, or interest rate, increases):

Ms↑: SB↑ ⇒ PB↓ ⇒ i↑. In this module the central bank does not control the repo rate or any other interest rate directly (as the SARB does in practice in South Africa). The central bank influences the interest rate through the money supply. Therefore, when describing monetary policy, the chain of events cannot start with i – it starts with a change in Ms.

The IS-LM Model

Learning Unit 4

This learning unit combines the previous chapters and tries to analyse how the output and income, and the interest rate are determined in the short run by combining the good market with the financial market, the goods market being learning unit 2 while the financial market is learning unit 3. Using the IS-LM model, this chapter is going to explain in words, chain of events and diagrams, how the level of output and income is determined by the interaction between the goods market and the financial market. The use of the IS-LM model is used to explain in words and diagrams to explain the impact of fiscal and monetary policy on the level of output and income. Lastly, the IS-LM model will be used to explain the changes in the level of output and income in the South African economy.

I trying to understand these concepts, we are going to make some assumptions, firstly, we are going to start by assuming that there is a relationship between investment and interest rate and the level of income and output.

4.1 THE INVESTMENT RELATION

In this model we change the assumption that investment is only an autonomous variable to one where investment is a function of the level of output and income as well as of the interest rate. The reason for mentioning this is that, in the goods market, model we covered in the learning unit 2, investment was treated as an exogenous variable and was represented as follows.

$$I = \bar{I}$$

By incorporating the suggestion of this chapter, we are going to state investment spending as a positive function of the level of output and income and which has a negative relationship with interest rate. This is illustrated by the following function.

$$I = I(Y, i)$$
$$(+, -)$$

Investment and the level of output

There is a positive relationship between the level of output and investment. An increase in the level of output will require firms to invest more in order to maintain and meet the required level of production, thus a positive relationship between investment and income. The chain of events to represent this are as follows.

$$Y\uparrow \Rightarrow I\uparrow$$
$$Y\downarrow \Rightarrow I\downarrow$$

Investment and the interest rate

The higher the interest rate, the higher the cost of borrowing will be and the higher the opportunity cost of own funds will be. At the same time, the higher the interest rate, the lower the level of investment spending in the economy will be. One way to determine whether an investment project is worth undertaking is to compare the internal rate of return of the project (i.e. the rate of return earned from the investment) with the market interest rate (which is the interest cost of borrowed funds or the opportunity cost of own funds). If the internal rate of return is higher than the market interest rate, it would be profitable to undertake the investment.

If, however, the internal rate of return is lower than the market interest rate, it would not be worthwhile undertaking the project. (In other words, the cost of financing the project would be more than its return.) The higher the interest rate, the higher the cost of borrowing and the fewer the profitable investment opportunities will be. This is illustrated by the following example:

Project	Rate of return	Funding required
A	10%	R100 000
B	15%	R200 000
C	8%	R 50 000
D	4%	R150 000

At a market interest rate of 20%, none of the projects is profitable since the cost of funding exceeds the internal rate of return for each project. At a market interest rate of 13%, only project B is feasible since the cost of funding is lower than the expected return from the project. At an interest rate of 13%, the level of investment spending is therefore equal to R200 000. At a market interest rate of 9%, projects A and B are feasible and the level of planned investment spending at an interest rate of 9%

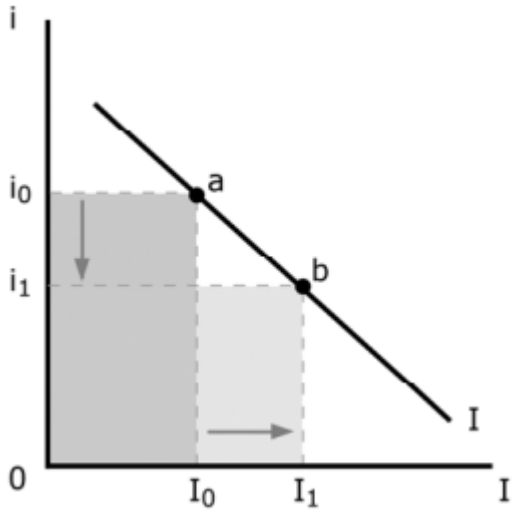
is equal to R200 000 + R100 000 = R300 000. At 5%, projects A, B and C are feasible and the level of planned investment is R350 000. At 2%, all the projects are feasible and the level of planned investment is R500 000. As the interest rate declines, planned investment spending in the economy increases.

Chain of events

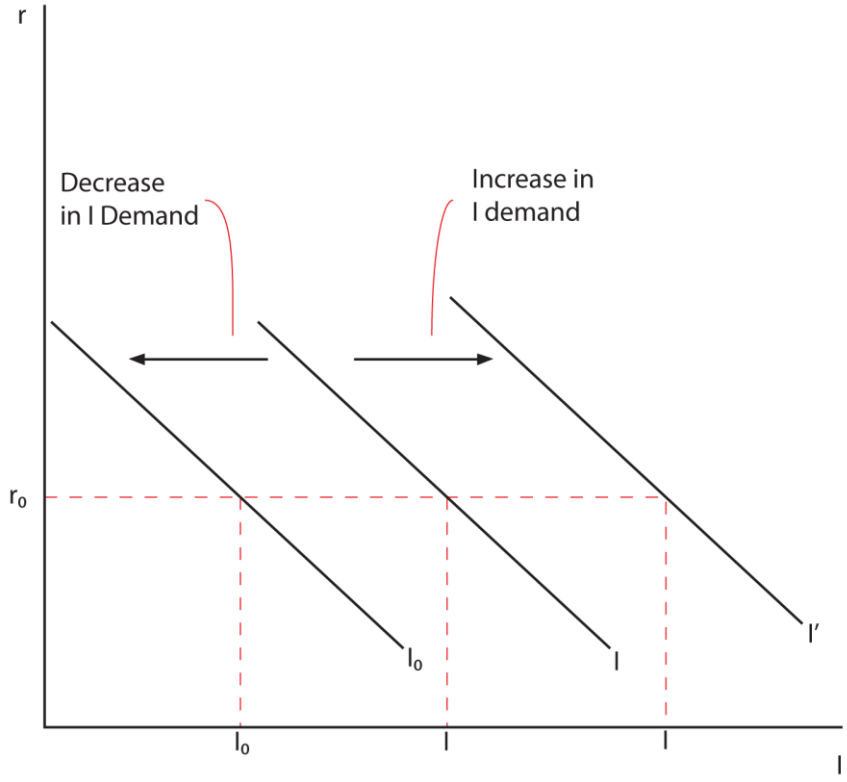
The chain of events will state that an increase in interest rate will lead to decline in the level of investment, while the decline in the interest rate will lead to increase in the level of investment as shown by the equations below.

$$i\downarrow \Rightarrow I\uparrow$$
$$i\uparrow \Rightarrow I\downarrow$$

Graphical representation of the relationship between interest rate and investment



A decrease in the interest rate from i0 to i1 increases investment from I0 to I1 and a downward movement along the investment curve from point a to point b takes place. There is a negative relationship between the interest rate and investment. If the interest rate declines, planned investment spending increases, and if the interest rate increases, planned investment spending decreases. There is therefore a movement along the investment curve. A shift of the investment curve takes place if any of the other factors, except the interest rate, that influence investment spending changes. For instance, a decline in business confidence and negative expectations will cause a leftward shift of the investment curve indicating that, at every interest rate, investment is lower.



4.2 EQUILIBRIUM OUTPUT AND INCOME IN THE IS-LM MODEL

In this part of the discussion we are going to look into the how the investment function in the goods market determine the equilibrium level of output and income, through explanation of the demand equation and equilibrium level of output and income.

Equilibrium output and income

In the IS-LM model the argument still holds that the demand for goods determines the level of output and that the demand for goods consists of consumption spending by households, investment spending by firms and government spending and is written as:

$$Z = C + I + G$$

Given that:

$$C = (Y - T)$$
$$I = I\ (Y, i)$$
$$G = G$$

The demand equation can now be written as:

$$Z = C\ (Y - T) + I(Y, i) + G$$

The equilibrium condition in the goods market is still:

$$Y = Z$$

And substituting Z with our new demand equation the equilibrium output and income is:

$$Y = C(Y - T) + I(Y, i) + G$$

From this equation we can see that a change in C, I or G will change the equilibrium level of output and income and that the multiplier is still in operation. The difference between the multiplier in the goods market model and the multiplier in this model is that, since investment is regarded as a positive function of output and income, a change in income not only causes a change in consumption spending but also a change in investment spending. The multiplier effect is thus stronger.

Equilibrium in the goods market diagram

Once investment is regarded as a positive function of output and income, a change in income not only causes a change in consumption spending, but also a change in investment spending. Our demand for goods curve therefore changes. This is shown by the diagram below.

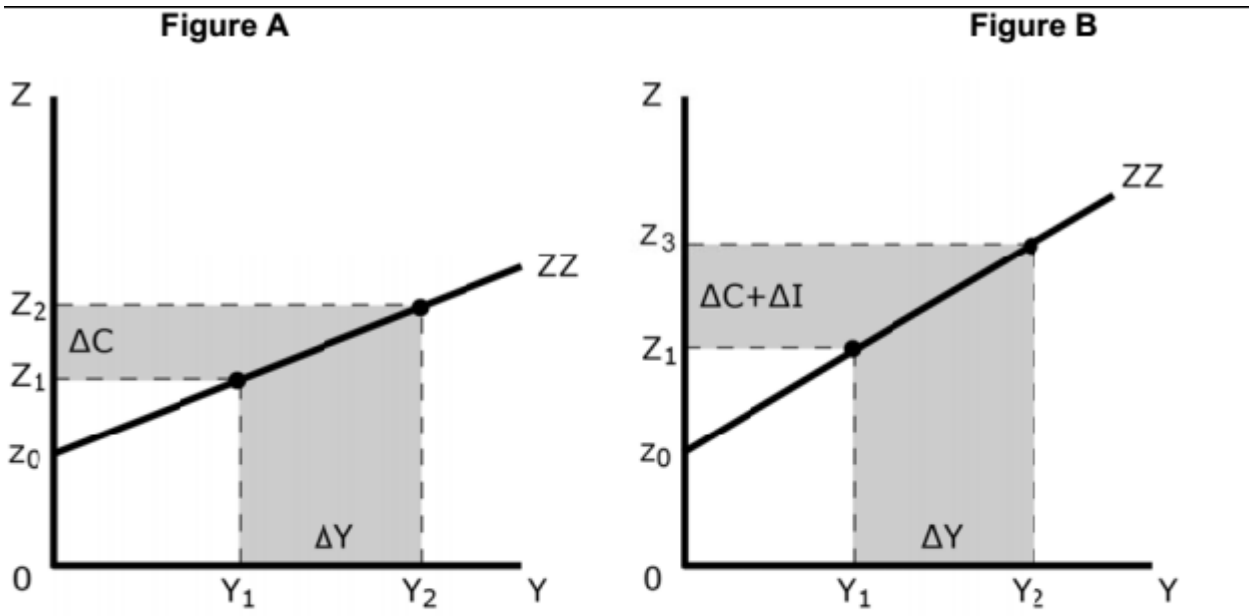


Diagram 4.2: Demand for goods

For a given increase in income from Y_1 to Y_2, consumption spending increases causing a change in demand for goods from Z_1 to Z_2.	For a given increase in income from Y_1 to Y_2, both consumption spending and investment increase, causing an increase in the demand for goods from Z_1 to Z_3

The increase in the demand for goods in figure B from Z_1 to Z_3 is greater than the increase in the demand for goods from Z_1 to Z_2 in figure A. The reason for this is that, in the case of figure B, both consumption spending and investment spending increase. This therefore also causes a higher multiplier effect. The ZZ curve in figure B is therefore steeper than the ZZ curve in figure A.

4.3 The IS Relation

In this s3ection we are going to give a description of the IS curve, describe the IS relation as an events chain, show how the IS curve is derived, as well as showing the movements along the IS curve and will also describe the factors that determine the slope of the IS curve.

Description of the IS curve

The IS curve shows different combinations of interest rates and levels of output where the goods market is in equilibrium. It is important to note that this curve represents the goods market and that, at any given point on the IS curve, goods market equilibrium exists.

Deriving the IS curve

The IS relation is derived from the goods market model that we covered in learning unit 2 and from the above investment function where investment spending is a function of the interest rate and the level of output and income.

Events chain

To derive the IS relation, we need to trace the impact of a change in the interest rate on the level of output and income. Taking the increase in interest rates as an example. An increase in the interest rate decreases investment spending since investment spending is a negative function of the interest rate. A decrease in investment leads to a decrease in the demand for goods, and through the multiplier effect, the level of output and income decreases. As the demand for goods and output decreases, both consumption spending and investment spending also decrease, and the multiplier process is in operation.

$$i\uparrow \Rightarrow I\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

The decline in output and income will lead to further fall in the level of investment, since there is a positive relationship between investment and income, with the following chain of events. investment spending decreases initially because the interest rate rises, and then because output declines. Consumption will also decline, because there is a positive relationship between consumption and investment, as shown by the second chain of events.

$$Y\downarrow \Rightarrow I\downarrow \qquad\qquad Y\downarrow \Rightarrow C\downarrow$$

Graphical derivation of the IS curve

In deriving the IS curve we are going to assume that the interest rate will increase, and the following diagrams will be used in deriving the IS curves, in which case figure A will be represents, and figure B representing the goods markets, where I = I(Y,i), figure C showing the IS curve. The change in the interest rate is the starting point of the derivation of the IS curve.

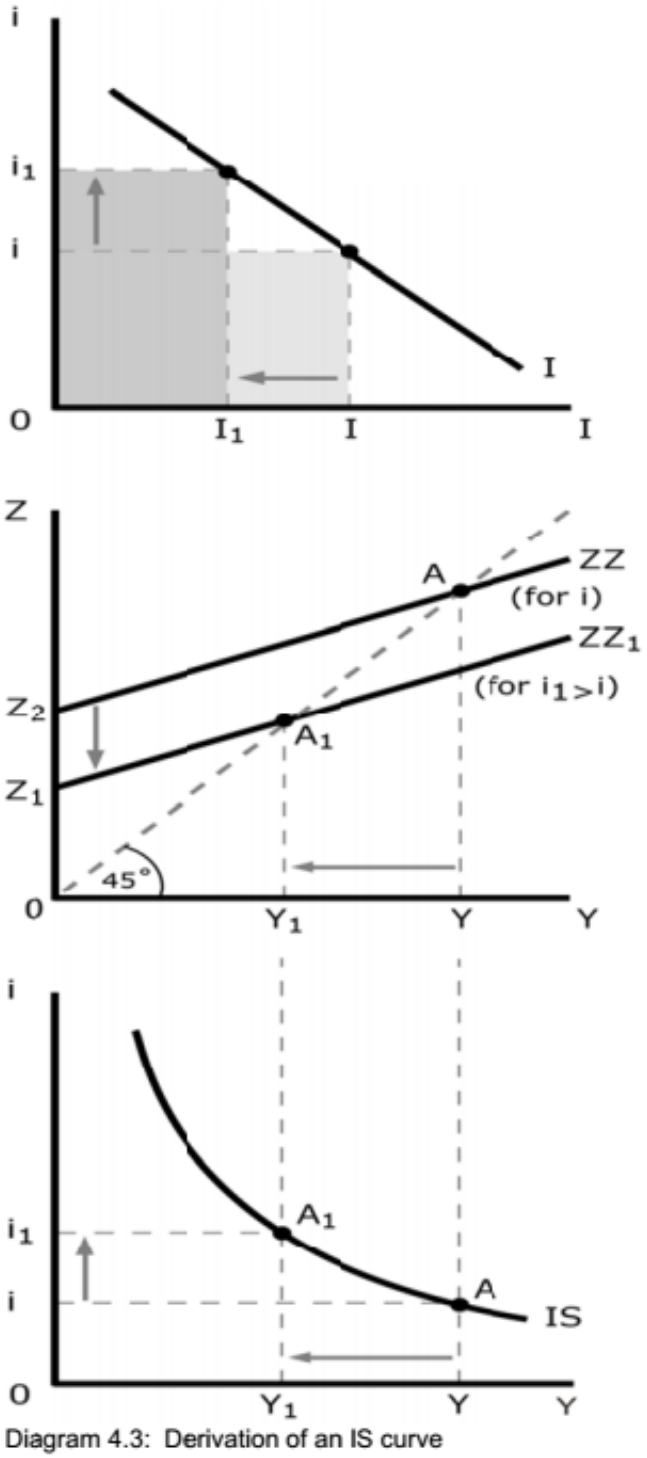


Figure A

Figure B

Figure C

Diagram 4.3: Derivation of an IS curve

In figure A, the interest rate (i) is measured on the vertical axis and the investment spending on the horizontal axis. While in figure B, the demand for goods Z, is measured on the vertical axis and the level of output and income Y on the horizontal axis. In figure c, the interest rate is measured on the vertical axis and the level of output and income Y on the horizontal axis. On both figure B and C the output and income level are measured on the horizontal axis.

Step 1: Assuming that the interest rate is i, the corresponding level of investment spending, according to the given investment schedule in figure A, is I.

Step 2: Given an interest rate of i with a level of investment spending I, the corresponding demand for goods in figure B is ZZ. Given this demand for goods, goods market equilibrium is reached at point A, where Z = Y.

Step 3: At this goods market equilibrium position A in figure B, the corresponding equilibrium level of output and income is Y.

Step 4: By extending this equilibrium level of income Y with a dotted line to figure C, we can plot the first point on our IS curve.

Step 5: The first point on our IS curve in figure C is plotted at the intersection of the dotted Y line with the dotted i line.

Step 6: The first point on our IS curve is also indicated as point A, because it corresponds to point A in figure B, thus indicating a goods market equilibrium position. At this point, the goods market is in equilibrium at an interest rate of i and an income level of Y.

Plotting the second point A_1:

Step 7: To derive the second point, we **assume that there is an increase in the interest rate** from i to i_1. According to our investment curve, the level of investment decreases to I_1 in figure A.

Step 8: In the goods market (figure B), the decline in investment spending decreases the demand for goods. The demand for goods curve shifts downwards to ZZ_1. The shift in the demand for goods is equal to the decrease in investment (which is the result of an increase in the interest rate). At the initial level of equilibrium income Y, supply exceeds demand, and there is an adjustment to a lower level of output and income. The decline in output and income is a multiple of the decrease in investment spending owing to the multiplier effect.

Step 9: Goods market equilibrium is ultimately reached at point A_1 in figure B.

Step 10: At this new goods market equilibrium at point A_1, the corresponding level of equilibrium income is Y_1. The decrease in the equilibrium level of income from Y to Y_1 is equal to the multiplier times the change in investment.

Step 11: By extending this equilibrium level of income Y_1 in figure B with a dotted line to figure C, we can now plot the second point on our IS curve.

Step 12: The second point on our IS curve in figure C is plotted at the intersection of the dotted Y_1 line with the dotted i_1 line.

Step 13: The second point on our IS curve is also labelled as point A_1 because it corresponds to point A_1 in figure B, which indicates a goods market equilibrium position Y_1 at an interest rate of i_1.

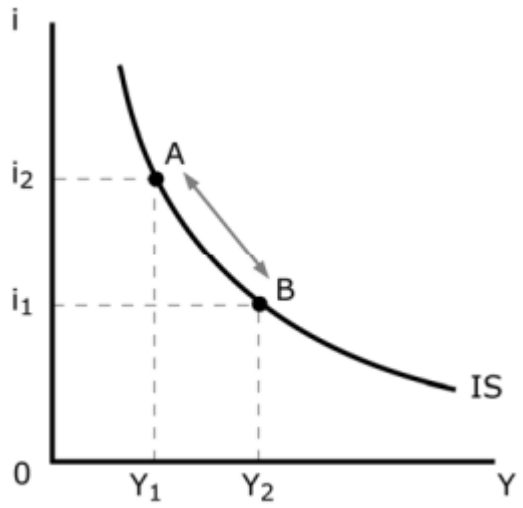
By repeating the same exercise for different interest rates, a series of goods market equilibrium points can be plotted in figure C, which ultimately gives us the IS curve.

We will take a shortcut and draw a downward-sloping curve through points A and A_1 in figure C, and label it IS.

This then is our IS curve showing combinations of interest rates and income levels where the goods market is in equilibrium, given that all autonomous variables remain unchanged. This means that when the IS curve was derived, we assumed that variables such as government spending, taxation and consumer and investor confidence remained unchanged. Note that the I in IS stands for investment and the S for savings.

Comparing points on an IS curve

When comparing two points on an IS curve, you need to take into account what happens to the variables in the model when the interest rate changes.



As the interest rate changes a movement along the IS curve takes place

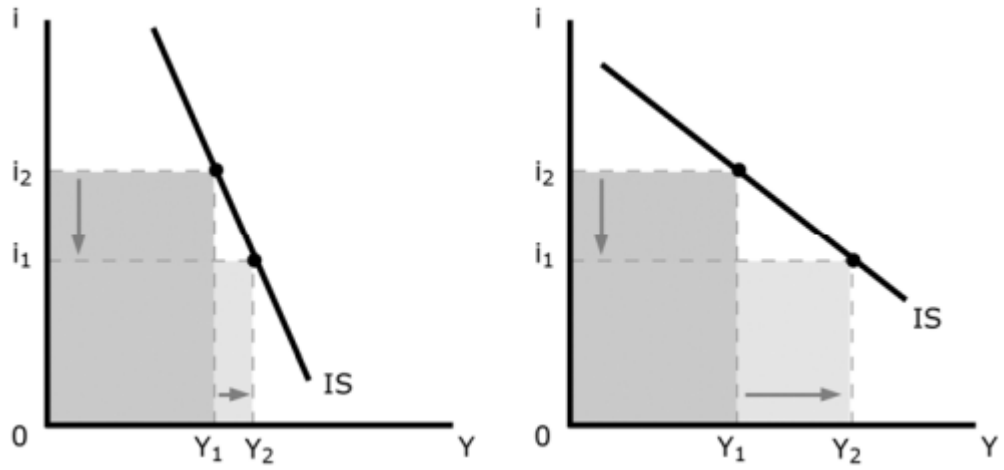
The following is a summary of the differences between points A and B on the above IS curve:

- Investment spending is different because the interest rate and level of output is different.
- The demand for goods is different because investment spending and consumption spending are different.
- The level of income is different because the demand for goods differs.
- Consumption spending is different because the level of income differs.
- All autonomous variables remain unchanged.

A movement from point A to point B therefore indicates that, as the interest rate declines, investment spending, consumption spending, the demand for goods and the equilibrium level of output and income increase.

The slope of the IS curve

Another interesting issue is what determines the slope of the IS curve. What will make one IS curve steeper than another IS curve? Or put differently, what will cause a given change in the interest rate to have a greater or smaller impact on the equilibrium level of income.



Different IS curves

The steepness of the IS curve depends on the following variables, interest sensitivity of investment spending, output and income sensitivity of investment spending.

Interest sensitivity of investment spending

The interest rate sensitivity of investment spending measures how sensitive investment spending is to a change in the interest rate. If investment spending is very sensitive to a change in the interest rate, a given change in the interest rate will have a greater impact on investment spending and, consequently, the greater the change in the level of output and income will be. This will give us a flatter IS curve.

Output and income sensitivity of investment spending

The output sensitivity of investment spending measures how sensitive investment spending is to a change in output and income. If investment spending is very sensitive to a change in output and income, a given change in output and income will have a greater impact on the investment spending and thus on the level of output and income. The IS curve is therefore flatter.

The following investment equation includes these sensitivities:

$$I = b_0 + b_1Y - b_2i$$

Where

- b0 is autonomous investment
- b1 is output sensitivity of investment spending
- b2 is interest rate sensitivity of investment spending

Note that a decrease in the interest rate has a negative value and, therefore, the –b2i will be positive if the interest rate decreases and negative if the interest rate increases. The higher the value of b1

the greater the impact of a change in output on the investment spending and the higher the value of b2 the greater the impact of a change in the interest rate on investment spending.

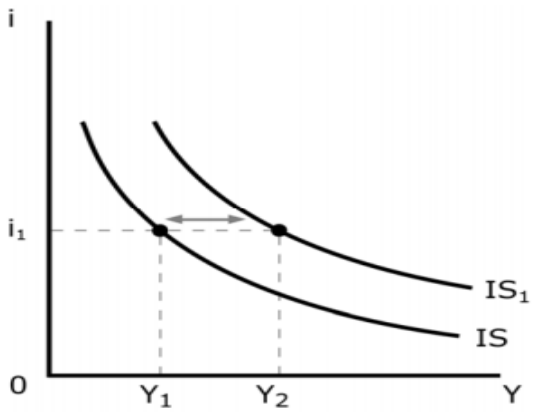
Shifts of the IS curve

A shift of the IS curve, however, is caused by a change in any of the autonomous factors that changes the demand for goods and the equilibrium level of output and income, at each and every interest rate. These autonomous factors are factors such as government spending, taxation, consumer and investor confidence.

An increase in government spending. At each and every interest rate, the demand for goods and the equilibrium level of output and income are higher than before. This is indicated by a rightward shift of the IS curve. At each and every interest rate government spending is higher, the demand for goods therefore increases and the levels of output and income are higher. With higher levels the levels of output and income are higher, the levels of consumption spending and investment spending are also higher. All the other autonomous spending components are unchanged.

An increase in taxation, however, implies that at each and every interest rate, the demand for goods and the equilibrium level of output and income are lower and a leftward shift of the IS curve occurs.

Shift of an IS-curve



An important variable that influences the shift of the IS curve is the size of the multiplier. The greater the multiplier, the greater the impact of a change in the autonomous variable and the greater the rightward shift of the IS-curve. The following table provides a summary of movements and shifts of an IS-curve.

Movement	Rightward shift	Leftward shift
upward: interest rate increases	increase in autonomous consumption spending because of, say, an increase in consumer confidence (c_0)	decrease in autonomous consumption spending because of, say, a decrease in consumer confidence (c_0)
downward: interest rate decreases	increase in autonomous investment spending ($\bar{I}$) because of, say, an increase in investor confidence	decrease in autonomous investment spending ($\bar{I}$) because of, say, a decrease in investor confidence
	increase in autonomous government spending (G)	decrease in autonomous government spending (G)
	decrease in autonomous taxation (T)	increase in autonomous taxation (T)

4.4 THE LM RELATION

Real terms in the financial market are now going to be incorporated in the model that we are going to use in analysing how the level of output and income are determined by the interaction between the goods market and the financial market. By looking on the real terms, the equilibrium in the financial market will be transformed from

M = PYL(i) to

M/P = YL(i).

in which case

M/P – real money supply

Y – real income

i – interest rate

The real money supply is the money supply (M/P) expressed in terms of its purchasing power (in terms of goods). For a given nominal money supply, an increase in the general price level results in a decline in the real money supply. With the same nominal amount of money, fewer goods and services can be bought. Conversely, a decline in the general price level results in an increase in the real money supply (more goods and services can be bought). This is illustrated by the following example in which it is indicated how the real money supply changes if the price level changes.

Nominal money supply (M^s)	Real money supply (M/P)
Money amount	Amount of goods
E.g.: M = R100 million Price level (P) = R10	M/P = R100 m/R10 = 10 million
E.g.: M = R100 million $P\uparrow$ = *R20*	M/P = R100 m/R20 = 5 million
E.g.: M = R100 million $P\downarrow$ = *R5*	M/P = R100/R5 = 20 million

The nominal demand for money is the demand for a given number of rands, while the real demand for money is the demand for money expressed in terms of the number of units of goods that that money will buy.

Our financial market equilibrium condition, M/P = YL(i), tells us that:

- if Y increases, given that M and P are fixed, then i must increase to ensure financial market equilibrium,
- if i increases, given that M and P are fixed, then Y must increase to ensure financial market equilibrium,
- if M increases, given that P is fixed, then either Y must increase or i must decrease to ensure financial market equilibrium

The LM relation

The LM curve shows different combinations of interest rates and levels of output where the financial market is in equilibrium. Financial market equilibrium exists when the quantity of money supplied is equal to the quantity of money demanded. It is important to note that the LM curve represents the financial market and, at any given point on an LM curve, the financial market is in equilibrium.

The chain of events for the LM relation

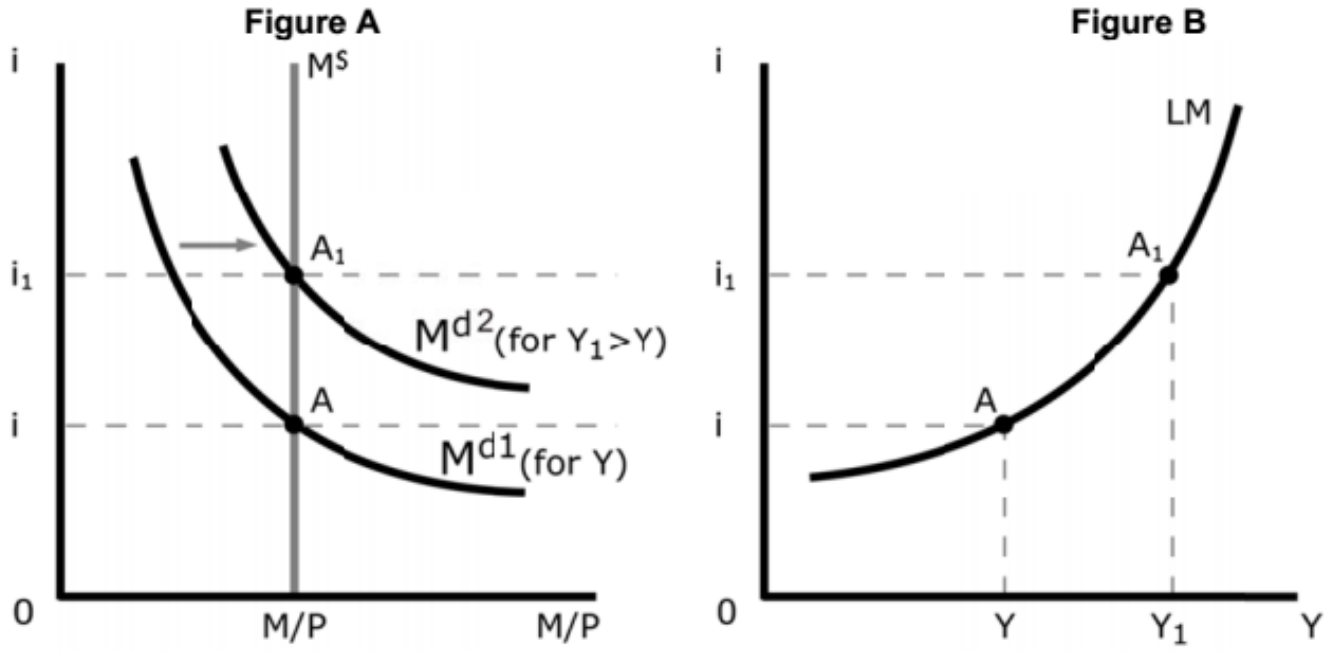
The LM curve is derived by tracing the impact of a change in the level of output and income on the financial market. The chain of events can be used to shows the impact of an increase in the level of output on the equilibrium interest rate, as shown below, $Y\uparrow \Rightarrow M^d\uparrow \Rightarrow i\uparrow$

An increase in the level of output increase the demand for money, and the interest rate rises in the financial market.

Graphical derivation of the LM curve

The derivation of the LM curve refers to the events that take place in the financial market when the level of output and income changes. The financial market is in equilibrium when the quantity of money demanded is equal to the quantity of money supplied, and this financial market is represented by figure A, in the diagram below. On the other hand, the LM is represented by the figure B. Both vertical

axis of the diagrams measures the interest rate, and are placed against each other, on other hand, the horizontal axis of figure A, measures the size of the real money supply, while the horizontal side of figure B, measures the level of income in the economy as shown by the diagrams below.



The derivation of the LM curve

The discussion on how the LM curve is derived is given below, in which case we suggest that the repeated process will give different point of equilibrium in the financial market represented by figure A, which can be plotted on figure B, in the process of deriving the LM curve. Because of time and space, we won't be able to specify every point, instead joining the two points will give us the LM curve.

To plot the first point A:

Step 1: Given an income level of Y in figure B, we have a corresponding demand for money curve M^{d1} in figure A.

Step 2: Given this demand for money curve M^{d1} and the real supply of money curve M^{s}, equilibrium in the financial market (i.e. where the quantity of money demanded = the quantity of money supplied) occurs at point A in figure A.

Step 3: At this financial market equilibrium position A in figure A, the corresponding equilibrium interest rate is i.

Step 4: By extending this equilibrium interest rate i in figure A with a dotted line to figure B, we can plot the first point on our LM curve.

Step 5: The first point on our LM curve in figure B is plotted at the intersection of the extended dotted line i with the vertical dotted line Y.

Step 6: This first point on the LM curve is also indicated as point A since it corresponds to point A in figure A and shows the financial market equilibrium position at an output level of Y.

To plot the second point A_1:

Step 7: **Assume an increase in the level of output and income** from Y to Y_1 in figure A.

Step 8: Given this higher level of output Y_1, the demand for money increases when people decide to do more transactions. This is indicated by a rightward shift in the demand for money curve from M^{d1} to M^{d2} in figure A.

Step 9: Given this new demand for money curve M^{d2}, we have a new financial market equilibrium position at point A_1 in figure A.

Step 10: At this new financial market equilibrium position A_1 in figure A, the corresponding equilibrium interest rate is i_1. An increase in the demand for money causes an increase in the equilibrium interest rate.

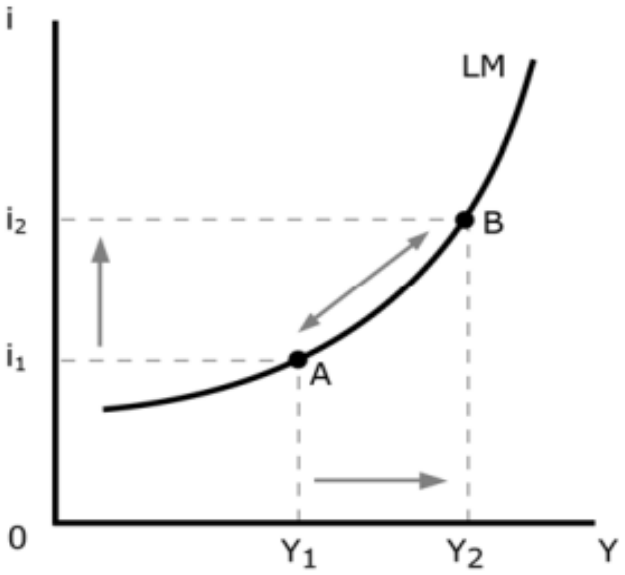
Step 11: By extending this equilibrium interest rate i_1 in figure A with a horizontal dotted line to figure B, we can plot the second point on our LM curve.

Step 12: The second point on our LM curve in figure B is plotted at the intersection of the extended dotted line i_1 with the vertical dotted line Y_1.

Step 13: This second point on the LM curve is also indicated as point A_1 since it corresponds to point A_1 in figure A and shows the financial market equilibrium position at a level of output and income of Y_1.

Movements along an LM curve

Below is the diagram that illustrate the movements along the LM curve. The causes for these movements along the LM curve will provided below as well as the differences between points A and B.



- The interest rate is higher at point B than at point A
- The level of income and output is higher at point B than at point A.
- The demand for money is higher at point B than at point A since the level of output and income is higher.
- The interest rate is higher at point B since the demand for money is higher.
- The money supply is the same at point A and point B.

A movement from point A to point B therefore indicates that, as the level of income and output rises, the demand for money increases and, given that the money supply is fixed, the interest rate rises.

The slope of the LM curve

Two variables that have an impact on the slope of the LM curve are the income sensitivity of the demand for money and the interest sensitivity of the demand for money. The income sensitivity of the demand for money measures by how much the demand for money changes if there is a change in the level of output and income. For instance, the greater the income sensitivity of the demand for money, the more the demand for money curve shifts for a given change in income – and the greater the shift of the demand for money curve, the greater the increase in the interest rate. This then gives us a steeper LM curve. The above can be explained by comparing the following two LM curves as demonstrated below:

Impact of a change in income on the interest rate

Figure A

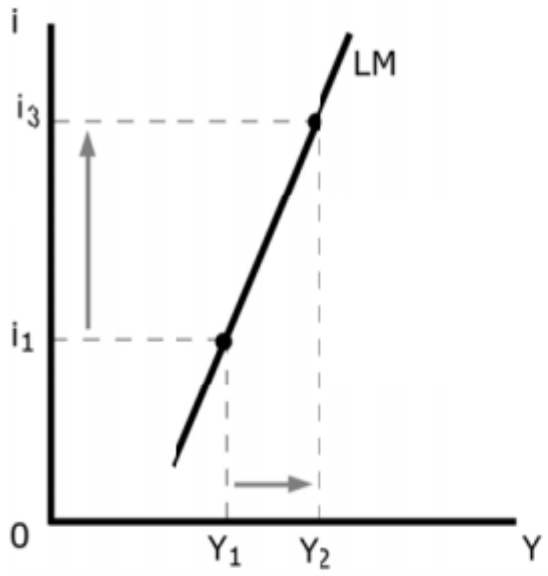
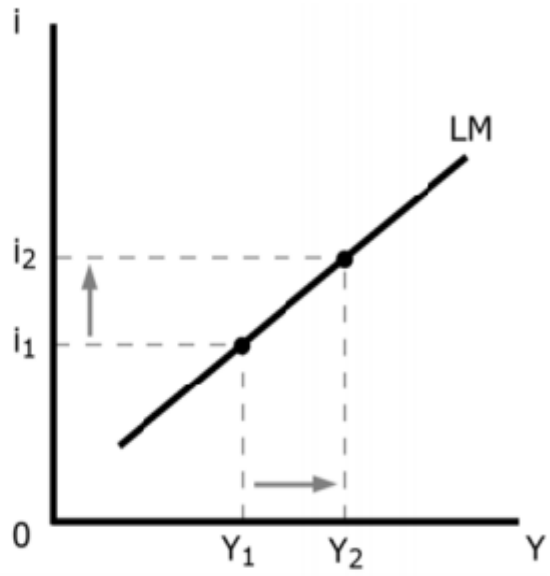


Figure B



In figure A we assume that, for a given increase in income (say R10 000), the demand for money increases by say R8 000, while in figure B we assume that, for a R10 000 increase in income, the demand for money increases by R6 000.

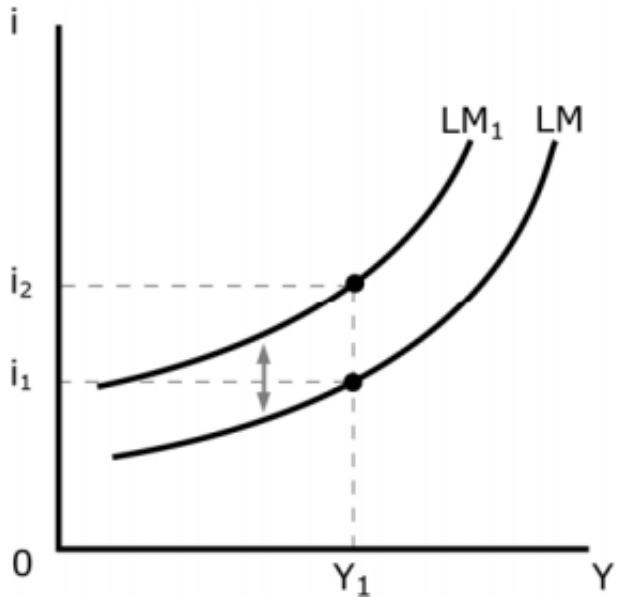
As you can see, the change in the interest rate in figure A is greater than the change in the interest rate in figure B. This is due to the fact that the income sensitivity of the demand for money is greater in figure A than in figure B.

Another important variable is the **interest sensitivity of the demand for money**. This variable, which plays an important role in the liquidity trap, measures how sensitive the demand for money is to a change in the interest rate. The more sensitive the demand for money for a change in the interest rate the flatter is the LM curve.

Shift of an LM curve

A shift of the LM curve occurs when the money supply changes. An increase in the money supply causes a downward shift of the LM curve indicating that, at each level of output, the equilibrium interest rate is lower in the financial market.

A decrease in the money supply causes an upward shift of the LM curve indicating that, at each level of output and income, the equilibrium interest rate is higher in the financial market.



Shift of an LM curve

The following table summarizes the difference between a movement along an LM curve and a shift of an LM curve.

Movement along	A downward shift	An upward shift
upward: output and income increases and the interest rate rises	an increase in nominal money supply	a decrease in nominal money supply
downward: output and income decreases and the interest rate falls		

4.5 Putting the IS and the LM relations together

The IS-LM model is obtained when the IS and LM curves are combined. The IS relation indicates goods market equilibrium positions while the LM curve indicates financial market equilibrium positions. In the above diagram a point such as point A indicates an equilibrium position where both the goods market and the financial market are in equilibrium. Note that there is just one point where both the goods and financial markets are in equilibrium and that this equilibrium point is not necessarily at the level of full employment. In this IS-LM model there are forces present to ensure that a point such as point A is reached, but it is not necessarily at the level of full employment.

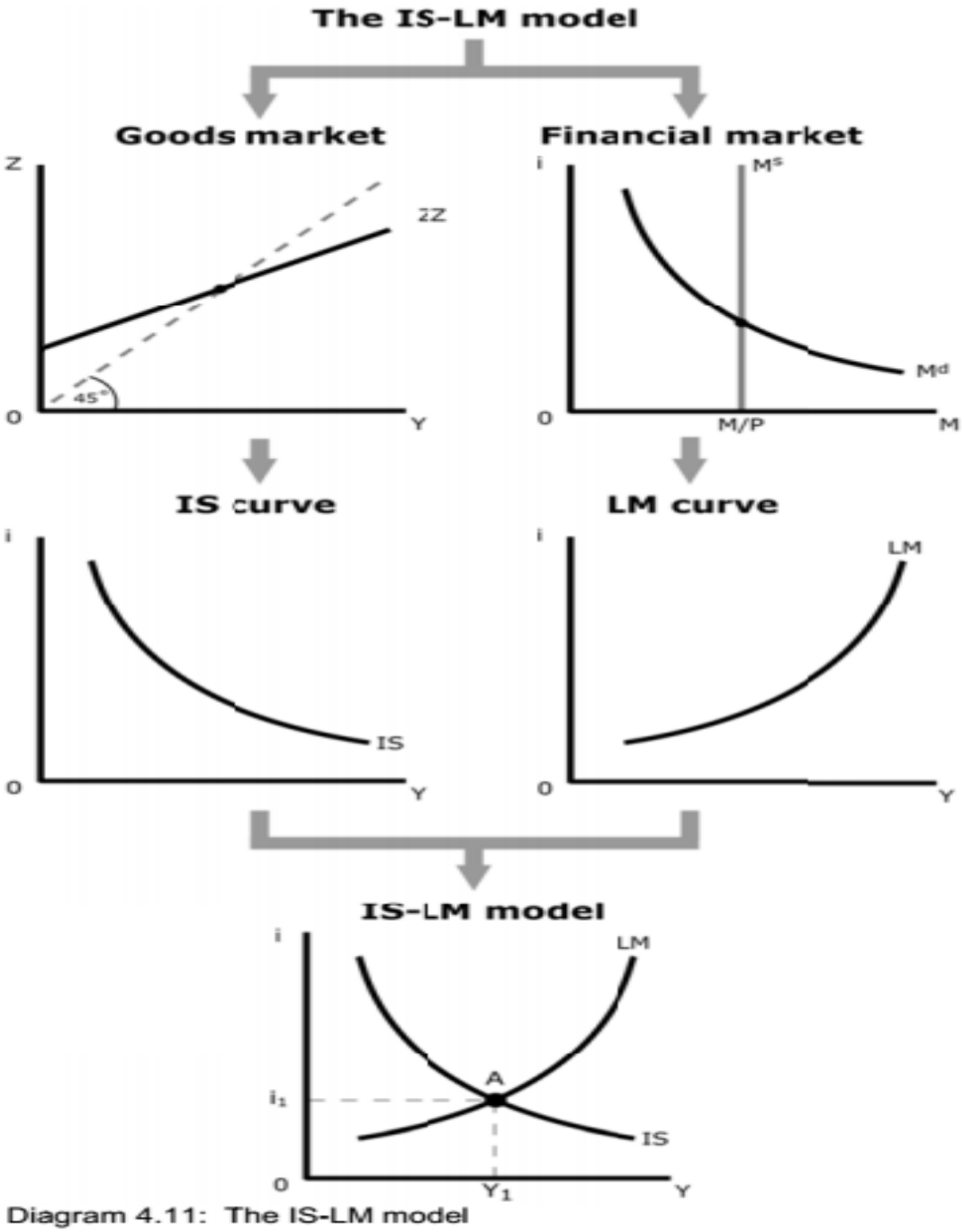


Diagram 4.11: The IS-LM model

A point such as point B in the above diagram indicates that the goods market is in equilibrium (it is on the IS curve) but that the financial market is not (it is a point off the LM curve). Since the financial market is in disequilibrium, changes will take place in this market. In this particular case there is an excess supply of money at an interest rate of i2 and, consequently, the interest will start to fall. As the interest rate falls, investment spending increases in the goods market and a movement to point A along the IS curve occurs.

Exogenous and endogenous variables in the IS-LM model

In the IS-LM model the most important variables that we wish to explain are the level of production and income (Y) and the interest rate (i). These variables are our endogenous or dependent variables.

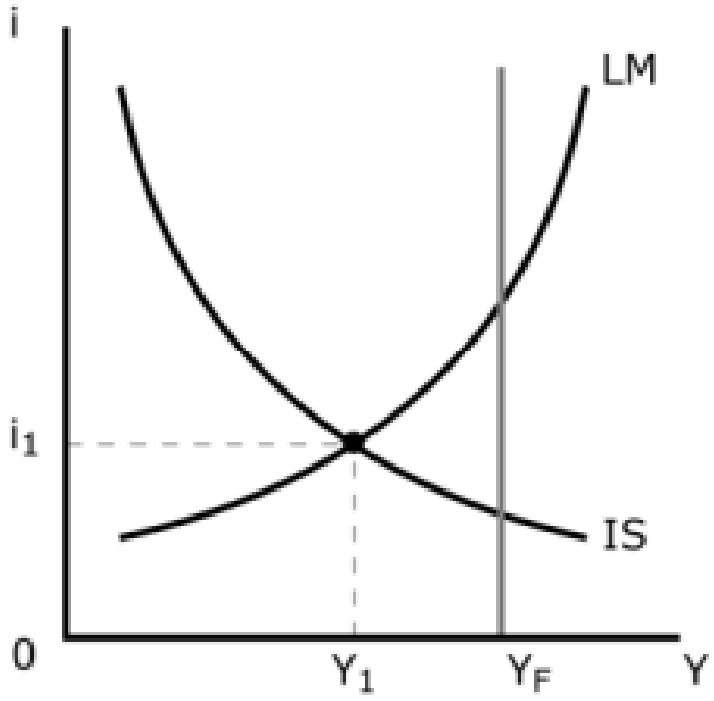
Any variable that is influenced by these endogenous variables is, by implication, also an endogenous variable. However, a variable can contain both an exogenous (autonomous) and an endogenous component. For instance, consumption spending (C) has an exogenous (autonomous) component (co) as well as an endogenous component (YD). The same applies to investment spending and the demand for money.

An exogenous variable has an effect on the endogenous variables, but is in turn not influenced by the endogenous variables. In the IS-LM model the values of the exogenous variables are determined by the model builder, while the values of the endogenous variables are determined by the exogenous variables and the specifications of the model.

Endogenous variables	Exogenous variables
$C = c_o + cY_D$ The Y_D part of the consumption function is the endogenous component.	$C = \mathbf{c_o} + \mathbf{c}Y_D$ The autonomous or exogenous variables in the consumption function are $\mathbf{c_o}$ and **c** (the marginal propensity to consume). The $\mathbf{c_o}$ part is known as autonomous or exogenous consumption.
The parts of investment that are dependent on income and the interest rate are the endogenous components.	The part of investment that is influenced by expectations, business confidence, and political and social factors is the exogenous component of investment. This is known as autonomous or exogenous investment.
Government spending (G) does not contain any endogenous component.	Government spending is an exogenous variable because its value is not determined by the endogenous variables in the model.
In this specific version of the IS-LM model, taxation (T) does not contain any endogenous component. If it is assumed that taxation is a function of the level of production and income, then it would be an endogenous variable.	Taxation is an exogenous component because its value is not determined by the endogenous variables.
The supply of money does not contain any endogenous component.	The supply of money is entirely exogenous and the quantity of money is determined by the central bank.
The endogenous component of the demand for money is the part of the demand for money that is determined by the interest rate and the level of production and income.	The exogenous component of the demand for money is the part that is influenced by expectations, business confidence, and political and social factors.

Impact of exogenous changes on the equilibrium level of income

In the previous section we indicated that, in this model, the economy can reach an equilibrium position that is not necessarily the level of full employment. The question then arises as to what can be done to ensure that, in this model, the economy moves to the level of full employment. The answer to this issue lies in changes in the exogenous factors. In the sections that follow, this model is therefore used to analyse the impact of a number exogenous factors on the economy. An exogenous factor or variable is a variable that we take as given and that is thus unexplained in the model.



Equilibrium and full employment in the IS-LM model

The important exogenous variables that we will look at in more detail are given in the following table:

Exogenous variables in the goods market (shifts the IS curve)	Exogenous variables in the financial market (shifts the LM curve)
government spending (G) taxes (T) consumer confidence (c_0) investor confidence ($\bar{I}$)	nominal money supply (M^s)

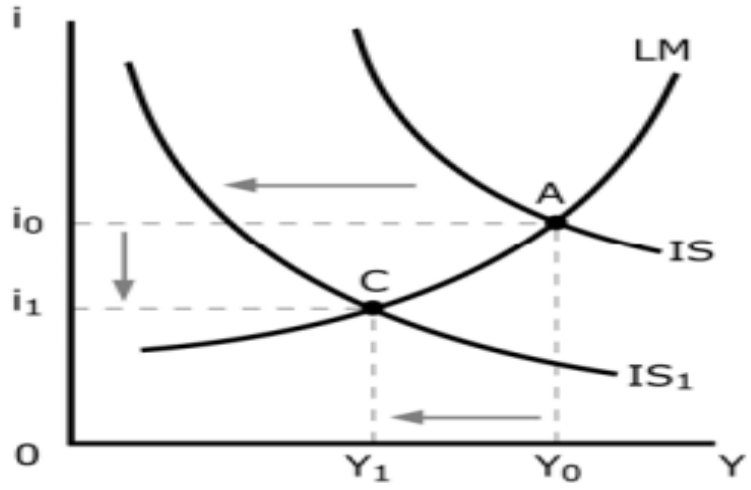
In terms of our IS-LM model, a change in exogenous variables in the goods market shifts the IS curve, while a change in exogenous variables in the financial market shifts the LM curve.

4.6 IMPACT OF FISCAL POLICY

In this part we are going to focus on the impacts of the fiscal policy on the IS-LM model, and the factors that influences the impact of the fiscal policy, as well as explaining the concept of crowding out effect. An expansionary policy is used to stimulate economic activity by increasing the demand for goods (aggregate demand). An expansionary fiscal policy means that government spending has to be increased and/or taxes have to be decreased. A contractionary policy is used to "cool down" economic activity by decreasing the demand for goods (aggregate demand). A contractionary fiscal policy means that government spending has to be reduced and/or taxes have to be increased.

The impact of a contractionary fiscal policy: increase in taxation

Using the diagram for the IS-LM model, the end result of an increase in taxation can be represented by a leftward shift of the IS curve and a new equilibrium is formed at point C. From this diagram it is clear that an increase in taxation causes a decline in the interest rate and a decrease in output and income.



Impact of a contractionary fiscal policy

The increase in the tax rate reduces disposable income. The reduction in disposable income causes a decrease in consumption spending because consumption spending is a positive function of disposable income. A decline in consumption spending causes a decline in the demand for goods since Z = C + I + G. The decline in demand reduces the level of output and income because the demand for goods determines the level of output and income.

$$T\uparrow \Rightarrow Y_D\downarrow \Rightarrow C\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

As the level of output and income declines there is a further decline in consumption spending and investment spending (since the level of sales decline) which, in turn, causes a decline in the demand for goods and the level of output and income. This is the multiplier in reverse.

$$\Rightarrow Y\downarrow \Rightarrow C\downarrow$$
$$\Rightarrow Y\downarrow \Rightarrow I\downarrow$$
$$\Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

On the goods market this decline in the interest rate increases investment spending because investment spending is a negative function of the interest rate. This increase in investment spending increases the demand for goods, and the level of output and income increases.

$$\Rightarrow i\downarrow \Rightarrow I\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

An important fact to notice here is that the decrease in output decreases investment spending ($Y\downarrow \rightarrow I\downarrow$), while a decrease in the interest rate increases investment spending ($i\downarrow \rightarrow I\uparrow$). We therefore have two opposing forces in operation and the end result will be determined by which of these forces dominates. The end result is a decrease in the equilibrium level of output and income and a lower interest rate. This is the result of the decline in the demand for goods. Bear in mind that it is the demand for goods that determines the level of output and income. consumption spending declines because an increase in taxes and a decrease in output both reduce disposable income

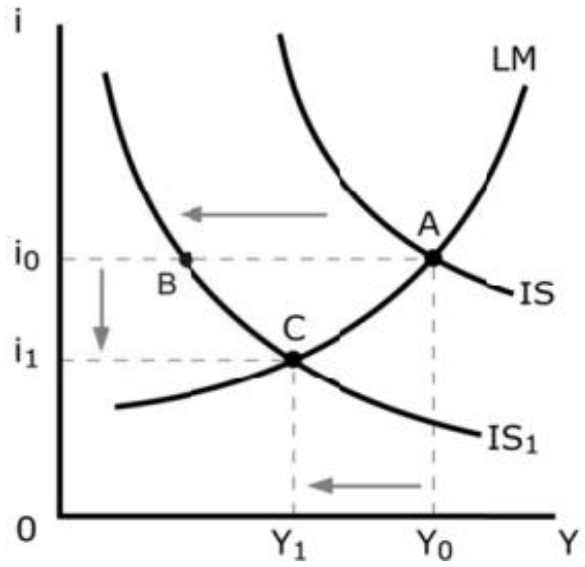
Looking at the demand for goods,

$$Z\downarrow = C\downarrow + I\downarrow\uparrow + G$$

Investment decreases because of a lower level of output, but increases as a result of a lower interest rate. Which effect dominates? If the impact of the level of output on investment spending is greater than the impact of the decrease in the interest rate on investment spending, investment spending declines. If, however, the impact of the decline in output is less than the impact of the decline in the interest rate, investment spending increases. Assuming that these two forces cancel each other out, the decrease in investment spending matches the increase in investment spending and investment spending remains unchanged. It is therefore clear that the decline in consumption spending reduces the demand for goods which causes the equilibrium level of output and income to decrease. Take note that, all other exogenous variables are assumed to be constant. All these changes can be explained through the use of the following diagram.

Graphical analysis

Starting from the equilibrium point A, the increase in the interest rate will shifts the IS curve to the left from IS to IS1. On the goods market the level of output and income decreases due to the decrease in consumption spending and investment spending from Y_0 to Y_1 and the disequilibrium position is reached at point B. at point B the financial markets is in disequilibrium, since the decrease in the level of output and income has decreases the demand for money. Such that an excess supply of money develops at point B, and consequently, the interest rate will then decline in the financial market. The fall in the interest rate will cause the level of investment to increase in the good markets. This increase in the level of investment is illustrated by the downward movement from point B to point C.



Determinants of the impact of fiscal policy

Increase in government spending is going to be used in explaining the determinants of the impact of fiscal policy. These factors that influences the impact of an increase in government spending include the following,

- The multiplier,
- The income sensitivity of the demand for money,
- The interest sensitivity of investment spending,
- Output and income sensitivity of investment spending.

The multiplier

The chain of events here, due to the increase in Y for a given increase in government spending will depend on the multiplier. The bigger the multiplier, the greater the impact of a given change in G on Y. The multiplier is therefore an important variable that impacts on the effectiveness of fiscal policy. In terms of our IS-LM model, it determines the shift of the IS curve. The greater the multiplier, the greater the shift of the IS curve.

$$G\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

Output and income sensitivity of demand for money

The more sensitive the demand for money is to a change in the income, the greater the increase in the interest rate for a given increase in income will be – and the more the interest rate rises, the greater the decline in investment spending. This makes an increase in government spending less effective in influencing the level of output and income. In terms of our IS-LM model, the steeper the LM curve the greater the income sensitivity of the demand for money

$$Y\uparrow \Rightarrow M^d\uparrow \Rightarrow i\uparrow$$

Interest sensitivity of investment spending

The more sensitive investment spending is to a change in the interest rate, the greater the change in investment spending for a given change in the interest rate. A higher interest sensitivity of investment spending therefore decreases the impact of an increase in government spending. The interest sensitivity of investment spending influences the slope of the IS curve. The greater the interest sensitivity of investment spending, the flatter the IS curve.

$$i\uparrow \Rightarrow I\downarrow$$

Output and income sensitivity of investment spending

The more sensitive investment spending is to a change in income, the greater the change in investment when that change in income occurs. At the same time, the impact of any increase in government spending is greater than it otherwise would have been since investment changes more.

$$Y\uparrow \Rightarrow I\uparrow$$

Crowding out

Depending on the assumptions we make about the interest sensitivity of investment spending and the output sensitivity of investment spending, a case can be made that an increase in government spending

might lead to the crowding out of investment spending. In this scenario, government spending replaces investment spending. This will happen if the interest sensitivity of investment spending is high and the output sensitivity of investment spending is low. From our IS-LM model we know that an increase in government spending increases the interest rate as shown by the following events chain:

$$G\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow \Rightarrow M^{d}\uparrow \Rightarrow i\uparrow$$

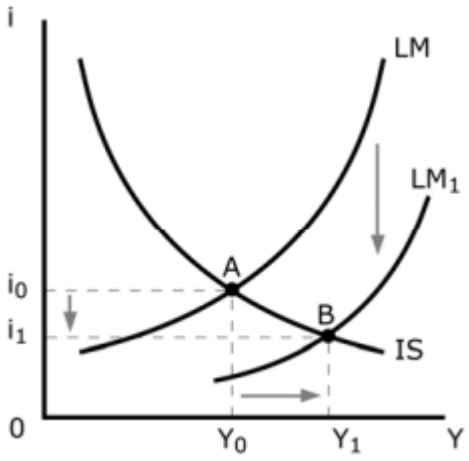
Following this increase in the interest rate, investment spending declines:

$$i\uparrow \Rightarrow I\downarrow$$

Given a high interest sensitivity of investment spending, there is a correspondingly large decrease in investment spending. Combined with a low output and income sensitivity of investment spending ($Y\uparrow \rightarrow I\uparrow$), the decrease in investment spending is greater than the increase in investment spending, government spending replaces investment spending and crowding out occurs.

4.7 IMPACT OF MONETARY POLICY

The impact of monetary policy on the IS-LM model, and the factors that influences the impact of monetary policy as well as the liquidity trap will be discussed in this section. An expansionary monetary policy is an increase in the nominal money supply in order to stimulate economic activity by increasing the demand for goods. A contractionary monetary policy is a decrease in the nominal money supply in order to dampen economic activity by reducing the demand for goods. The effects of increase in the nominal money supply is shown by the diagram below. Precisely, an increase in the money supply shifts the LM curve downwards and a new equilibrium is reached at point B. an increase in nominal money supply causes a decrease in the interest rate and an increase in output and income.



Using words and a chain of events, the impact of an increase in the money supply on output and income and the interest rate can be described as follows: On the financial market an increase in the nominal money supply increases the real money supply and an excess supply of money develops. This excess supply of money causes the interest rate to decline.

$$M\uparrow \Rightarrow M/P\uparrow \Rightarrow i\downarrow$$

On the goods market the decrease in the interest rate increases investment spending, the demand for goods and the level of output and income. The rise in the level of output and income further increases investment as well as consumption spending. Together with the effects of the multiplier, the chain of events will be as follows.

$$i\downarrow \Rightarrow I\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$
$$Y\uparrow \Rightarrow I\uparrow$$
$$Y\uparrow \Rightarrow C\uparrow$$

The end result is that the equilibrium level of output and income is higher and the interest rate is lower. Both consumption spending and investment spending are higher. Consumption spending is higher since output and income are higher, and investment spending is higher since the level of output is higher and the interest rate is lower. Government spending and taxation remain unchanged.

$$Z\uparrow = C\uparrow + I\uparrow + G$$

Graphical analysis

An increase in the nominal money supply causes a downward shift of the LM curve from LM to LM1. At point A an excess supply of money is created on the financial market and consequently the interest rate starts to decreases. As the interest rate decreases, a downward movement along the IS curve occurs. The decline in the interest rate increases investment spending, the demand for goods and output and income. On the horizontal axis, output and income increase and this process continues until an equilibrium position – where both the goods and the financial market are in equilibrium – is reached at point B. At this equilibrium position the interest rate is i1 and the level of output and income Y1.

Determinants of the impact of monetary policy

There are two main variables that determines the impact of an expansionary monetary policy in the IS-LM model. These variables are the interest sensitivity of investment spending and the interest sensitivity of the demand for money.

Interest sensitivity of investment spending

An important variable that determines the impact of monetary policy is how sensitive investment is to a change in the interest rate. Increase money supply will increase the real money and lead to decline in the interest rates, which will lead to increase in the level of investment and the demand of goods represented by symbol Z, and thus a rise in the level of output and in the economy represented by the symbol Y. If investment is not very sensitive to a change in the interest rate, then a given change in the interest rate will have little impact on investment spending and, consequently, change in the level of output will be small.

$$M\uparrow \Rightarrow M/P\uparrow \Rightarrow i\downarrow \Rightarrow I\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

The interest sensitivity of the demand for money

The interest sensitivity of the demand for money determines by how much the interest rate changes if there is a change in the money supply. For monetary policy to have an impact on the level of output and income it needs to cause a change in the interest rate. The more sensitive the demand for money is to a change in interest rate, the greater the change in the interest rate for a given change in the money supply, and the greater the impact of monetary policy. If an increase in the money supply has no impact on the interest rate, then monetary policy is completely ineffective to change the level of output. This is what happens in the case of the liquidity trap.

$$M\uparrow \Rightarrow M/P\uparrow \Rightarrow i\downarrow \Rightarrow I\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

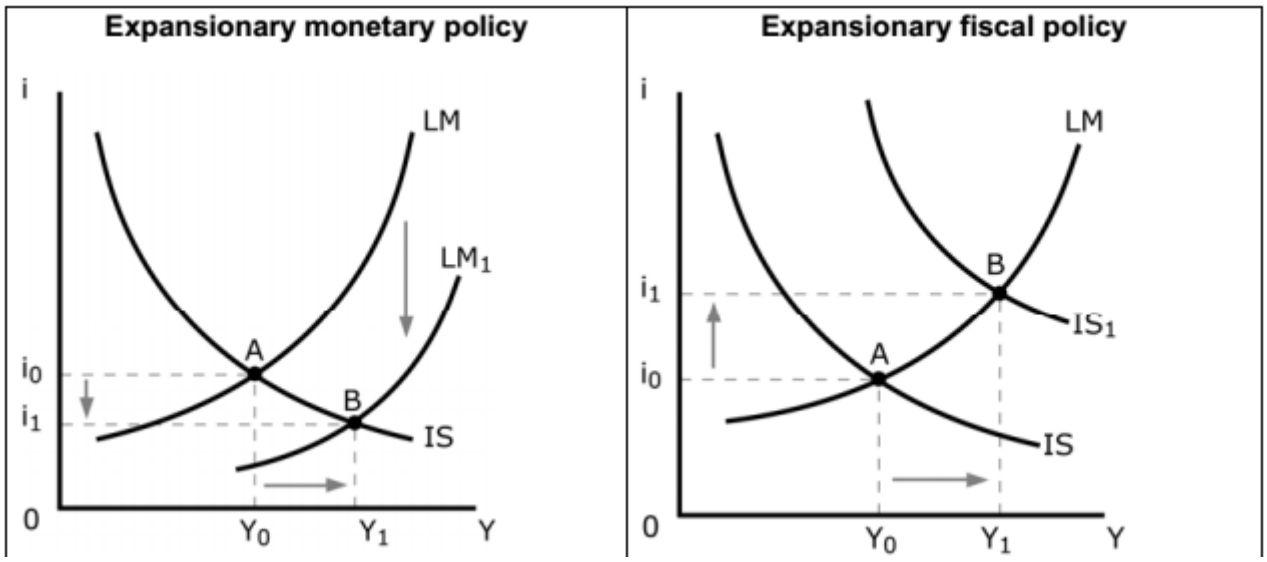
In the liquidity trap an expansionary monetary policy is powerless to increase the level of output and income since money market participants prefer to keep money and not buy bonds. In contrast an expansionary fiscal policy is very effective since there is no crowding of investment spending. An increase in the demand for money does not lead to an increase in the interest rate and consequently investment spending does not decline.

4.8 COMPARING FISCAL POLICY WITH MONETARY POLICY

The aim of this part is discussing and compare the impacts of the fiscal and monetary policies. The expansionary fiscal policy and expansionary fiscal policy do all lead to increase in the level of output and income, however, their impact is through different variables. The use of diagrams is going to be used in analysing and comparing the effects of the fiscal policy and monetary policy, below is the analysis of both expansionary monetary policy and expansionary fiscal policy.

Impact of an expansionary monetary policy and of an expansionary fiscal policy:

Comparing monetary and fiscal policy



In an expansionary monetary policy, the interest rate is lower, while in an expansionary fiscal policy it is higher. The reason for this is that in an expansionary monetary policy, there is an increase in the nominal money supply which reduces the interest rate. In an expansionary fiscal policy, the money supply remains unchanged, and the increase in the demand for money – caused by the rise in the level of output and income – increases the interest rate.

The effects of the expansionary monetary and expansionary fiscal policy through different variables are shown below.

Variable	Expansionary monetary policy	Expansionary fiscal policy
Consumption spending	Increases because Y is higher	Increases because Y is higher
Investment spending	Higher because i is lower and Y is higher	Indeterminate: increases because Y is higher but decreases because i is higher
Government spending	Unchanged	Increases if the expansionary fiscal policy is the result of an increase in government spending
Taxation	Unchanged	Decreases if the expansionary fiscal policy is the result of a decline in taxation
Money supply	Increases	Unchanged

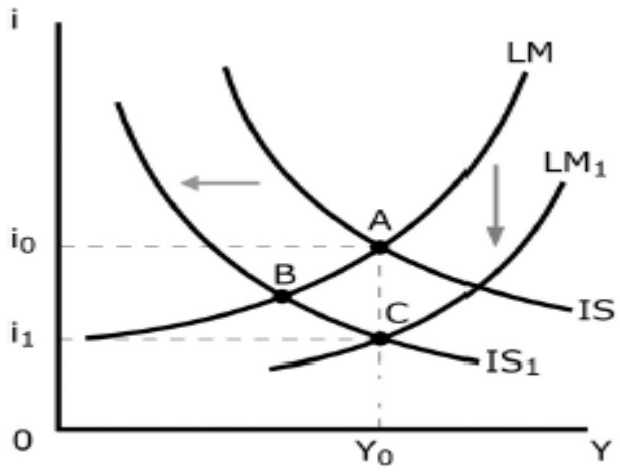
4.9 POLICY MIX IN THE IS-LM MODEL

This section seek to illustrate how the expansionary fiscal policy and expansionary monetary can be used in trying to achieve certain economic objectives, like solving the problems of unemployment and balance of payment deficit.

Dealing with a budget deficit and unemployment

A budget deficit implies that spending by government exceeds its revenue (taxes). To decrease this budget deficit a contractionary fiscal policy – such as a decrease in government spending and/or an increase in taxation – needs to be implemented.

Assuming a decrease in government spending with the aim of solving the problem deficit, it will lead to decrease in the demand for goods, which will cause the level of output to decline, and then unemployment will rise. The increase in unemployment will be represented on the curve by the leftward shift in the IS curve, and the new equilibrium will be reached at point B, where both the interest rate and the level of output will decline. On its own, a contractionary fiscal policy causes a decline in the budget deficit, but at the expense of an increase in unemployment.

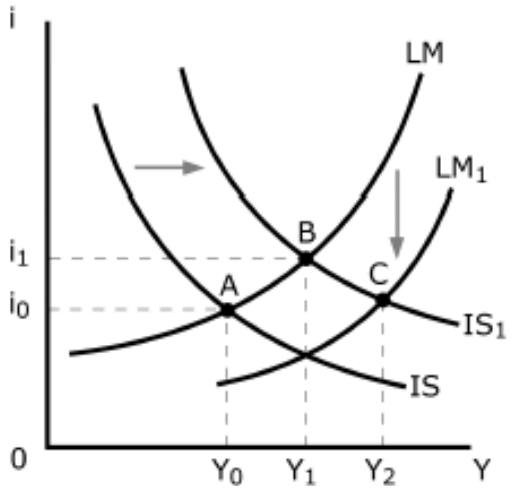


If an expansionary monetary policy is implemented at the same time with the expansionary fiscal policy the decline on the level of employment might be mitigated, or softened. This is because the expansionary monetary policy will lead to a decline in the interest rate. The decline in the interest rate will then lead to increase in the investment spending in the economy, as well as the increase in the demand for goods, such the level of output as whole will also increase. The effects of expansionary monetary policy in this IS-LM model will be illustrated by the downward shift of the LM curve. This will lead to a movement from equilibrium point B, to equilibrium point C, where the level of deficit is small, with a large employment level. The economy at this point the monetary policy will be too ineffective to bring a change to the economy. This stage is called the liquidity trap.

Increase the level of output without a change in the interest rate

If the objective is to increase the level of output without an increase in the interest rate the appropriate policies are an expansionary fiscal policy with an expansionary monetary policy. The illustration of how the output can be increased without any change in the level of interest rate will be illustrated below, through the use of the IS-LM model. In this case the expansionary fiscal policy will call for an increase in the government spending and decrease in taxation, in such a way that the decrease in taxation will lead to increase in the disposable income. The increase in the disposable income will lead to increase in the demand for goods, such that the level of output will rise, which will be illustrated by the rightward shift of the IS curve.

On the other hand, the increase in output causes an increase in the demand for money and a rise in the interest rate in the financial market. In our IS-LM model a new equilibrium is reached at point B with am higher level of output and a higher interest rate. Note, however, that this policy will cause an increase in the budget deficit since government revenue (T↓) has declined.



Using a policy mix to keep the interest rate the same

On the note, the central bank may decide to implement an expansionary monetary policy to stop the interest rate from rising. The expansionary monetary policy will lead to the downward shift of the LM curve, such that the equilibrium will now be reached at point C, where the level of output is higher but the level of interest rate is lower at point A.

4.10 FISCAL POLICY IN THE GOODS MARKET AND THE IS-LM MODEL

The aim of this part of discussion is to analyse and compare the impact of fiscal policy in the goods market and the IS-LM model. In the goods market a increase in government spending will increase output and income, where the increase in income will be equal to the increase in government spending times the multiplier. This will be shown by the chain of events which suggests that increase in government spending will lead to increase in the demand for goods as well as increase in the income, as shown in the chain of events below.

$$G\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

Looking on the demand for goods, consumption will increase due to increase in government spending. This will lead to the following chain of events, where we are going to say that increase in consumption plus investment will lead to increase government spending as well. In this case we are assuming that investment spending is exogenous variable. In our model of IS-LM, the increase in government spending will not only lead to an increase in output and income, instead other variables are going to be influenced like interest rate and investment spending. From this explanation we are going to have the following chain of events.

$$G\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$
$$Y\uparrow \Rightarrow M^d\uparrow \Rightarrow i\uparrow$$
$$i\uparrow \Rightarrow I\downarrow$$
$$Y\uparrow \Rightarrow I\uparrow$$

The impact on the level of output and income is therefore not only determined by the increase in government spending, but also by the change in the interest rate, how sensitive investment spending is to a change in the interest rate, and how sensitive investment is to a change in income. The similarity between the two models is that, in both instances, an expansionary fiscal policy increases the level of output and income. The difference is that in the IS-LM model there are more variables that influence the impact of an expansionary fiscal policy.

Openness in goods and financial markets

Learning Unit 5

Introduction

The aim of this chapter is to look on the explanation of how output and income will be determined in the economy, more specifically the determination of output and income in an open economy. The statement of open economy implies that the foreign sector is now being introduced in our discussion. The concepts that are going to be explained in this section include the nominal exchange rate, the real exchange rate, and the components of the South African balance of payments, the interest parity condition and the use of the interest parity condition between domestic and foreign bonds.

Openness in the goods market refers to the ability of consumers and firms to choose between domestic and foreign goods. While there are different ways of measuring the openness of the goods market, the most popular is to express imports and exports as a percentage of GDP. In South Africa, exports for 2013 were 24.63% of GDP and imports 32.14% of GDP, indicating that South Africa can be regarded as an open economy.

The choice between domestic goods and foreign goods

When goods markets are open, economic participants (households, firms and government) have a choice between buying domestic goods or foreign goods. A key factor that influences this decision is the price of domestic goods relative to foreign goods. In other words, the real exchange rate plays a vital role in this decision. The factors that impact on the real exchange rate are the nominal exchange rate, the domestic price level and foreign price level. It is therefore essential that you understand how these factors determine the real exchange rate. We will start with the nominal exchange rate.

Nominal exchange rate (E)

There are two ways in which the nominal exchange rate of the country is defined, namely the direct method and the indirect method. The explanation of each of these will be provided below.

- ***Direct method*** – this is the way of expressing the price of foreign currency in terms of the domestic currency (like $= R13.50), and this is the common way of expressing the exchange rate in South Africa.
- ***Indirect method*** – this another way of expressing the price foreign currency, however, here the price of the domestic currency is expressed in terms of foreign currency (like R1= $0.0012.

The discussion in this module focus on international convention of defining the nominal exchange rate as the price of the domestic currency in terms of foreign currency (R1 = $). It is important to remember how to convert these currencies, using this method.

An appreciation

An appreciation in the nominal exchange rate occurs when the price of the domestic currency in terms of the foreign currency increases. A change from R1 = $0.20 to R1 = $0.25 implies an increase in the nominal exchange rate (E) because the rand is worth more in terms of dollars than before. With R1, South Africans can now buy 25 US cents, while Americans must pay 25 US cents to buy R1. The domestic currency, in this case the rand, appreciates. For R1, more dollars can be obtained than before. [Expressing the nominal exchange rate in terms of the price of the dollar, it changes from $1 = R5 to $1 = R4 (fewer Rands are needed to buy a dollar).]

Depreciation

A depreciation in the nominal exchange rate occurs when the price of the domestic currency in terms of the foreign currency decreases. A change from R1 = $0.20 to R1 = $0.15 implies a decrease in the nominal exchange rate. The domestic currency, in this case the rand, depreciates because for R1, one obtains fewer dollars. [In terms of the price of foreign currency, it changes from $1 = R5 to $1 = R6.66 (more Rands are now needed to buy a dollar).]

It is important to remember that appreciation is used only when the flexible or floating exchange rate system is used. On the other hand, when a fixed exchange rate is used, revaluation or devaluation will take place. Thus there is a difference between depreciation and devaluation, revaluation and appreciation, but the differentiating factor being the system under consideration.

From nominal (E) to real exchange rates (ε)

Nominal exchange rate is the exchange rate that is not adjusted to the rate of inflation, while on the other hand, real exchange rate is the exchange rate that has been adjusted to the rate of inflation.

Put in other words, nominal exchange rate between the rand and the dollar tells us how much a dollar will cost us, the real exchange rate tells us what happens to the relative price of domestic goods in terms of foreign goods. It gives us some indication of the affordability of domestic goods compared with foreign goods and it is this relative price that influences economic participants' choice between domestic and foreign goods. The formula that will be used in working the real exchange rate in this module is shown below.

$$\varepsilon = \frac{EP}{P^*}$$

The three distinct factors that influence the real exchange rate are the following,

- The nominal exchange rate (E),
- The domestic price level, (P),
- The foreign price level (P*)

The impact of the nominal exchange rate (E)

Assume the following:

Year 1
GDP deflator for South Africa: 110
GDP deflator for the USA: 110
The nominal exchange rate: R1 = $0.20

Given this information, the real exchange rate is

$\varepsilon = 0.20 \times 110/110 = 0.2 \times 1 = 0.2$

This real exchange rate of 0.2 is an index number and does not tell us much. What is important is what happens to the value over time.

Year 2
GDP deflator for South Africa: 110
GDP deflator for the USA: 110
The nominal exchange rate: R1 = $0.10

Given this information, the real exchange rate is

$\varepsilon = 0.10 \times 110/110 = 0.1 \times 1 = 0.1$

Comparing the real exchange rate for year 2 ($\varepsilon = 0.1$) with the real exchange rate for year 1 ($\varepsilon = 0.2$), we can now conclude that the real exchange rate has declined and a real depreciation has occurred. In other words, the relative price of our goods compared with US goods has declined. In this case it was the result of the decrease (depreciation) in the nominal exchange rate.

The impact of the price level
Let us now see what happens if the relative price level increases:

Year 1
GDP deflator for South Africa: 110
GDP deflator for the USA: 110
The nominal exchange rate: R1 = $0.10

Given this information, the real exchange rate is

$\varepsilon = 0.10 \times 110/110 = 0.1 \times 1 = 0.1$

Year 2
GDP deflator for South Africa: 120
GDP deflator for the USA: 110
The nominal exchange rate: R1 = $0.10

An increase in the relative price of South African goods (EP) compared with US goods (P*) increases the real exchange rate.

$EP^{\uparrow} > P^* \Rightarrow \varepsilon^{\uparrow} \Rightarrow$ **real appreciation**

A decrease in the relative price of South African goods (EP) compared with US goods (P*) reduces the real exchange rate.

$EP^{\downarrow} < P^* \Rightarrow \varepsilon^{\downarrow} \Rightarrow$ **real depreciation**

From bilateral to multilateral exchange rates

Bear in mind that, because countries trade with more than one country at a time, the multilateral real exchange rate provides us with a measure of the average price of South African goods relative to those of our principal trading partners.

5.2 OPENNESS IN THE FINANCIAL MARKETS

Openness in financial markets refers to the ability of financial investors not only to choose between money and domestic financial assets, but also to include foreign financial assets in their portfolio. See the prescribed book page for a discussion of why openness in the financial market allows a country to have a trade deficit or trade surplus.

Balance of payments

EXPLAIN

Trade balance and balance on current account

The trade balance is the difference between trade exports and imports. It is, however, not always clear whether services are included or excluded in this figure. To indicate that it excludes services, one could make use of the concept merchandise trade balance. This will then be the difference between merchandise exports (including net gold exports) and merchandise imports. The balance on the current account is the difference between all the sales of goods and services to the rest of the world and all the primary income receipt minus all the purchases of goods and services from the rest of the world and primary payments.

Impact of interest rate and exchange rate

The level of interest rate and exchange rate determine the level of exports in the economy as well as the level of foreign direct investment in out of the country. The following formulas will be used in trying to illustrate how the two concepts affect the economy. In regard to investment, the interest rate and exchange rate of the country do affect the return of investment. The formula for the expected return on South African bonds held for one year, in SA Rands is illustrated as follows.

$R(1 + i_t)$

where
R = the amount of rands to be invested
i_t = the domestic interest rate

Formula for the expected return on USA bonds held for one year, in South African Rands:

$$RE_t(1+i_t^*)(1/E^e_{t+1})$$

where
R = the amount of rands to be invested
i_t = the domestic interest rate
i_t^* = the foreign interest rate
E_t = the nominal exchange rate
E^e_{t+1} = the expected nominal exchange rate

Using the above information, we can calculate the expected return of the bonds as follows. Suppose you are a South African and lucky enough to have R100 000 available that you will not need for transactions. After doing some research on different financial investment opportunities you ended up-having to choose between buying one-year South African bonds or one-year USA bonds. What would you do based on the following information?

Interest rate on a one year South African bond = 4%
Interest rate on a one year USA bond = 3.8%
Current exchange rate: R1 = \$0.10
Expected exchange rate: R1 = \$0.11

Return on South African bond:
$R(1 + i_t)$
= R100 000 (1 + 0.04)
= R104 000

Return on USA bond:
$RE_t(1+i_t^*)(1/E^e_{t+1})$

= R100 000 x \$0.10 (1+0.038)(1/\$0.11)
= \$10 000 (1.038)(1/\$0.11)
= \$10 000 x 9.4363636
= R94 363.64

Interest parity condition

If financial investors' only concern is the expected rate of return, they will hold only the assets with the highest expected rate of return. Combining this behaviour with the free flow of financial capital,

the arbitrage process will ensure that the expected rate of return between financial assets in the world will ultimately be the same.

One way to look at the arbitrage process is to assume that the expected exchange rate will be the same as the current exchange rate. If country A offers a higher return than country B, then capital will flow to country A where the demand for financial assets will increase. This will lead to an increase in the price of these assets and therefore a decline in the return on these assets. This process of arbitrage continues until the rate of return is the same in both countries. Using the example of the decision between holding a one year South African bond or a one year USA bond, arbitrage implies that, eventually, the expected rate of return between these two bonds will be the same. This is what is represented by equation 18.2 in the textbook.

If you enter the values based on our previous example where:

Interest rate on a one year South African bond = 4%
Interest rate on a one year USA bond = 3.8%
Current exchange rate: R1 = $0.10
Expected exchange rate: R1 = $0.11

It looks as follows:

$(1 + 0.04) = (1 + 0.038)(0.10/0.11)$
$1.04 = 0.943636$

Clearly the two sides are not equal. It is through arbitrage that equality between the two sides will be reached. As it stands there is an opportunity for Americans to increase their return by buying South African bonds. These actions will change bond prices in both countries – and thereby the interest rates as well as the exchange rate and the expected exchange rate. Assuming that the interest rate is fixed in South Africa at 4%, and that expectations are that the future exchange rate will remain unchanged, arbitrage might lead to the following end result:

The interest rate in America increases to 3.9% and the current exchange rate to R1 = $0.11.

This then gives us:

$(1 + 0.04) = (1.039)(0.11/0.11)$

$1.04 = 1.039$ and a position closer to equality is reached.

The interest parity condition implies that, through the process of arbitrage, the domestic interest rate (i) must be (approximately) equal to the foreign interest rate (i*) minus the expected appreciation of the domestic currency (Ee).

$$i_t \approx i_t^* - \frac{E^e_{t+1} - E_t}{E_t}$$ (expected appreciation of the domestic currency)

What this condition tells you is that, when you have to decide between domestic or foreign financial investments, you should not only consider the difference in the interest rate but also take expected changes in the exchange rate into account.

Note that in the case of an appreciation, the term $\frac{E^e_{t+1} - E_t}{E_t}$ is positive.

In the case of a depreciation, the term $\frac{E^e_{t+1} - E_t}{E_t}$ is negative.

The following example illustrates the use of the interest parity condition to determine whether a South African should hold South African bonds or USA bonds.

The choice between SA bonds and USA bonds

Suppose the one-year nominal interest rate is as follows:

Domestic interest rate in South Africa (i): 5%

Interest rate in the USA (i*): 2%

Should you hold SA bonds or USA bonds?

- It depends whether you expect the rand to depreciate versus the dollar over the coming year by more or less than the difference between the SA interest rate and the USA interest rate, in this case 3% (5%–2% = 3%).
- If you expect the rand to depreciate by more than 3%, then, despite the fact that the interest rate is higher in SA than in USA, investing in SA bonds would be less attractive than investing in USA bonds. By holding SA bonds, you will receive higher interest payments, but the rand will be worth less in terms of dollars, making investing in SA bonds less attractive than investing in USA bonds.
- If you expect the rand to depreciate by less than 3%, or even to appreciate, then the reverse holds, and SA bonds are more attractive than USA bonds.
- And if you expect the rand to depreciate by 3% then you will be indifferent between SA bonds and USA bonds

The goods market in an open economy

Learning unit 6

The aim of the learning unit is to explain through the use of chain of events, equations, diagrams, the impact of a change in domestic demand on the level of output and income and trade balance. The impact of change in foreign demand on the level of output and income as well as on trade balance is also going to be explained through the use of chain of events, equations and diagrams. How depreciation does affect the level of output and income as well as balance of payments will also be explained through the use of diagrams, equations and diagrams.

6.1 THE IS RELATION IN AN OPEN ECONOMY

(Section 19.1 in the prescribed book)

The demand for domestic goods

It is also important to remember that there is a difference between the domestic demand for goods, and the demand for domestic goods. We can relate this to the gross domestic expenditure as well as the expenditure on domestic goods and services.

The determinants of the demand for domestic goods

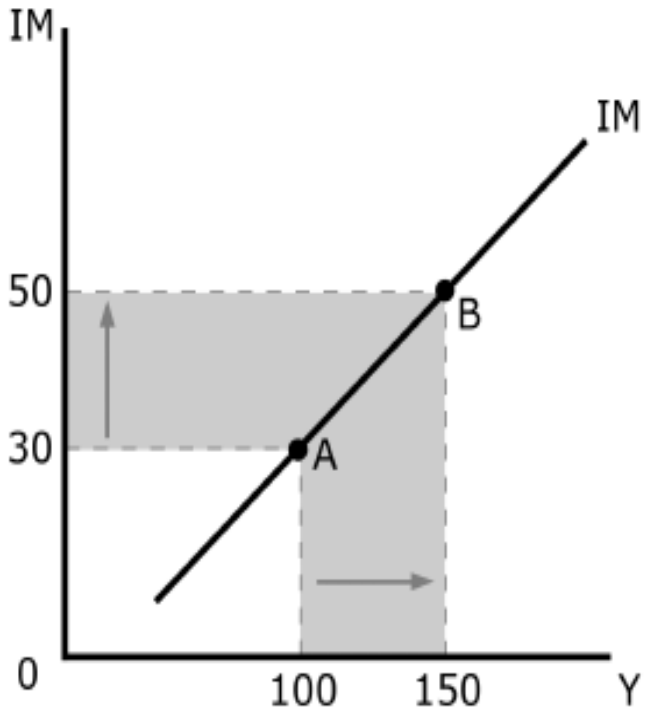
The determinants of C, I and G are the same factors that were explained in learning units 2 and 4. Consumption (C) is a function of disposable income (YD); investment (I) is a function of the level of output and income (Y) and the real interest rate (r); and government spending (G) is regarded as exogenous.

The determinants of imports

There are two factors that influence the level of imports, namely the domestic level of output (Y) and the real exchange rate (ε). This is an important relationship. When domestic output in the economy rises, it leads to an increase in imports. A rise in output and income causes an increase in imports by both households and firms. Households buy final goods and services and firms buy mainly intermediate and capital goods.

$$Y\uparrow \Rightarrow IM\uparrow$$

If this relationship is presented in a diagram, with the level of output and income on the horizontal axis and the value of imports on the vertical axis, we see that as output increases from, say, R100 million to R150 million, imports increase from R30 million to R50 million. You will see later how this behaviour, whereby imports increase when output and income increase, influences the multiplier process in the economy since part of domestic spending is now on imported goods.



Output and imports

The import curve is upward sloping to reflect the positive relationship between output and imports and the slope is determined by the marginal propensity to import. An increase in the real exchange rate reduces the cost of imports and, consequently, more is imported. There is thus a positive relationship between the real exchange rate and imports, this is represented by the following chain of events.

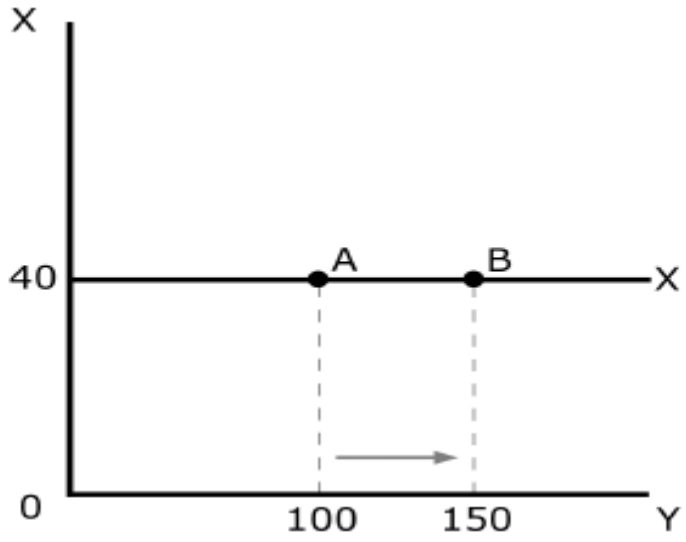
$$\varepsilon\uparrow \Rightarrow IM\uparrow$$

The determinants of exports

Unlike imports, the level of exports is not determined by the domestic level of output (Y) but by the level output of a country's trading partners (Y*). The other factor that influences exports is the real exchange rate (ε). A change in the domestic level of output does not influence the level of exports. Exports can thus be regarded as exogenous.

$$X = X$$

If this relationship is represented in a diagram, with the level of domestic output (Y) on the horizontal axis and the value of exports on the vertical axis, we see that as output increases from, say, R100 million to R150 million, exports remain unchanged at R40 million.



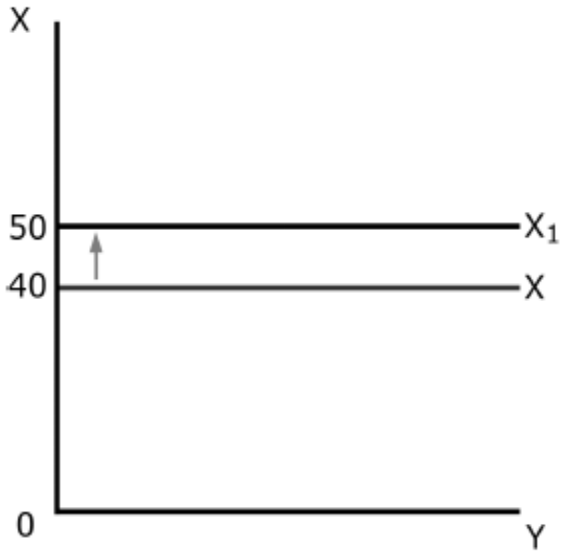
Output and exports

Level of foreign output (Y*)

A change in the output level of our trading partners (Y*), however, has an important effect on our level of exports. As the level of output of our trading partners increases, they buy more goods from us and our exports to them increase. This will be represented by the following chain of events,

$$Y^*\uparrow \Rightarrow X\uparrow$$

For instance, a rise in the economic growth rate of our trading partners increases our exports to countries, while an increase in exports will shift our export curve upwards, say, from R40 million to R50 million, depending on how much more we export to these countries.



Increase in exports

Real exchange rate (ε)

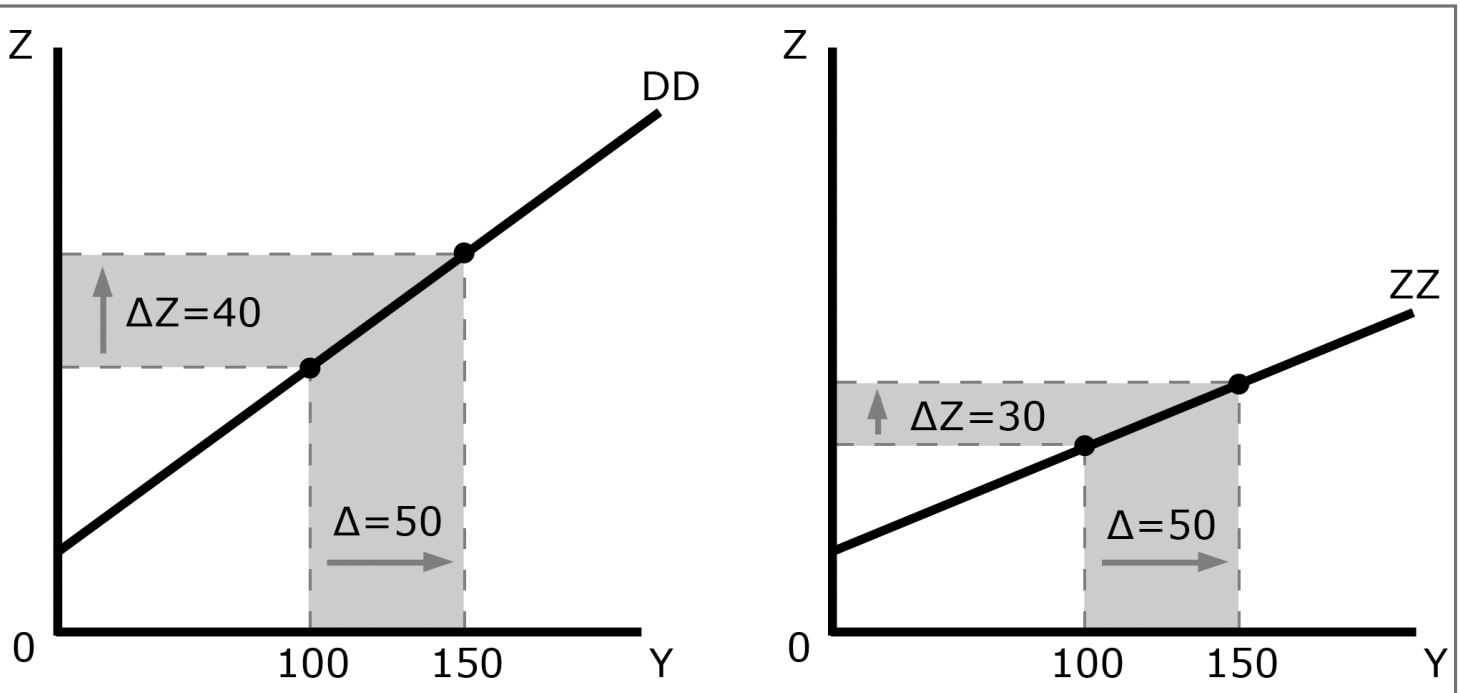
An increase in the real exchange rate implies that our goods are relatively more expensive than the goods produced in the rest of the world. A more expensive price for our exports will usually result in a decrease in exports and there is thus a negative relationship between the real exchange rate and exports. The chain of events for the increase in the real exchange rate is shown below, where we states that the increase in the real exchange rate will lead to decline in the quantity of exports, since it will become more expensive for foreigners to buy our products.

$$\varepsilon\uparrow \Rightarrow X\downarrow$$

Putting the components together

The DD curve and ZZ curve

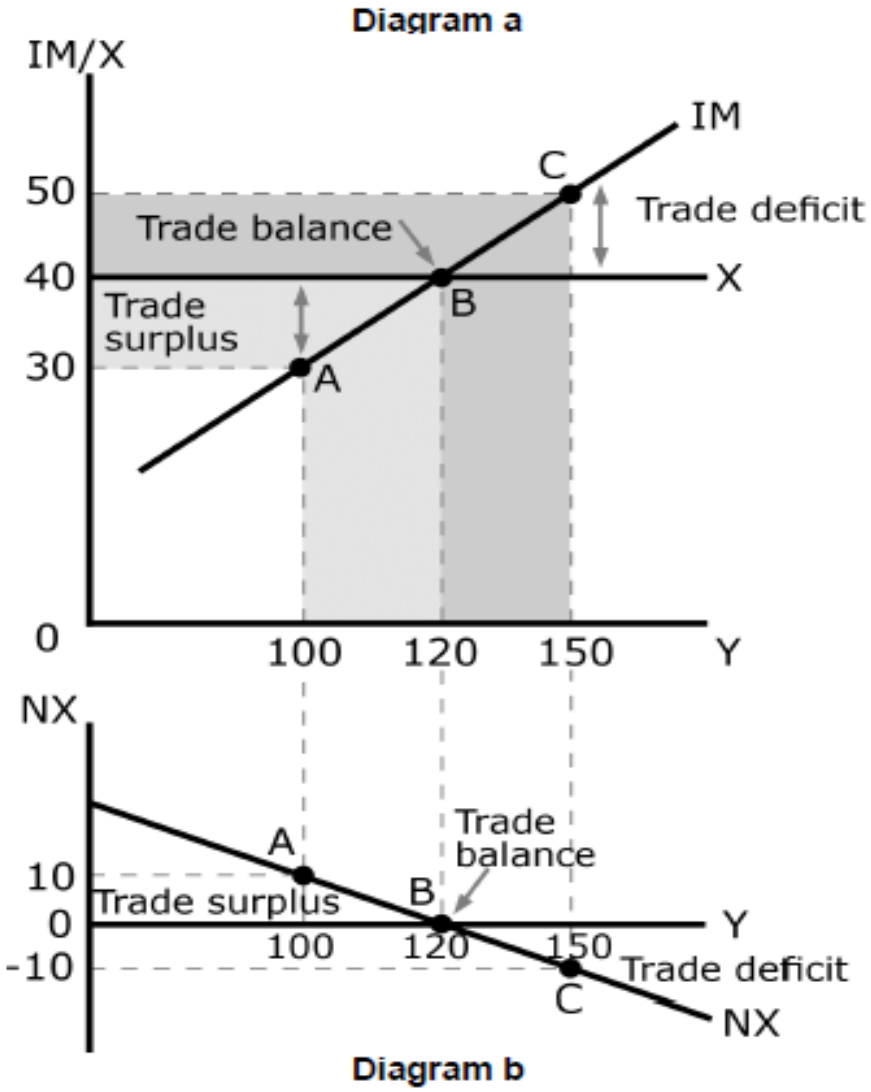
A significant difference between the DD curve (domestic demand curve) and the ZZ curve (demand for domestic goods curve), is that the slope of the ZZ curve is smaller than the slope of the DD curve. This is because imports are a positive function of the domestic level of output and income. As output and income increase in the economy, some of the increase in demand falls on imports instead of domestic goods. This also leads to a smaller multiplier effect. It is the slope effect that is of greater significance. Consider the following two curves: DD represents the domestic demand for goods in a closed economy, while ZZ represents the demand for domestic goods in an open economy. As you can see, the slopes of these curves differ: DD is steeper than ZZ. DD is steeper because the increase in output and income is spent on domestic goods, while for the ZZ curve, part of the increase in output and income is now spent on imported goods. Consequently the demand for domestic goods increases less for an open economy.



The DD curve and ZZ curve

Constructing the NX curve

The NX curve shows what happens to the trade balance (i.e. the difference between exports and imports) as the domestic level of output and income increases in the economy. When studying this section, remember the positive relationship between the domestic level of output and imports. As the domestic level of output and income rises, imports increase. There are two ways to construct the NX curve. In the prescribed book, the NX curve is constructed in figure 19-1(c). An alternative way of constructing the NX curve is to use the import and export curves shown above. Given the real exchange rate the level of exports is R40 million in the diagram below, regardless of the level of domestic output. According to our import function, at an output and income level of R100 million, the level of imports is R30 million, at an income level of R120 million the level of imports is R40 million, and at an income level of R150 million the level of imports is R50 million.



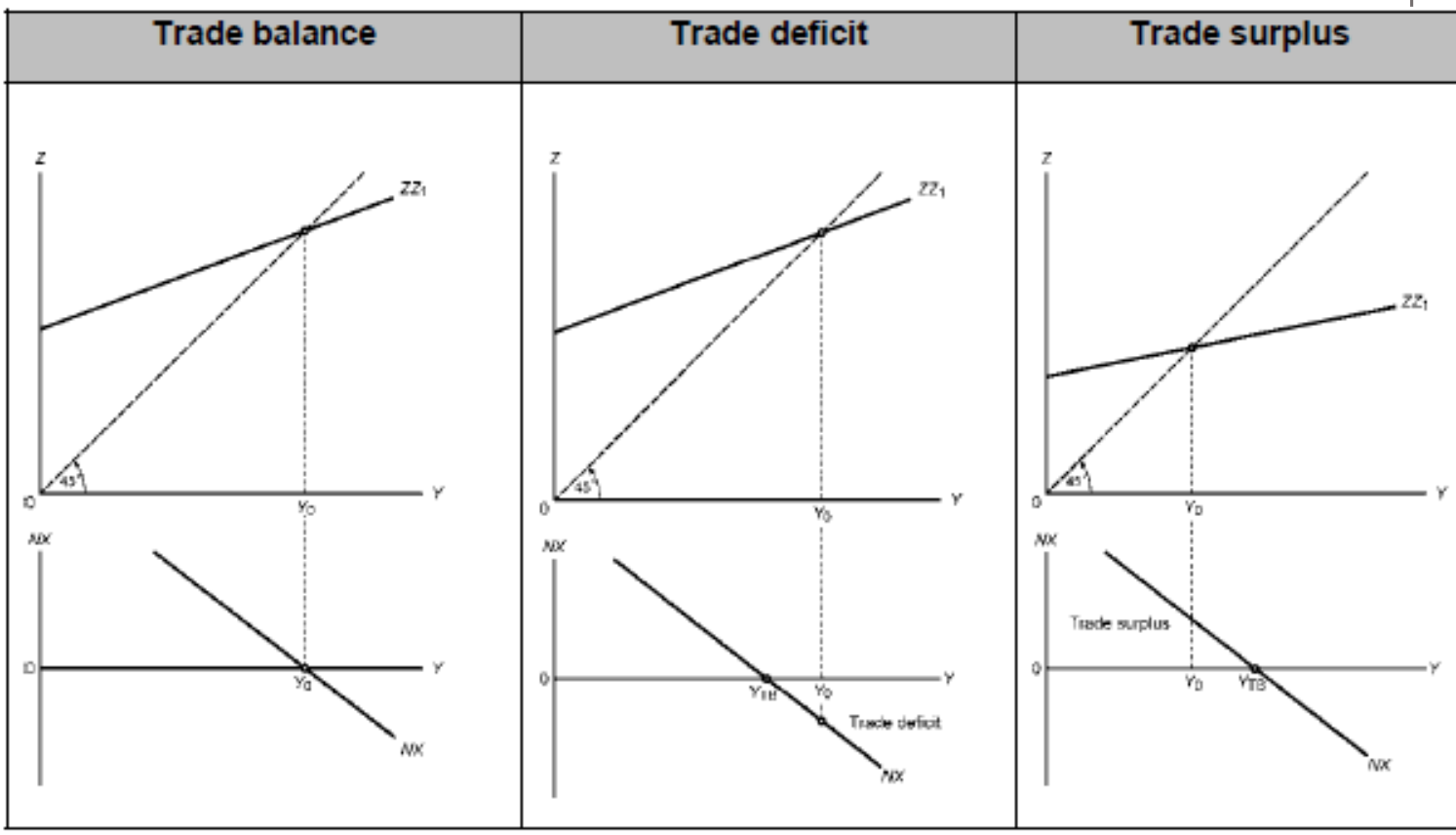
At an income level of R100 million, there is thus a trade surplus of R10 million because the difference between exports of R40 million and imports of R30 million is R10 million. Extending the level of output and income of R100 million to diagram b, a point on the NX curve can be plotted. Point A indicates that, at an income level of R100 million, a trade surplus of R10 million exists.

We also know from diagram that at an income level of R120 million, exports = imports = R40 million and trade balance equilibrium exists. In other words, the trade balance is zero. This gives us point B on the NX curve in diagram b. In the same way, point C indicates that, at an income level of R150 million, a trade deficit of R10 million exists. At this level of output and income the level of imports is R50 million while the level of exports is only R40 million.

Point B provides us with the trade balance point, which is the point at which the level of output and income is such that the imports equal exports and NX = 0. At income levels lower than this income level there is a trade surplus (NX>0), while at income levels higher than this income level there is a trade deficit (NX<0).

6.2 EQUILIBRIUM OUTPUT AND THE TRADE BALANCE

The determination of the equilibrium output and income will be explained in words, through the use of diagram and chain of events in the economy. The relationship between equilibrium level of output and income and the trade balance will be explained by means of words and chain of events. The diagrams below illustrates the situation where the economy will be in equilibrium but with other situation in which the economy will be having a trade balance, or trade deficit or trade surplus.



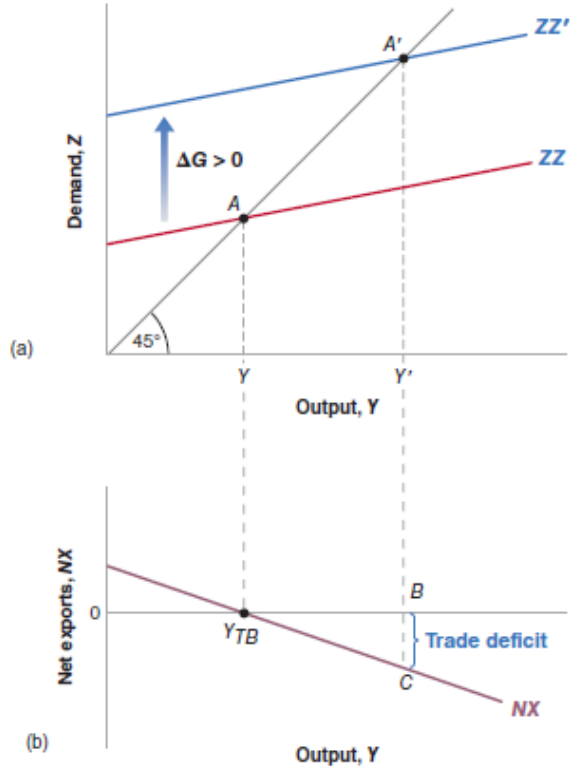
A change in any of the variables that determine the demand for goods changes the equilibrium level of output and income. A change in the equilibrium level of output and income, in turn, leads to a change in the trade balance.

6.3 INCREASES IN DEMAND, DOMESTIC OR FOREIGN

(Section 19.3 in prescribed book)

A rise in domestic demand, say, through an increase in government spending, increases the demand for goods and the equilibrium level of output and income increases. Since part of the increase in demand falls on imported goods, the level of imports increases and the trade balance decreases. In the diagram below, the original equilibrium position Y, corresponds with a trade balance equilibrium position (NX = 0). The increase in government spending here leads to a trade deficit (NX < 0). In other words, the trade balance worsens or decreases. Not only does the increase in government spending increase the trade deficit, but it also increases the budget deficit. In an open economy one must

therefore consider not only the impact of an expansionary fiscal policy on the budget deficit but also the impact on the trade deficit.



Chain of events

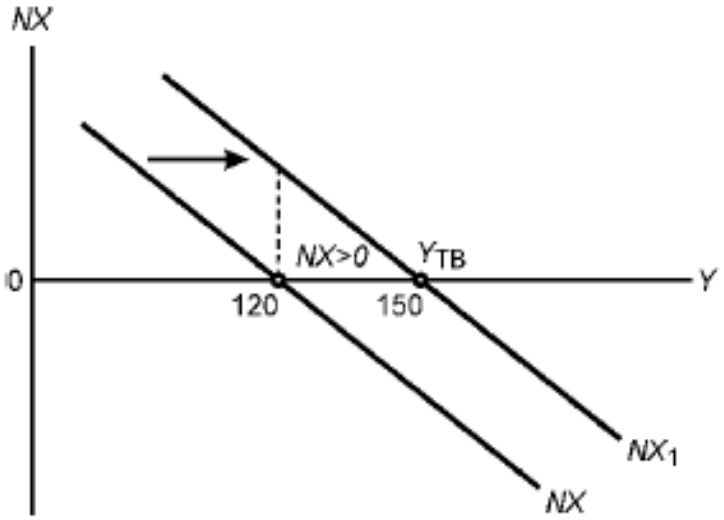
The increase in government spending that will lead to increase in the demand for goods, and increase in income, which also lead to increase in imports and fall of the net exports component can be shown as follows,

$$G\uparrow \rightarrow Z\uparrow \rightarrow Y\uparrow \rightarrow IM\uparrow \rightarrow NX\downarrow$$

An expansionary fiscal policy is not always a suitable instrument to increase the demand for goods in order to increase in the level of output and income and decrease unemployment. One needs to take the impact it has on the trade balance, as well as on the government budget, into account.

Increase in foreign demand

A rise in exports increases the demand for goods, which in turn increases the equilibrium level of output and income, the increase in output also in turn causes a rise in imports. Increase in exports leads to the rightward shift in the net exports curve as shown by the following diagram, where the net exports curve shifts from NX to NX1. According to this new NX curve, at an income level of Y (which was R120 million in our example), a trade surplus occurs, and the level of income (YTB) at which a trade balance occurs is now at a higher level (R150 million).

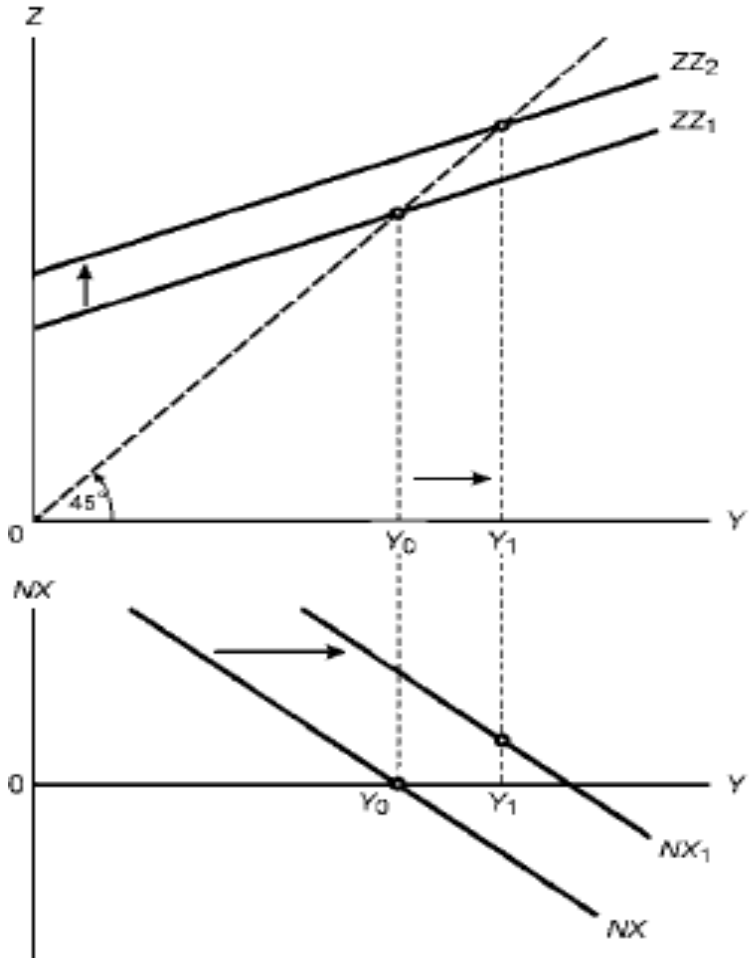


Chain of events

The positive effect of an increase in exports on the trade balance, however, outstrips the negative effect of an increase in imports. The trade balance thus improves (NX□).

$$X\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow \Rightarrow IM\uparrow$$

In the following diagram we are going to illustrate the impact of an increase in exports on the level of output and income and trade balance.



Increase in exports

6.4 DEPRECIATION, THE TRADE BALANCE AND OUTPUT

The impact of depreciation of the real exchange rate is going to be explained in this section. The Marshall-Lerner condition as a theory is also going to be illustrated in this section and lastly the section will also elaborate on the impact of depreciation on the level of output and income and trade balance.

Impact of a depreciation on the real exchange rate

Assuming that the relative prices remains the same, depreciation of currency will lead to a lower exchange rate.

Depreciation and the trade balance: the Marshall-Lerner condition

The depreciation of the real exchange rate impacts the demand for domestic goods through a change in exports and imports – and it increases the import bill. A depreciation has both a positive and a negative effect on the trade balance.

Positive effect	Negative effect
A depreciation reduces the price of exports and increases the price of imports. Exports therefore increase and imports decrease and the trade balance improves.	The rise in the price of imports increases the import bill, which impacts negatively on the trade balance.

For the Marshall-Lerner condition to hold, a real depreciation must eventually lead to an increase in net exports (an improvement in the trade balance). For this to occur, the positive effect on the trade balance must outstrip the negative effect.

The effects of a depreciation

Given that the Marshall-Lerner condition holds, a depreciation results in an improvement in the level of output and income and the trade balance. The level of output and income increases since the demand for domestic goods increases. The increase in the demand for domestic goods is the result of two things: the rise in exports and expenditure switching. Expenditure switching takes place when the increase in the relative price of imports cause economic participants to switch their expenditure from imported goods to domestic goods. The chain of events for this process will be as follows, decline in the export prices, leading to increase in the exports, and causing the demand for goods to rise, which in the end will lead to increase in the income.

$$P_{exports}\downarrow \Rightarrow X\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

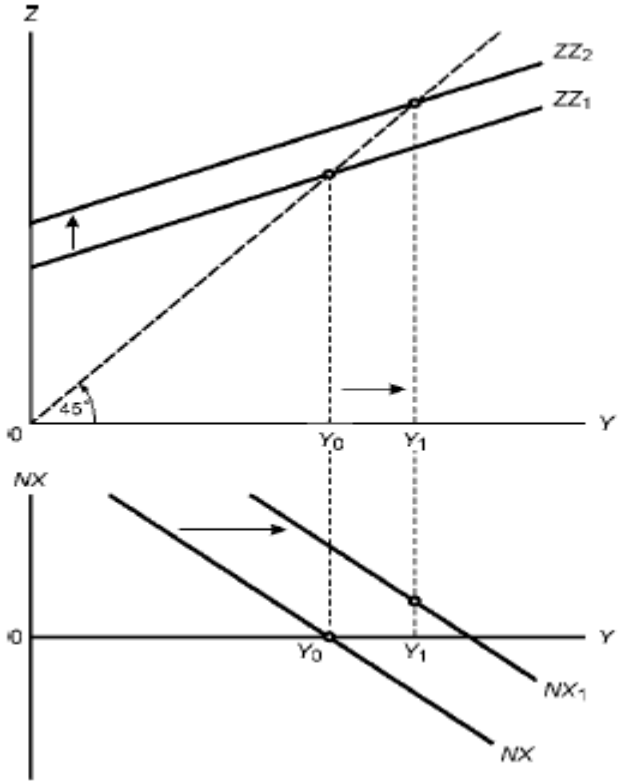
The increase in the relative price of imports causes a switching of expenditure from foreign goods (which are now more expensive) to domestically produced goods. This results in a higher demand for domestic goods and a higher level of output and income. This will be represented by the following chain of events.

$$P_{imports}\uparrow \Rightarrow IM\downarrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

This combination of higher exports and lower imports causes an improvement in the trade balance.

$$X\uparrow \text{ and } IM\downarrow \Rightarrow NX \text{ improves}$$

All this will be represented in the diagram below, that the decline in the export prices will increase income from Y_0 to Y_1, which on the other hand, will make imports more expensive, and then improves the balances of trade since less goods will be imported.



Impact of a depreciation

From the diagram above, a depreciation causes an upward shift of the ZZ1 curve to ZZ2. This increase is due to the increase in exports and to expenditure switching from imports to domestic goods. The higher demand for domestic goods increases the level of output and income and it increases from Y0 to Y1.

Since exports are higher, the NX curve shifts to the right to NX1. According to the new NX1 curve at the equilibrium income of Y1 there is now a trade surplus. The depreciation has increased the equilibrium level of output and improves the trade balance.

Learning Unit 7

Output, the interest rate and the exchange rate: the IS-LM model for an open economy

7 Introduction

The aim of this section is to look into the equilibrium in the goods market in an open market, as well as discussing the equilibrium in the financial market in the open economy as well. The section will

also discuss the relationship between the domestic interest rate and the nominal exchange rate, equilibrium in the goods and financial market in an open economy. The impact of fiscal policy in an open economy will also be explained, in addition the impact of an open economy will also be explained. Lastly the comparison between the impact of fiscal policy and impact of monetary policy in an open economy.

7.1 EQUILIBRIUM IN THE GOODS MARKET

Equilibrium in the goods market taking the assumptions of the IS-LM model we are going to assume that prices are constant, both the domestic and foreign price level. With this view we are going to analyse the economy through the use of nominal variables, of nominal interest rate and nominal exchange rate.

Impact of the nominal interest rate (i) on the goods market

An increase in the interest rate leads to a decrease in investment spending, the demand for goods and the level of output and income. The decrease in output and income is a multiple of the decrease in investment spending. This is due to the multiplier effect.

$$i\uparrow \Rightarrow I\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

Impact of the nominal exchange rate (E) on the goods market

A depreciation of the exchange rate results in an increase in exports and the trade balance improves. The increase in exports increases the demand for goods and the level of output and income.

$$E\downarrow \Rightarrow X\uparrow \Rightarrow NX\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

The chain of events that we are going to have will states that increase in interest rate will lead to decline investment, and decline in the demand for goods, and decline in the overall income. On the other hand, the decline in the interest rate will lead to increase in the level of investment in the economy, which will lead to increase in the level of demand for goods and increase in the overall output and income in the economy.

$$i\uparrow \Rightarrow I\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$
$$i\downarrow \Rightarrow I\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

Decline in the exchange rate, which we call depreciation, will lead to increase in the level of exports, such that net exports will increase and the demand for goods will also increase, and income will also increase. On the other hand, the appreciation of the currency will lead to decline in the level of exports,

which will lead to decline in the level of net exports, such that the demand for goods will decline as well and leading to decline in the overall income and output in the economy.