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COURSE – ECS 2602

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Unit	Topic	Description	Est Reading Time (mins)
1	Introduction		10
2	Overview of the South African Macroeconomic Environment		25
3	The Goods Market		40
4	The Financial Market		30
5	Goods and Financial Market IS-LM model		50
6	Goods and Financial Markets in an Open Economy		30
7	The Goods Market in an Open Economy		30
8	The IS-LM Model in an Open Economy		35
9	Labour Market		45
10	AD-AS Model		40

Introduction

Macroeconomics deals with the **economy as a whole** and not the behaviour and decisions of individual consumers, as in microeconomics. Macroeconomics is about 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.

The module consists of three interrelated sections. In the first section, which consists of study units 1 to 4, we develop a model called the IS-LM model for a **closed** economy. It is through the IS-LM model that you will start to understand how the **demand for goods determines the level of output and income** and the **role of fiscal and monetary policies** in influencing the demand for goods and hence the level of output and income.

A closed economy does not participate in any international trade, while an open economy has significant trade and financial relationships with other economies. In study units 5–7 we extend the IS-LM model to deal with output and income determination in an **open economy** and consider the role of fiscal and monetary policy in such a model.

In **study unit 5**, a number of **key concepts and relationships** are introduced. In **study unit 6**, with study unit 2 as background, the focus is on the **demand for goods in an open economy**. **Study unit 7** focuses on **determining the level of output for an open economy using the IS-LM model**. *Note the importance of the IS-LM model (study unit 4) as a building block.*

In study units 8 and 9, the **supply side** of the economy is added and we return to a closed economy. In this section, you will learn how the level of output and income is determined by the **interaction of the aggregate supply and aggregate demand for goods**. And we will once again consider role of fiscal and monetary policy in such a world. We also look at what happens in this world if a **supply shock** occurs.

In study unit 8, the **labour market** is introduced and in study unit 9 the **goods market**, the financial market and the labour market are combined in the AS-AD model.

Hints on using diagrams (or figures/graphs)

To be able to use a diagram (or figure/graph) correctly you must learn to read, draw and explain a diagram:

- Read. This entails understanding the determinants (or factors) of each curve and the way in which they affect the specific curve.
- Draw. All diagrams, axes and curves should be labeled. The initial point of equilibrium should be indicated and, if it changes, this should also be noted on the diagram.
- Explain. You should be able to explain the diagram in words.

A useful teaching tool, which is used in this module, is the **events chain** (or chain of events).
An events chain is used to highlight different steps in the economic process. As an example, consider the following familiar set of events comprising the impact of an **increase in investment on the level of output and income**:

An increase in investment (I) causes an increase in the demand for goods (Z), because I is a component of Z. This leads to an increase in output and income (Y) (Since firms respond to the increased demand for goods by producing more).
In terms of an events chain, this is represented as follows:

I↑ → Z↑ →Y↑

Overview of the South African Macroeconomic Environment

Differentiate between:

Microeconomics: deals with the behaviour and decisions of individual consumers, households, firms and focuses on demand and supply of individual goods and services and the determination of their prices.

Macroeconomics: deals with the economy as a whole. It determines and explores the relationship between aggregate concepts such as Y (income, production), general price level, interest rate levels, economic growth, unemployment and exchange rates.

Important concepts

Gross Domestic Product (GDP): the **total value** of all **final** goods and services produced **within the boundaries** of a country in a particular period.

- **Gross**: includes the total amount of goods and services produced, that is no adjustment has been made for depreciation.
- **Final Goods and Services** versus Intermediate Goods and services: those goods and services that are consumed by households and firms. Intermediate goods used in the process of production are excluded in order to avoid double counting.
- **Total value** is the value of production in terms of the prices of the various final goods and services. [Different prices may be used]
- **Current Production**: production of new goods and services

Nominal versus Real: also current versus constant

Nominal GDP is the sum of the quantities of final goods and services produced, multiplied by their current price. An increase in nominal GDP might increase over time as a result of:

- an increase in the quantity of goods and services produced
- an increase in the prices of goods and services produced

Real GDP (constant prices): quantities produced are valued at the prices in a base year. This overcomes the problem of price changes. Real GDP therefore measures the actual physical volume of production.

Per Capita real GDP

Positive economic growth actually occurs only when total real production or income grows at a faster rate than population. If population growth rate exceeds the economic growth rate, a decline in real GDP per capita occurs. Real GDP per capita is widely used as a measure of the economic welfare or wellbeing of residents of a country. If real GDP per capita rises, it is assumed that people are better off.

Some problems with using this indicator:

- **Measurement problems** - If a factor such as an increase in defense expenditure was responsible for the increase in GDP, it does not necessarily follow that there was a related increase in economic welfare.
- **Distribution of income** - An unequal distribution of income implies that the benefits of an increase in GDP flow largely to a relatively small group of people and do not "trickle down" to the poor.

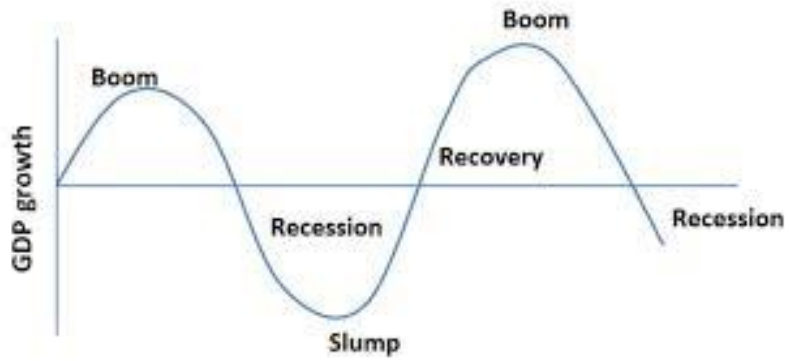
Macroeconomic Objectives

1. **Economic Growth**: use the change in real GDP
2. **Full Employment (unemployment):** unemployment rate: the number of unemployed people as a % of the economically active population (EAP)
3. **Price Stability (inflation):** most commonly used indicator for measuring inflation is the CPI
4. **Balance of Payments Stability:** effects of inflows and outflows of funds into and out of SA as recorded in the Balance of Payments. Stability of the balance of payments exists when there is some balance between exports and imports.
5. **Equitable Distribution of income**

1. Economic growth in South Africa

Economic growth of the South African economy has, on average**, deteriorated significantly since the 1960s**. During the first three years of the 1990s, South Africa experienced negative economic growth rates. A negative economic growth rate means that the real value or volume of production in that particular year was lower than in the previous year.
Looking at the growth rate since 1994, the downward trend after the 1960s appeared to turn around. The period after 1994 was characterised by two important developments that had a particular influence on the South African economy: the political democratisation of South Africa and economic globalisation. Economic globalisation refers to the integration of the South African economy into the international economy.

South African Business Cycles:



- Definition: the expansion and contraction of economic activity in a country.
- The longest business cycle in SA (trough to trough) started in March 1986 and ended in May 1993.
- Longest expansion phase in SA started in September 1999 and ended in November 2007.

Stabilization Policies

- Use of fiscal policy and monetary policy to stabilize the economy.

Fiscal Policy	Monetary Policy
Government's policy regarding the level and composition of spending, taxes and borrowing.	**SARB's policy** regarding the stance on the repo rate and money supply.
Instrument: Budget	Instrument: Repo rate and Open Market Operations
Policy variables: Government spending (G) and Taxation (T)	Policy variables: Money supply (Ms) and Interest rates (i)
Expansionary: G↑ and/or T↓	Expansionary: MS↑ or i↓
Contractionary: G↓ and/or T↑	Contractionary: MS↓ or i↑
These are demand management policies and affect the economy from the demand side.	

2. Inflation

- **Definition:** a continuous and considerable rise in the general price level.
- Commonly used indicator is the CPI.
- CPI = the consumer price index which reflects the cost of a representative based of consumer goods and services.
- The rate of change in CPI is used to measure the inflation rate.

3. Unemployment

An unemployed person is someone who is willing and able to work but who does not have a job.

- Strict definition (used by StatsSA) versus expanded definition.
    - Strict definition – Unemployed, are those persons who, being 15 years and older,
        - are not in paid employment or self-employment
        - were available for paid employment or self-employment during the seven days preceding the interview and
        - took specific steps during the four weeks preceding the interview to find employment or self-employment.
    - Expanded – omits the requirement that a person actively seeks employment. The argument is that many people are discouraged from actively seeking work owing to the small probability of finding a job.
- Unemployment rate: the number of unemployed people as a percentage of the economically active population (EAP).

The unemployment rate is not only high in South Africa, but also differs in terms of race, gender, age and educational qualifications.

The causes of unemployment are varied, and at any given time, it may be caused by more than one factor. It might, for instance, be the result of the contraction phase of the business cycle as well as structural changes in the economy.

The type of unemployment in SA is structural unemployment. This occurs when there is a mismatch between workers' qualifications and job requirements, or when jobs disappear because of structural changes in the economy. For example, when we built the Gautrain, we had to bring in engineers from other countries as we did not have the skills available to fill the job requirements.

4. Balance of Payments Stability

Definition: a systematic statistical record of all economic transactions between the residents in the reporting country and the rest of the world.

The South African balance of payments summarises the transactions between South African households, firms and government and foreign households, firms and government.

The balance of payments consists of four basic accounts:

- the current account
- the capital transfer account
- the financial account
- unrecorded transactions

The two major accounts are the current and financial account. The **current account** records a country's involvement in international trade (exports and imports), while the **financial account** records the country's involvement in international capital flows.

If there is a surplus on the current account, this indicates that the value of the country's exports exceeded the value of its imports during the period under review. If there is a deficit, then imports were greater than exports.

A surplus on the financial account indicates that more funds flowed into than out of the country during the period concerned and a net inflow of foreign capital occurred. A deficit on the financial account indicates that the outflow of capital exceeded the inflow of capital and a net outflow of capital occurred.

The balancing item in the balance of payments (in principle) is the **change in the country's gold and other foreign reserves**. The sum of the current account balance, the capital transfer account, the financial account balance and the unrecorded transactions are therefore reflected in the change in foreign reserves.

Balance of payments stability exists when there is some balance between exports and imports. Balance of payments stability is one of the macroeconomic objectives. In technical terms, this means that the balance of payments and exchange rates should be fairly stable.

5. Distribution of Income

South Africa has one of the most unequal distributions of personal income in the world. In South Africa, the Gini coefficient has been estimated to be as high as 0.68. This is one of the highest Gini coefficients ever estimated in the world. Estimates for the industrial countries tend to average between about 0.30 and 0.45, and for developing countries, the estimates generally vary between about 0.40 and 0.60. The Gini coefficient lies between 0 and 1 with 1 being the worst.

The Goods Market

This particular module looks at the goods market and analyses and explains how the demand for goods determines the level of production and income in the economy. Demand determines Supply.

The **demand for goods** which consist of **consumer spending, investment spending and government spending** are important factors in creating employment opportunities in South Africa. In this regard **fiscal policy**, through changes in government spending and taxation, plays an important role in influencing the demand for goods.

1. **Composition of GDP [measure of economic activity]**

- **Expenditure on GDP:** C + I + G + X – IM
  - **Consumption –** purchases by consumers, largest component of GDP
  - **Investment = nonresidential + residential**
  - **Government spending** – goods = public goods, office equipment, services = services provided by government officials.
  - **Difference between exports and imports is called the trade balance**.

  - Final consumption expenditure by households in the national accounts is classified in terms of durable goods, semi-durable goods, nondurable goods and services.

  - Final Consumption expenditure by government includes not only the buying of final goods, such as textbooks for schools and medication for hospitals, but also the services provided by government employees, such as teachers and medical personnel.
    - Transfer payments (social grants) are excluded: child support; old age pensions; disability grants and interest on debt.

  - Gross Capital Formation (Investment) is spending by households, private firms and government on residential and nonresidential capital goods and is made up of gross fixed capital formation and inventory investment.

NOTE: Expenditure on GDP includes exports and excludes imports, it is all spending on what we as a country produce. **Gross Domestic Expenditure** total value of spending within the borders of a country, including imports but excluding exports, since spending on exports takes place outside the borders of the country:

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

2. **Demand for Goods**

- Goods Market: demand for goods and services (Z)

$$Z \equiv C + I + G + X - IM$$

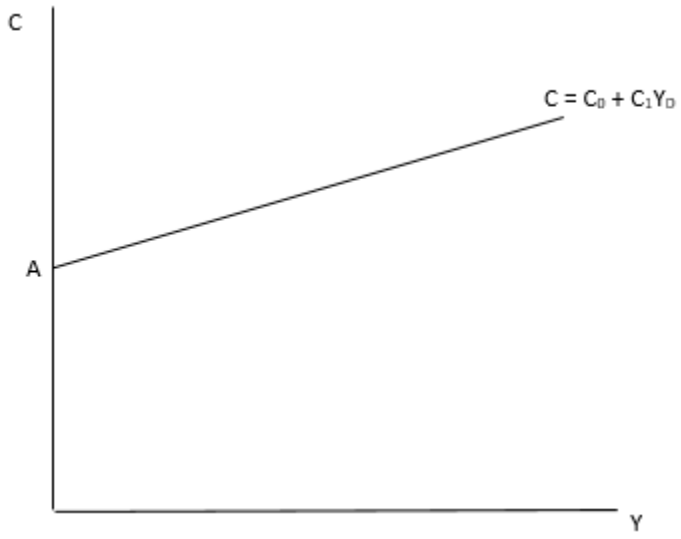
- **Consumption:** $c_o + c_1 Y_D$

  - Households are responsible for consumer spending and a change in their spending behaviour, even a small one, will result in a change in the demand for goods, output and income.
  - Consumption is made up of two parts: **autonomous consumption** and **induced consumption**.
  - **Autonomous consumption**: c_o is independent of income (Y) – even if income is zero, people still need to eat! How? By using savings called dissaving or borrowing.
  - **Induced consumption:** $c_1 Y_D$ is that part of consumption that is dependent on income and the marginal propensity to consume (c_1).
  - **Marginal propensity to consume** = the portion of household income that is spent on goods and services. For example, if income increases by R1000, what % of this R1000 will be spent? R1000 x MPC. MPC is always a value between 0 and 1.

An increase in income (Y) causes an increase in consumer spending (C), and the marginal propensity to consume (c) determines **by how much** consumption increases for a given increase in income.

  - Autonomous consumption is affected by non-income determinants such as interest rates, expectations, wealth.
  - Y→ C → Z→ Y→ C
  - Savings and the demand for goods: the more households save the less they consume (spend).
  - **Exogenous and endogenous variables of the consumption function**
    - Exogenous (autonomous) variable is independent from the endogenous variable – the variable we are trying to explain - and while it influences the endogenous variable it is not influenced by it.
    - In this model, the main endogenous variable is the level of output and income (Y).
    - In terms of the consumption function, exogenous variables are Autonomous consumption, and the marginal propensity to consume.
    - A change in autonomous consumption shifts the consumption function while a change in the marginal propensity to consume changes the slope of the consumption function.
    - The endogenous variable in the consumption function is that part of consumption spending which changes if the level of output and income changes and is represented as a movement along the consumption function.

Relation between consumption and disposable income
The Consumption Function



The autonomous part of consumption determines the y-axis intercept of the curve and the marginal propensity to consume determines the slope of the curve. $0 < c_1 < 1$ therefore, the slope is also less than 1.

- **Investment:** $I = \bar{I}$

  - Investment spending is spending by firms on additions to capital stock with future profits in mind. Investment does not depend on current income, but rather future income and is therefore autonomous. *Do not confuse real investment with financial investment - investment in shares and other financial instruments.*
  - Investment is exogenous, i.e., it is independent of Y (income)
  - Investment depends on interest rate, expectations, business confidence and regulations.
  - Investment Creates production capacity in the economy and creates a demand for goods and services.
  - Savings and investment have a positive relationship. In this module, the assumption is that increased investment leads to increased income which leads to an increase in savings. This leads to the phrase "investment will create its own savings".
  - **Inverse relationship between interest rate and level of Investment Spending**

- **Government Spending and Taxes**

  - Government spending and taxes are both exogenous variables.
    - Governments do not follow same behavioral rules as consumers. Government can spend money at their discretion, if funds are not available, they can borrow the money needed and spend.
  - **Fiscal policy** is the government policy in terms of the level and composition of government spending, taxation and borrowing.
  - The main instrument of fiscal policy is the BUDGET
    - The budget is the annual announcement of the government's fiscal policy changes:
      - Budget deficit: G > T
      - Budget surplus: G < T
      - Balanced budget: G = T
  - Two variables of FISCAL POLICY: Government Spending (G) and Tax (T)
  - Expansionary fiscal policy: used to stimulate economic activity by increasing the demand for goods (aggregate demand). This means that government spending has to be increased and/or taxes have to be decreased
  - Contractionary/Restrictive fiscal policy: used to "cool down" economic activity by decreasing the demand for goods (aggregate demand), spending has to be reduced and/or taxes have to be increased.

<u>Determination of Equilibrium Output and Income</u>

How the demand for goods determines the equilibrium level of output (production) and income in the goods market?

What is equilibrium?

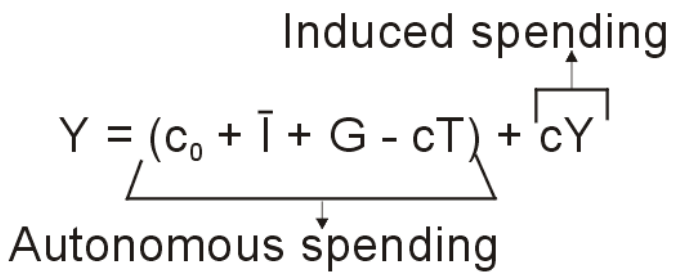
A situation in which all forces of change are neutralized or balanced.

- All positions where Z = Y [represented by 45° line] i.e. production = demand for goods → **Equilibrium condition**
- Components of Z: C + I + G
- But remember:

  - C = co + c(Y – T)
  - I = I
  - G = G
  - T = T
  - At equilibrium: $Y = c_0 + c_1(Y-T) + I + G$

This constructed model now enables us to look at what determines the level of output or how it changes in response to government spending.

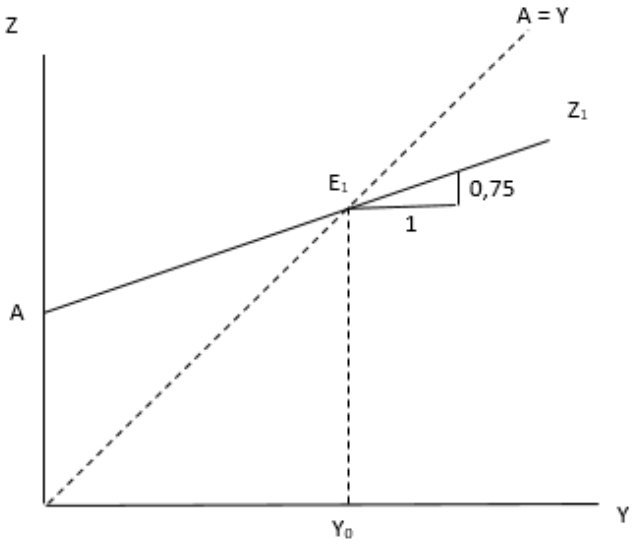
Autonomous and induced spending



Autonomous – variables that are independent of the level output or income
Induced – variables dependent on level of income and output

Bear in mind that Y is found on both sides of this equation. This means that while the demand for goods (Z) determines output and income (Y), output and income (Y) in turn influences (Z) through the effect it has on consumer spending by households. And this is why, as you will see later, there is a **multiplier effect** in the economy.

The goods market diagram



Households consume according to their income and autonomous consumption and will only change this pattern if their income changes or a factor that determines their autonomous consumption.

Firms make their investment decisions and have no intention of changing their behaviour unless one of the factors that determine their investment behaviour change.

Given this spending pattern, the **demand for goods** determines the amount of goods that producers **produce**, and they will only change their production if the demand for goods changes.

Demand Creates Supply

Ensuring goods market equilibrium

Role of inventories: It is through changes in inventories that the message whether to produce more or less is transmitted to producers.

Adjustment process

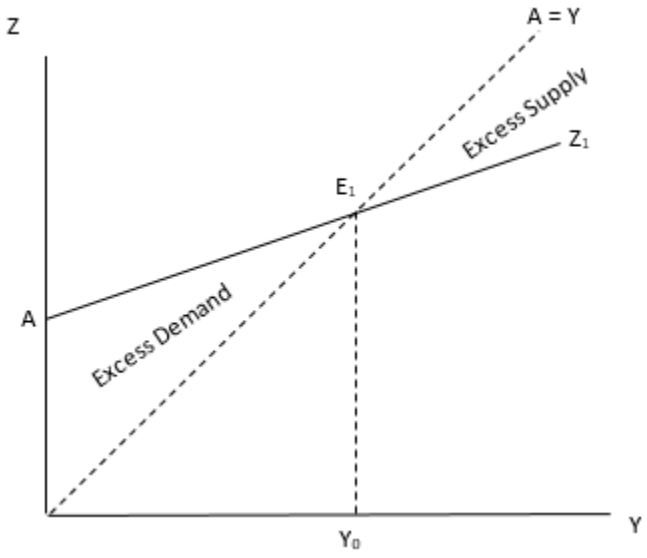
If there is an **excess demand** for goods, and producers (firms) will respond to this excess demand by **increasing their level of production**. As they increase their level of production, more factors of production are employed and **household income increases**, resulting in an increase in consumer spending. This process continues until equilibrium is reached.

Adjustment Process:

- If Z > Y: Y ↑ → C↑ → Z↑ ==== Excess demand
- If Z < Y: Y↓→ C↓→ Z↓ ==== Excess supply

Adjustment process in terms of a diagram

Excess demand Z > Y: Y ↑ → C↑ → Z↑



In the graph above, if Y is at any point before Y_0, there will be excess demand. This can be seen as any point before Y_0, the Z_1 curve is higher than the 45-degree line (on the y-axis). Any point after Y_0, we can see that the 45-degree line is above the Z_1 curve and that means that output Y is greater than Z_1 the demand. In this case there will be excess supply.

Numerical example

- Calculating Aggregate Demand
  - Calculate Z if c = 0.8, c_o = 500, I = 300, G = 400, T = 300 and Yo = 4800
    - $Z = (c_0 + I + G – cT) + cY$
    - $Z = (500 + 300 + 400 – 0.8[300]) + 0.8\ (4800)$
    - $Z = 4800$
  - Make sure you can calculate if you are given a graph with numbers.

Equilibrium level of income and full employment

By manipulating the equilibrium equation:

$Y = Z = c_0 + c(Y–T) + \bar{I} + G$

to solve for Y (the equilibrium level of output and income), we end up with the following formula:

$Y = 1/(1 – c)\ (c_0 + \bar{I} + G – cT)$

Using the following values:

c = 0.8, c0 = 500, $\bar{I}$ = 300, G = 400 and T = 300

the equilibrium level of income can be calculated as follows:

$Y = 1/(1 - 0.8)\ (500 + 300 + 400 – 0.8\ [300]) = 4800$

- The term $[c_0 + \bar{I} + G – cT]$ = autonomous spending and is most likely positive. If Government is running a balanced budget (T = G) and the propensity to consume (c_1) is less than 1, then ($G – c_1T$) is positive and so is autonomous spending
- Looking at $1/1 – c_1$, because $0 < c_1 < 1$, then $1/1 – c_1$ is a number greater than 1. It *multiplies* autonomous spending and therefore is called the **multiplier**
- What does the multiplier imply? If consumers consume more, i.e. c_0 increases by R1 million, the equation tells us that output will increase by more than R1 million. The multiplier equals 1/1 – 0.6 = 2.5, so output increases by R2.5 million.

How to reach full employment

The answer lies in **increasing the demand for goods** since it is the demand for goods that determines the level of output and income. In technical terms, the answer lies in a change in the variables that affect **autonomous spending and/or the marginal propensity to consume**.

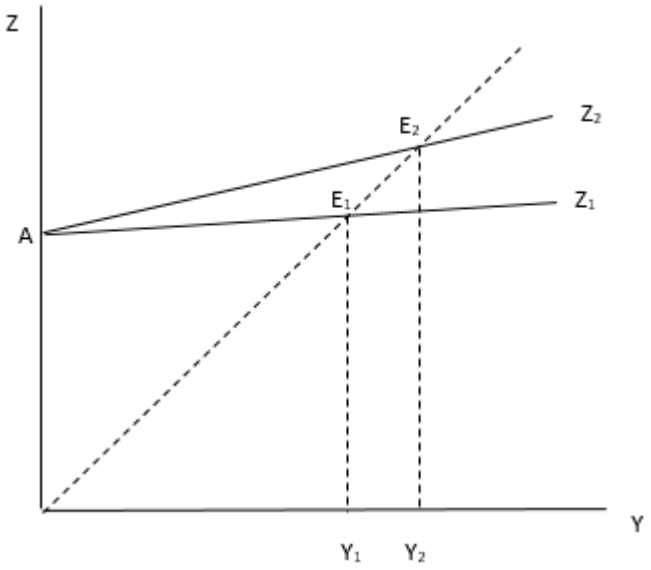
- An **increase in the marginal propensity to consume** leads to a rise in consumer spending, the demand for goods and the equilibrium level of output and income.
- An **increase in autonomous spending** causes an increase in the demand for goods, which increases the level of output and income and moves the economy closer to full employment.

Increase in MPC

This implies that households spend a larger proportion of every additional rand on consumption. The term, c, in our consumption equation is therefore larger and the **slope** of the consumption curve steeper. Since the slope of the demand for goods curve is determined by the slope of the consumption curve, the slope of the demand for goods curve is steeper.

Using our equilibrium equation, a higher c_1 implies a higher value for 1/1 - c, and the equilibrium level of output and income rises

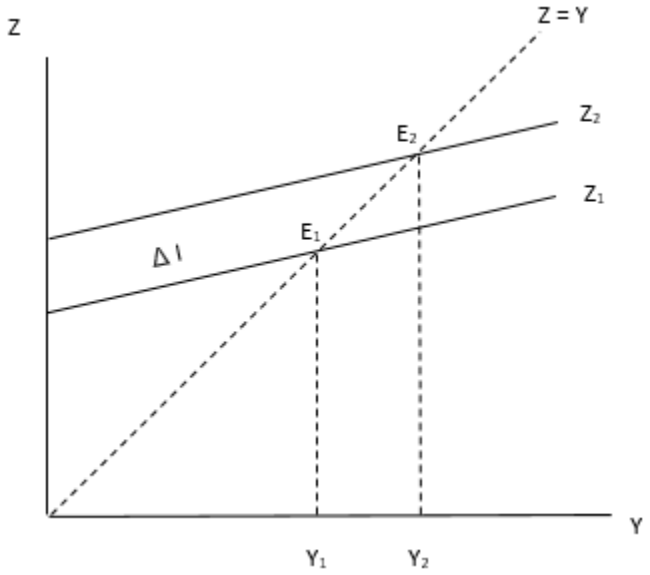
Diagram of effects of an increase in MPC



When the MPC increases, we pivot the demand curve upwards. The autonomous intercept A does not change.

An increase in autonomous investment

Investment forms part of autonomous spending and an increase in investment increases the demand for goods and shifts the demand for goods curve upwards. The autonomous (y-axis) intercept is higher. With the new demand for goods function Z_2 and the new equilibrium (E_2) we can see that the level of output and income has increased. The equilibrium level of output and income rises from Y_1 to Y_2, which is greater than the increase in autonomous spending. The reason for this is the multiplier effect.



<u>The multiplier effect</u>

What happens if investment increases?

The initial effect of an increase in investment is to increase the demand for goods by an amount equal to the increase in investment spending.	If I increases by 100, then Z increases by 100
This increase causes firms to produce more capital goods and the increase in total production and income is equal to the initial increase in investment.	The increase in Z of 100 increases Y by 100.
The amount by which they increase their consumer spending depends on the marginal propensity to consume, and this will be less than the increase in income.	The increase of 100 in Y increases C, but less than 100. If the marginal propensity to consume is 0.8 the increase in Y is 80.
This increase in consumer spending means a further increase in the demand for goods – hence there is a further rise in output and income which, in turn, increases consumer spending.	The increase of C of 80 increases Z by 80, which further increases Y by 80. The multiplier effect is thus in operation.

Can the multiplier effect continue indefinitely? – No, with each round of the multiplier, it becomes smaller and will eventually wear itself out.

Multiplier as an events chain:
I ↑ → Z↑ → Y↑ → C↑ → Z↑→ Y↑

Reaching full employment

1. Increase in consumer confidence
2. Increase in investment demand
3. Increase in government spending (decrease in taxes)

Government spending and taxation

Impact of an increase in government spending = increase in autonomous spending, therefore an upward shift in demand for goods. Works in the same way as an increase in Investment spending.

Change in taxes

- Change in government spending directly influences demand for goods
- However, initial effect of change in taxes is on disposable income of households
- This changes consumer spending but by less than change in income because MPC is less than 1.

Why is a balanced budget still seen as expansionary?
The difference between the initial impact of a change in government spending and a change in taxes implies that even if the change in G is equal to the change in T, $\Delta G = \Delta T$, it will still have an expansionary effect on the economy.

The reason for this is as follows:
When government increases spending, for example, by building roads, for 1 million, output and income directly increases by 1 million and the multiplier will start from this point. The government has injected a 1 million into the economy this is a direct effect.

If government also increases taxes by 1 million, it withdraws a 1 million from the economy. Households however, do not decrease their spending by 1 million, but rather by c x 1 million. The multiplier starts to operate from c x 1 million rather than from the 1 million..

While an increase in government spending initially increases output and income by 1 million, an increase in taxes of 1 million does not initially decrease output and income by 1 million but indirectly (through the consumption function) by c x 100.

Assume that c = 0.8 and that G increases by 100 and T increases by 100.
The value of the multiplier is 5.

An increase of 100 in government spending increases Y by 100 x 5 = 500
An increase of 100 in taxes decreases Y by 0.8(100) x 5 = 400
The net effect is an increase of 100 in output and income.

- **A balanced budget still increases output**

Some constraints when using Fiscal policy to increase demand for goods in SA

- **Problem of structural unemployment**

South Africa has a structural unemployment problem. This occurs when there is a mismatch between workers' qualifications and job requirements, or when jobs disappear because of structural changes in the economy. This is usually 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.

While an increase in the demand for goods might create more job opportunities, we might find ourselves in the ironic situation that, while there are more job opportunities, the unemployed are **not able to fill** these jobs owing to a lack of skills and training. The economy becomes **supply constrained** and demand policy alone is not enough.

- **Jobless growth**

While an increase in the demand for goods increases the level of output and income, it does not follow that an increase in the level of output will necessarily lead to more job opportunities. E.g. increased output may lead to increase in capital-intensive production methods → less labour is used

- **Wage increases**

The way in which the **labour market reacts** in the event of an increase in the demand for goods will determine whether demand policies are suitable. If an increase in the demand for goods leads to an increase in wages, which causes an increase in prices and inflation, this might require the use of expenditure-reducing policies (i.e. a decrease in the demand for goods) to keep inflation in check.

- **Budget deficit constraint**

Budget deficit should be about 3% of GDP, in order to limit the impact of the budget deficit on interest rates, inflation and the balance of payments. With the South African government committed to reducing the budget deficit and the ratio of taxation to GDP, there is little scope for using government spending and taxation to pump up the demand for goods.
Crowding out might occur - the rise in interest rates owing to increased government spending reduces investment spending by the private sector.

- **Balance of payments constraint.**

If the propensity to import is high, it not only implies that the multiplier effect is smaller, but also that an increase in the demand for goods causes an increase in imports, which might lead to balance of payments problems.

The Financial Market

In the previous unit, we excluded interest rates. We now turn to the financial market and look at what determines the interest rate and how the SARB can affect it.

Demand for money

Money ≠ income ≠ wealth

Income – what you earn from working plus interest or dividends, it is a flow variable

Wealth – value of all financial assets minus all financial liabilities, it is a stock variable

Money – financial assets that can be used to directly buy goods or pay liabilities are called money, it is also a stock variable

Factors that impact the demand for money

Your financial wealth can be held in money (passive) or bonds (Treasury Bills) (active). The choice between the two depends on:

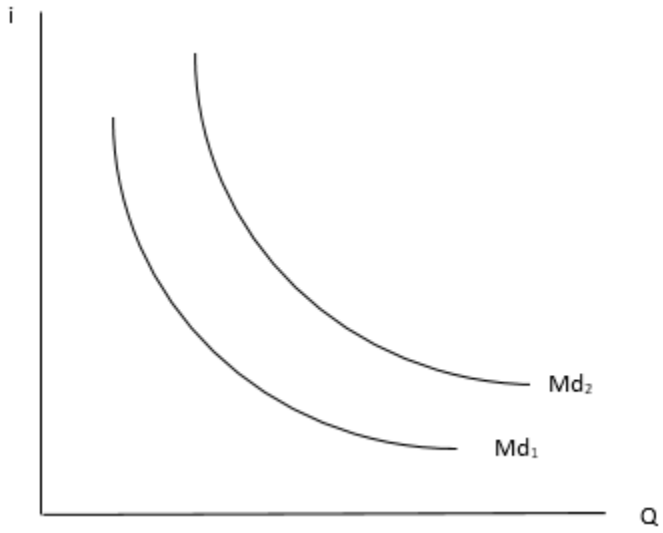
- Level of transactions
- Interest rate on bonds

$$M_d = YL(i)$$
$$+ -$$

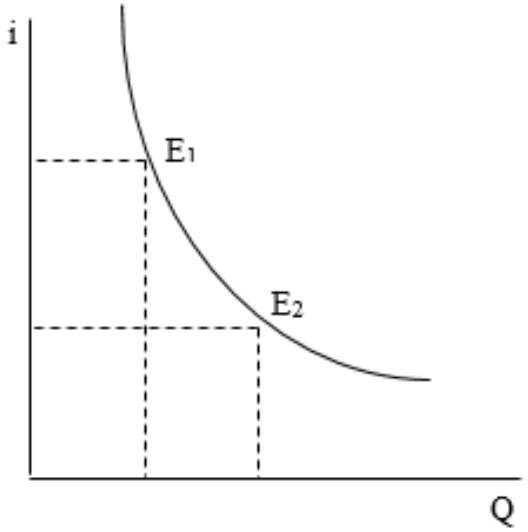
The demand for money, M_d, is equal to nominal income, Y, times a function of the interest rate, i.
The minus sign means interest rate has a negative effect on money demand.

It is this relationship between Y and M_d that provides the link between the goods market, where Y is determined, and the financial market, where the interest rate (i) is determined. There is positive relationship between the level of income (Y) and the demand for money (M_d). In other words, if output and income increases, the demand for money increases, and if the level of output and income decreases, the demand for money decreases.

The demand for money



A **shift** of the demand for money curve takes place when the level of output and income (Y) changes



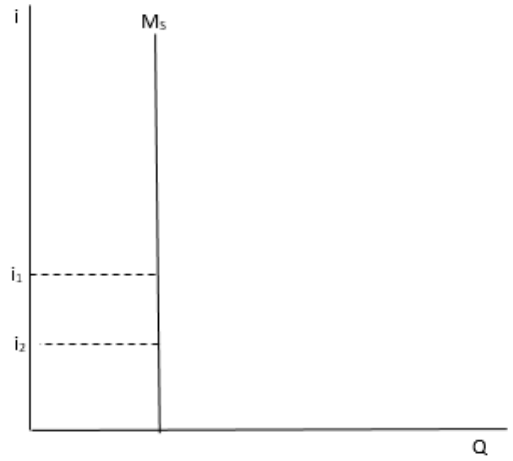
A **movement along** the demand for money curve takes place when the interest rate (i) changes

In the above graph, the interest rate is decreased and there is an increase in the demand for money. This is shown by the increase in Q as we move down the M_d curve to E_2 with a corresponding decrease in i.

Determining the interest rate

We assume that the only money in the economy is currency which is supplied by the central bank. An exogenously controlled money supply also implies that the money supply is not influenced by the interest rate and is therefore autonomous in the model. This is shown with the vertical money supply curve which is entirely inelastic with regard to the interest rate. Therefore, a change in the interest rate from i_1 to i_2 does not affect the money supply.

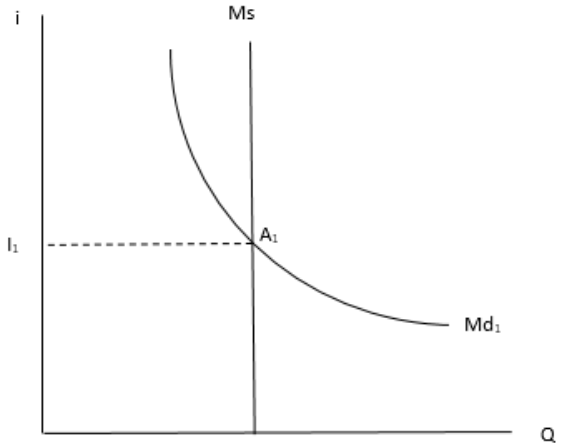
In the diagram below, this **exogenously determined money supply curve is** represented by Ms.



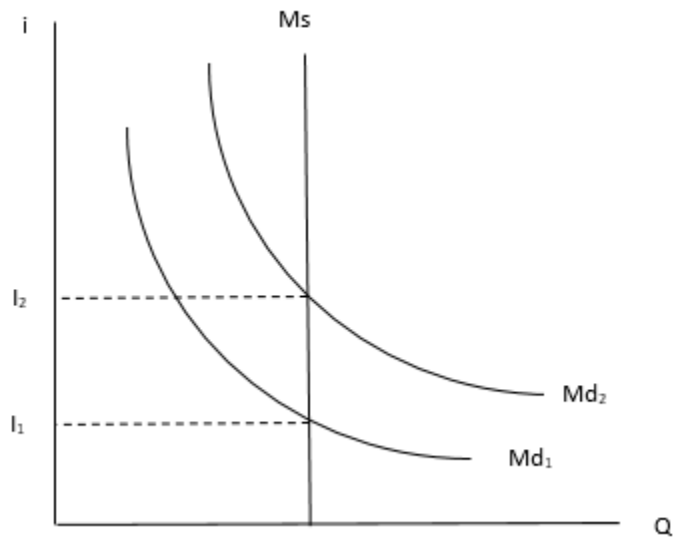
Equilibrium in the financial market

The point where the demand curve for money intersects the supply curve of money (or where the quantity of money demanded is equal to the quantity of money supplied).

It is indicated as point **A_1** in the diagram below. At this equilibrium position, there is portfolio equilibrium in the sense that at the equilibrium interest rate of i_1, people are holding the amount of money and bonds they want and will only change their holdings of money and bonds if the interest rate or the level of output and income changes.

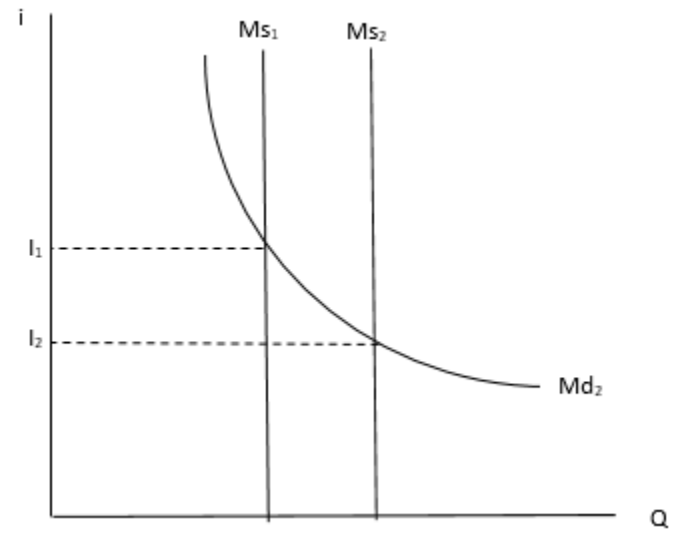


Effect of an increase in output or income on the interest rate



An increase in nominal income leads to a shift in the money demand curve and an increase in the interest rate. The reason: at initial interest rate, the demand for money exceeds the supply. A higher interest rate is needed to decrease the amount of money people want to hold.

Effect of an increase in the money supply



An increase in the supply of money by the central bank leads to a decrease in the interest rate. This decrease in interest rate increases the demand for money, so it equals the now larger supply of money.

Monetary policy and open market operations

Open market operations - the sale or purchase of domestic financial assets such as treasury bills by the central bank in order to exert a specific influence on the quantity of money and the interest rate.

Increase in money supply – the CB **buys** treasury bills on the open market from a broker, a commercial bank or individuals. In exchange for the treasury bills, the sellers of these bills receive money from the central bank. Thus, the money supply is increased. This is represented by a rightward shift in the money supply curve. **Expansionary Monetary Policy**

Decrease in money supply – the CB **sells** treasury bills on the open market to a broker, a commercial bank or individuals. Here the buyers of treasury bills pay the central bank with money, and the money supply decreases. This is represented by a leftward shift in the money supply curve. **Contractionary Monetary Policy**

Price of treasury bills and the interest rate

To understand why the interest rate decreases in the financial market if the central bank increases the money supply through open-market operations, you need to understand the relationship between the price of treasury bills and the interest rate.

The interest rate is determined through the price of bonds (in this case the price of treasury bills). Treasury bills are traded on a **discounted basis** and **redeemed at par** on the maturity date.

- **"Redeemed at par"** - 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.

The price paid for treasury bills determines the interest rate (which is the rate of return) in the market. 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:

$$\frac{\text{face value} - \text{price paid}}{\text{price paid}} \times \frac{100}{1}$$

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

= 5.26%

As the price of treasury bills increases, the rate of return (the interest rate) on them decreases.

How the CB increases the money supply to reduce the interest rate

It needs to convince financial market participants to sell their treasury bills to the central bank. Given the fact that financial market participants are in equilibrium – in other words, at the equilibrium interest rate they are satisfied with the amount of money and treasury bills they hold – the central bank needs to offer to buy the treasury bills at a higher price.

At a higher price for treasury bills, the interest rate is lower and financial market participants will be prepared to hold a larger amount of money and fewer bonds at this lower interest rate.

Ms↑: DB↑ → PB↑→ i↓

The opposite is true when the CB wants to **reduce the money supply to increase the interest rate**. It must convince financial market participants to switch from money to treasury bills. This requires a lower price for treasury bills, which implies a higher interest rate. It is only when the price of treasury bills is lower and the interest rate higher that financial market participants are prepared to hold more treasury bills and less money.

Goods and Financial Market IS-LM model

The Goods Market and the IS relation

Equilibrium in goods market → production, Y = demand for goods, Z.

Factors that changed equilibrium output:

- Government spending
- Shifts in consumption demand

We will now focus on the effect of the interest rate on the variables making up Z

Possible effects of the interest rate on the demand for goods:

- ***Consumption spending.*** Consumption spending on durable goods such as cars and furniture, is particularly sensitive to changes in the interest rate since most of these goods are **bought on credit**. The higher the interest rate, the higher the cost of credit and the less affordable these goods will be. Therefore, consumption spending will decrease.
- ***Investment spending***. Investment spending is **negatively** related to the interest rate. The interest rate is what firms must pay if they borrow funds to finance their investment spending. The higher the interest rate, the more firms have to pay out in interest per annum from the earnings they receive from their investment spending. Consequently, the higher the interest rate, the fewer the potential profitable investment projects will be.
- ***Government spending***. Part of government spending is financed from **borrowing**. The government is legally obliged to pay interest on the money it borrows. The higher the interest rate, the higher the interest component will be. This higher interest component implies that **fewer funds are available for other current spending** as well as capital spending.

We will only consider the impact of changes in the interest rate on investment spending.

Investment function: investment, sales and the interest rate

Investment depends on two factors:

1. **Level of sales** - an increase in the level of production implies an increase in the level of sales. As the level of production increases, the level of sales rises and firms tend to invest more (buy additional machines) – hence a positive relationship between the level of output and the level of investment.
2. **Interest rate -** Building a new factory or buying a machine requires funds. Funding for investment can either be borrowed or financed from own funds. The higher the interest rate, the higher the cost of borrowing will be, as well as the opportunity cost of own funds, and the lower the level of investment spending in the economy will be.

Considering these two effects we can now write the investment relation:

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

I is no longer considered autonomous as it now also depends on Y: $I = I(Y, i)$

➔ $Y = Z = c_o + c(Y - T) \mathbf{+ I (Y, i)} + G$

Determining output

Using $Y = Z = c_o + c(Y - T) \mathbf{+ I (Y, i)} + G$, we can now look at what happens to output when the interest rate changes.

Since investment is now a function of the level of output and income, the demand for goods curve changes. It now has a steeper slope compared to the demand for goods curve in study unit 2.
A change in income not only causes a change in consumption spending but also a change in investment spending – hence the increase in spending for a given increase in income is higher.

Diagram A: $I=\bar{I}$

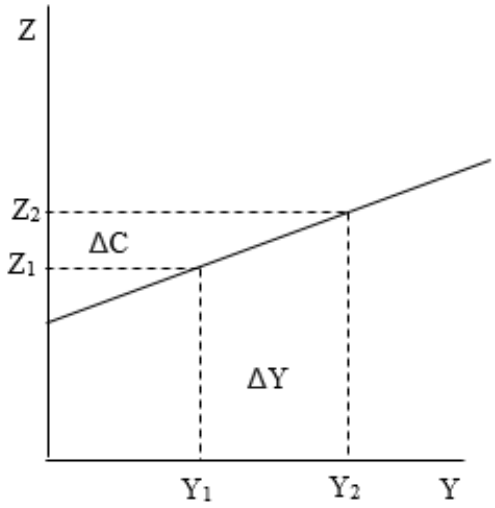
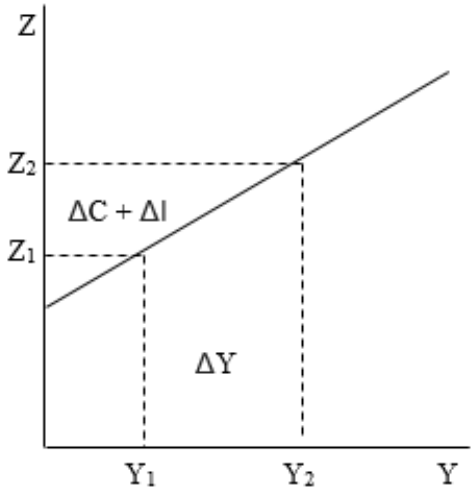


Diagram B: I = I(Y)



The increase in demand for goods in diagram B from Z_1 to Z_2 is greater than the increase in the demand for goods from Z_1 to Z_2 in diagram A, since in the case of diagram B, both consumption spending and investment spending increase. This therefore also causes a higher multiplier effect.

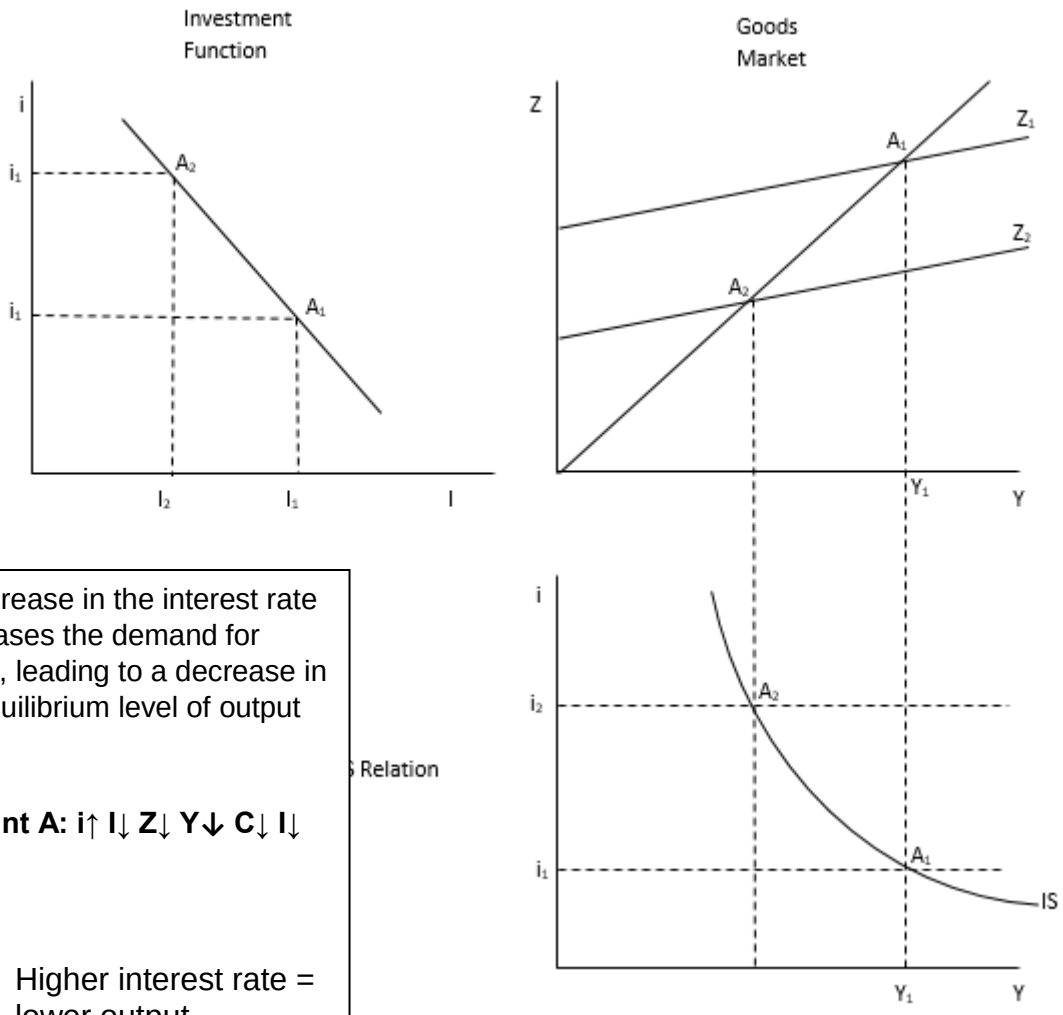
Deriving the IS curve

It gives us a picture of what happens in the goods market when the interest rate changes. To understand the IS curve, you need to know the events that lie behind it, which you will grasp when you derive it.

To plot the first point A:

1) We assume an interest rate i, there is a corresponding level of investment spending I, according to the investment schedule in figure a. For this given I, there is also a corresponding demand for goods ZZ.
2) Given this demand for goods, equilibrium is at point A, where Z = Y. At this goods market equilibrium position, A in figure b, the corresponding equilibrium level of output and income is Y.
3) By extending this equilibrium level of income Y with a dotted line to figure c, we can plot our first point on our IS curve.
4) 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.
5) We then assume an increase in the interest rate from i to i_1. According to our investment schedule, there will be a corresponding decrease in I to I_1 in figure a.
6) In the goods market (fig b), the decline in investment spending decreases the demand for goods shown by the downward shift of ZZ to ZZ_1. The decline in output and income Y is a multiple of the decrease in investment spending due to the multiplier effect.
7) Goods market equilibrium is ultimately reached at point A_1 in figure b.
8) 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.
9) By extending this equilibrium level of income Y_1 in figure b with a dotted line to figure c, we can now plot our second point on our IS curve. The second point on our IS curve is labelled 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.

It gives us a picture of what happens in the goods market when the interest rate changes.



An increase in the interest rate decreases the demand for goods, leading to a decrease in the equilibrium level of output

At point A: i↑ I↓ Z↓ Y↓ C↓ I↓ ZZ↓

➔ Higher interest rate = lower output

- **The IS curve**: you must be able to explain and illustrate the derivation of the IS curve. The following is a brief explanation:
  - The IS curve shows the combinations of interest rates and income levels where the goods market is in equilibrium, given that all autonomous variables are unchanged and for a given interest rate.
  - When IS curve is derived, government spending, taxation and consumer confidence are unchanged.
  - When deriving the IS curve **assume a change in the interest rate**, which leads to a shift of the ZZ curve and thereby the establishing of a new equilibrium level.
  - The IS curve shows the inverse relationship between interest rate (i) and the income/output (Y).

Also note:

- Movement **along** the IS curve: change in interest rate.
- **Shift** of the IS curve: change in government spending, taxation and consumer confidence (exogenous variables).

Financial Markets and the LM relation:

Real money, real income and the interest rate

In study unit 3, the financial market is done in nominal terms, while in study unit 2 the goods market is done in real terms. To turn the financial market in a real market we specify the money supply in real terms.

Nominal money supply (M_s) – money amount	Real money supply (M/P) – number of goods
E.g.: M = R100 million Price level (P) = R10	M/P = R100 m/R10 = 10 million
E.g.: M = R100 million *P↑ = R20*	M/P = R100 m/R20 = 5 million
E.g.: W = R100 million *P↓ = R5*	M/P = R100/R5 = 20 million

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 amount of nominal money, fewer goods and services can be bought. A decline in the general price level results in an increase in the real money supply (more goods and services can be bought) → purchasing power.

Deriving the LM curve

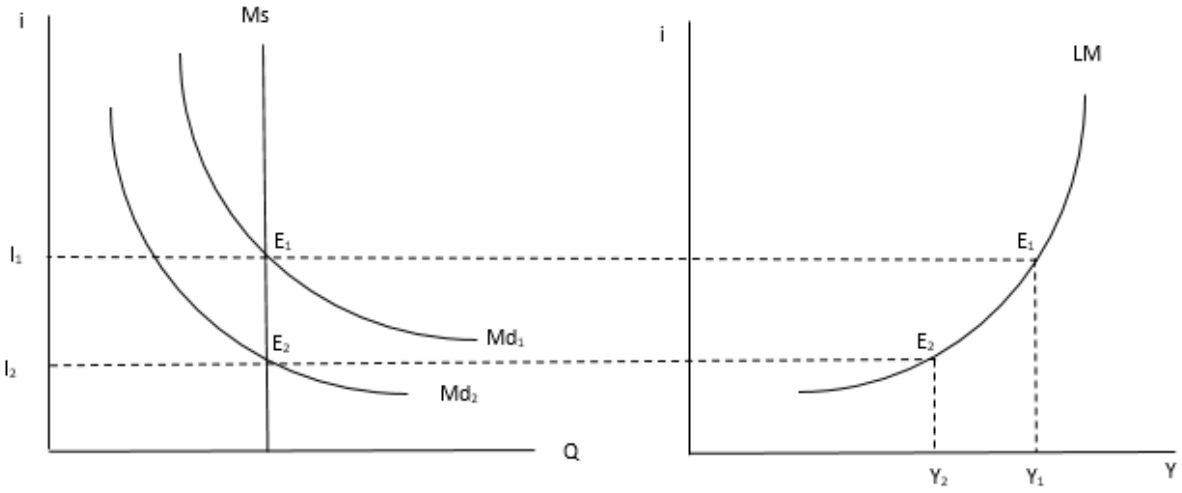
The equilibrium condition in the financial market therefore changes from:

M = $YL(i) to M/P = YL(i)

- Derived from the financial market when the **level of output and income changes.**
- LM curve is derived from all the points of equilibrium in the money market (that is where the quantity of money demanded is equal to the quantity of money supplied) for a given level of Y.
- **Assume that the level of Y** changes. This results in a change in the demand for money.
- The change in the demand for money leads to a change in the interest rate, so giving another point on the LM curve.
- LM curve shows a **positive relationship between interest rate and level of output.**

To plot the first point A:

1) Given the equilibrium income level Y in figure b, we have a corresponding demand for money curve Md in figure a. Equilibrium in the financial market occurs at point a in figure A where Md = Ms.
2) For this financial market equilibrium position, A in figure a, the corresponding equilibrium interest rate is i.
3) 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.
4) 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.
5) This first point on the LM curve is also indicated as point A since it corresponds to point A in figure a.
6) To plot the second point A_1, we assume an increase in the level of output and income from Y to Y_1 in figure b. This increase in Y will increase Md in the economy and shift the Md curve to the right at Md_1.
7) Given this new demand for money curve Md_1, we have a new financial market equilibrium position at point A_1 in figure a.
8) 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.
9) 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.



An increase in income leads to an increase in the demand for money at a given interest rate. Given the money supply, this increase in demand for money leads to an increase in the equilibrium interest rate.

At point A: $Y\uparrow$ $M_d\uparrow$ → $i\uparrow$

This then is our LM curve showing combinations of interest rates and income levels where the financial market is in equilibrium, given that the real money supply is fixed.

Also note:

- Movements **along** the LM curve caused by a change in interest rate
- **Shift** of the LM curve: change in nominal supply of money (M) or a change in the price level (P) (exogenous variables).

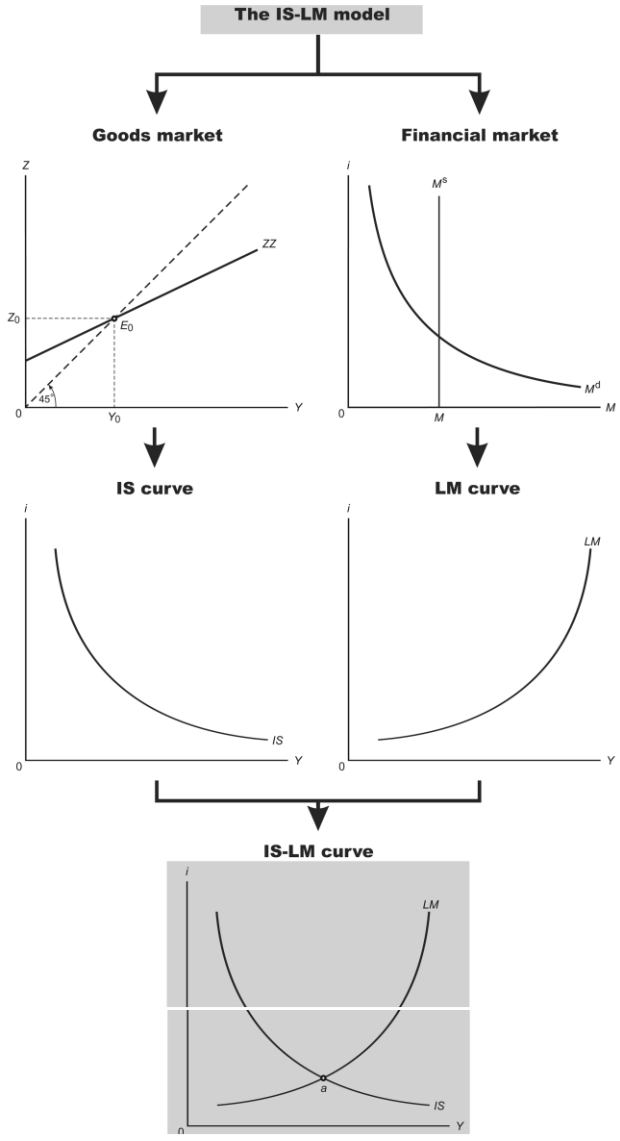
REMEMBER:

- IS Curve: $Y = C(Y - T) + I(Y, i) + G$
- LM Curve: $M/P = YL(i)$

Also:

- Increase in output leads to an increase in interest rate - positive sloping LM curve
- Increase in interest rate leads to a decrease in output (demand) - negative sloping IS curve.

3. Putting the IS and LM relations together



3. **Use the IS-LM Model to show the effects of exogenous variables:**

- **Goods market variables –** government spending (G), taxes (T), consumer confidence (c_0), investor confidence (I)
- **Financial market variables –** nominal money supply (M_s)

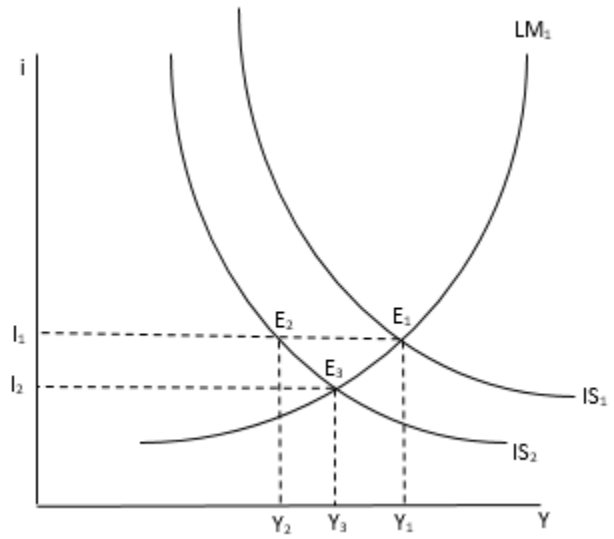
Note:

- **Decide on which market the initial impact is felt** e.g. the first impact of a change in G or T is on the goods market where it influences a number of variables which eventually impact the financial market.

Fiscal policy, activity and the interest rate

An **expansionary** policy is used to stimulate economic activity by increasing the demand for goods (aggregate demand). G↑ or T↓
A **contractionary** policy is used to "cool down" economic activity by decreasing the demand for goods (aggregate demand). G↓ or T↑

Impact of a contractionary fiscal policy



Goods Market:

An increase in taxes reduces Y_D which causes a decrease in consumption which decreases demand. This then reduces output and income. Investment also declines as the level of sales decrease. → IS curve shifts left. **$T\uparrow\ Y_D\downarrow\ C\downarrow\ Y(Y_1 - Y_2)\downarrow\ I\downarrow$**

Financial Market:

Decline in output reduces demand for money as there are less transactions, this causes a decrease in interest rate. **$Y\downarrow\ M_d\downarrow\ i(i_1 - i_2)\downarrow$**

Goods Market:

The decline in the interest rate increases investment which increases demand and

The LM curve is left unchanged since taxes do not appear in the LM equation.

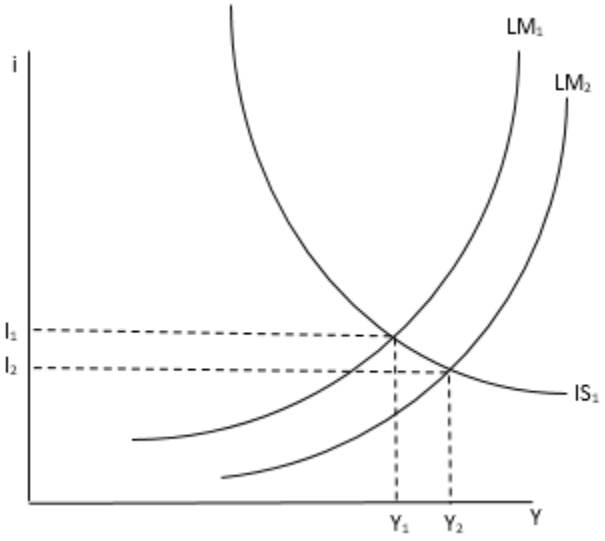
End result: a decrease in the equilibrium level of output and income and a lower interest rate. Consumption spending declines because an increase in taxes and a decrease in output both reduce disposable income. Investment decreases because of a lower level of output, but increases as a result of a lower 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.

Monetary policy, activity and the interest rate

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.

Impact of expansionary monetary policy: increase in nominal money supply



Financial Market:

Increased money supply causes interest rate to decline →LM shifts right. **M↑ i↓**

Goods Market:

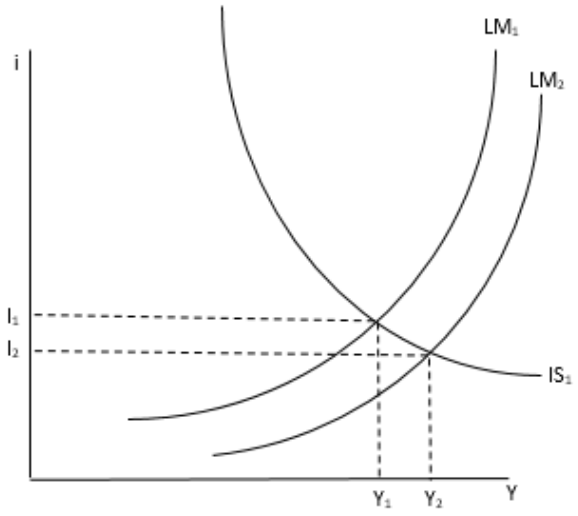
Decrease in interest rate increases investment, demand, output and income which increases consumption. → move along IS from a to a_1. **i↓ I↑ Z↑ Y↑ C↑**

End result: equilibrium level of output and income is higher as well as

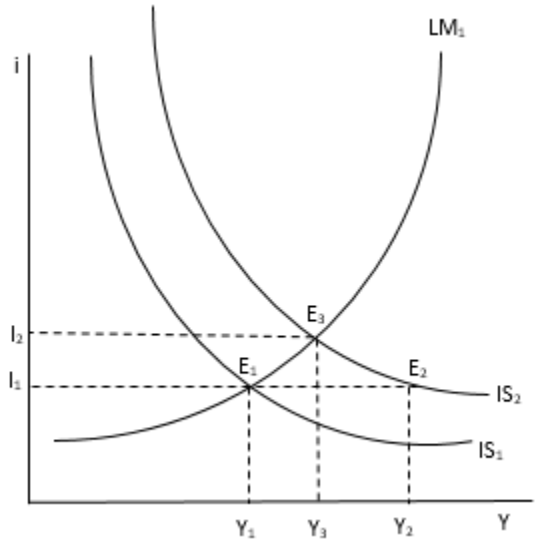
4. Using a policy mix

While an expansionary monetary policy and an expansionary fiscal policy both increase the level of output and income, the impact on the variables, however, is different.

Expansionary monetary policy



Expansionary fiscal policy



- **Comparing fiscal policy with monetary 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.

Looking at some of the other variables:

Variable	Expansionary monetary policy	Expansionary fiscal policy
C	Higher because Y is higher	Increases because Y is higher
I	Increases because i has decreased.	Indeterminate: affected by Y and i.
G	Unchanged	Depends: if is through G or T.
T	Unchanged	Depends: if is through G or T
Ms	Increases	Unchanged.

Comparing fiscal policy in the goods market and the IS-LM model

Comparing the impact of an increase in government spending in the goods market model (study unit 2) with that of the impact in the IS-LM model we notice the following:

In both models

- the level of output and income increases
- the level of consumption spending is higher
- government spending is higher

The differences between the two models are:

- In the IS-LM model the interest rate is higher while in the goods market model it is unchanged
- In the goods market model investment is unchanged.
- In the IS-LM model investment is indeterminate – it increases because output and income increase but decreases because the interest rate is higher.

Goods and Financial Markets in an Open Economy

1. **Openness in the Goods Market**

- refers to the ability of consumers and firms to choose between domestic and foreign goods.
- the most popular way to measure openness is to express imports and exports as a percentage of GDP.
- In South Africa for 2009 exports were 27.4% of GDP and imports 28.13% of GDP, indicating that South Africa can be regarded as an open economy.

Choice between domestic goods and foreign goods

- The real exchange rate influences this choice (price of domestic goods relative to foreign goods)
- The factors that impact on the real exchange rate are the nominal exchange rate, the domestic price level and foreign price level
- Need to differentiate between the nominal exchange rate and the real exchange rate:

  - **Nominal Exchange rate** (E): price of domestic currency in terms of foreign currency: R1 = $0.14
    - **Appreciation:** 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.
    - **Depreciation:** 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
    - **Note** that the terms "appreciation" and "depreciation" are used when a flexible (floating) exchange rate system is in operation; under a fixed exchange rate system, the terms used would be "revaluation" (in the place of an appreciation) and "devaluation" (in the case of a depreciation).

  - **Real Exchange rate** (ε): Price of domestic goods in terms of foreign goods. Indication of affordability of domestic goods. (not directly observable)
    - $E = EP/P^*$
    - Note that this is an index number, therefore its level is uninformative, only the rate of change of the exchange rate is informative

Factors that affect the real exchange rate:

- **The impact of a change in the nominal exchange rate**

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
ε = 0.20 x 110/110 = 0.2 x 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
ε = 0.10 x 110/110 = 0.1 x 1 = 0.1

Comparing the real exchange rate for year 2 (ε = 0.1) with year 1 (ε = 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 depreciation in the nominal exchange rate.

- **Impact of a change in the price level**

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
ε = 0.10 x 110/110 = 0.1 x 1 = 0.1

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

Given this information, the real exchange rate is
ε = 0.10 x 120/110 = 0.1 x 1.1 = 0.11

Comparing the real exchange rate for year 2 (ε = 0.11) with year 1 (ε = 0.1), we can now conclude that the **real exchange rate has increased** and a real appreciation has occurred. In other words, **the relative price of our goods compared with US goods has increased**. In this particular case, it was caused by the increase in the domestic price level.

Note: a depreciation of the domestic currency is not necessarily sufficient to cause a decrease in the real exchange rate. If the depreciation is accompanied by an increase in the domestic price level, the rise in the domestic price level compared with foreign price level, tends to erode the impact of the depreciation.

Consider the following formula for the real exchange rate between the rand and the dollar: $\varepsilon = EP/P^*$

Where:
ε is the real exchange rate between the rand and the dollar
E is the nominal exchange rate between the rand and the dollar
P* is the price of American goods in dollars
P is the price of South African goods in Rands

From bilateral to multilateral exchange rates

Note: 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. We weigh each country by how much they trade with us and by how much they compete with us in other countries.

2. Openness in the Financial Markets

- The ability financial investors have to choose between domestic financial assets and foreign financial assets.

The South African Balance of Payments – Systematic statistical account of all the economic transactions between the residents of one country and the residents of other countries in a specific period.

The balance of payments consists of four basic accounts:

- current account
- financial (Capital) account
- capital transfer account
- unrecorded transactions

The balancing item in the balance of payments (in principle) is the change in the country's gold and other foreign reserves.

The Current Account

Current account (annual figures R millions) 2010	
Merchandise exports	566760
Net gold exports	59499
Service receipts	102362
Income receipts	34099
Less: merchandise imports	598151
Less: payments for services	134843
Less: income payments	87022
Current transfers	-16762
(net receipts)	
Balance	-74058

- Merchandise exports and imports comprise the rand value of the trade in all physical goods, which comprise raw materials and capital, intermediate and final goods.
- The difference between merchandise exports (including net gold exports) and merchandise imports is referred to as the **trade balance**.
- Service receipts and payments for services include the transportation of goods and passengers between countries, travel, construction services, financial and insurance services, various business, professional and technical services, as well as personal, cultural and recreational services and government services. Included in service receipts is the money spent by foreign tourists in South Africa, while money spent by South Africans travelling abroad is included in payments for services.
- Income receipts refer to income earned by South African residents in the rest of the world, while income payments refer to income earned by non-residents in South Africa.
- Current transfers include social security contributions and benefits, taxes imposed by government and private transfers of income such as gifts, personal, immigrant and other remittances and charitable donations.
- A **current account surplus** indicates that a country earns more on exports (goods and services and income receipts) than it spends on imports (goods and services and income payments). A **current account deficit** exists when a country spends more on imports (goods and services and income payments) than it earns on exports (goods and services and income receipts). This would be reflected as a negative balance on the current account.

The Financial Account

Financial Account (annual figures R millions)	
	2010
Direct investment Liabilities	11370
Assets	-3297
Net direct investment	8073
Portfolio investment Liabilities	107876
Assets	-28232
Net portfolio investment	79644
Other investment Liabilities	10957
Assets	-17674
Net other investment	-6717
Balance	81000

- In the financial account, international transactions in assets and liabilities are recorded. The financial account has three main components: direct investment, portfolio investment and other investment.
    - **Direct investment** includes all transactions where the purpose of the investor is to gain control of or have a meaningful say in the management of the enterprise in which the investment is made (e.g. the establishment of new businesses or the acquisition of shares in existing ones).
    - **Portfolio investment** refers to the purchase of assets such as shares or bonds where the investor is interested only in the expected financial return on the investment.
    - **Other investment** is a residual category which includes all financial transactions not included under direct investment or portfolio investment, including loans, currency and deposits. An important category of other investment is short-term trade credit which is used to finance imports and exports.
- The balance on the financial account is obtained by adding net direct investment, net portfolio investment and net other investment.

Choice between Domestic and Foreign Assets:

- Openness means that financial investors are able to choose whether to purchase domestic financial assets or foreign financial assets.
- Interest rates and exchange rates: the decision as to whether to invest abroad or at home depends on interest rates and the expected movements in the exchange rate.

- If financial investors' only concern is the expected rate or return, they will only hold the bonds with the highest expected rate of return.
- 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.

- **Interest parity condition** = implies that through the process of arbitrage, the domestic interest rate must be approximately equal to the foreign interest rate minus the expected appreciation of the domestic currency.

$$I_t \approx i_t^* - \frac{E^e_{t+1} - E_t}{E_t}$$

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

Note: If E^e t+1 = Et, then the interest parity condition implies that it = it*
Therefore, unless countries are willing to tolerate large movements in their exchange rates, domestic and foreign interest rates are likely to move very much together.

The choice between SA bonds and US bonds

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

Domestic interest rate in South Africa (i): 5%
Domestic interest rate in the USA (i*): 2%

Should you hold SA bonds or US 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 US 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 US bonds.
- By holding SA bonds, you will receive higher interest payments next year, but the rand will be worth less in terms of dollars next year, making investing in SA bonds less attractive than investing in US bonds.
- It 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 US bonds.

The Goods Market in an Open Economy

1. **Goods Market in an Open Economy**

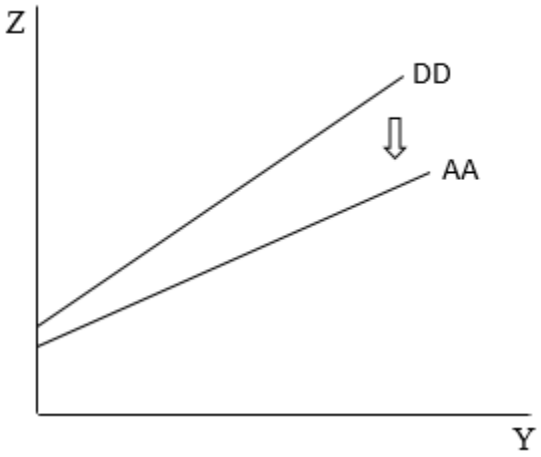
- Distinguish between: Domestic Demand for goods (DD) and the Demand for Domestic Goods (ZZ)
  - DD: $C + I + G = C(Y-T) + I(Y,i) + G$
  - $ZZ = C + I + G - IM/\varepsilon + X$
- Note that the model is specified in real terms and therefore imports are expressed in terms of the price of domestic goods (IM/ε) and subtracted.

- **Determinants of C, I and G**
  - 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

- **Determinants of Imports:**
  - Higher domestic income leads to higher demand for domestic and imported goods
  - An increase in Y leads to increase in IM
  - An increase in the real exchange rate (ε) reduces the cost of imports therefore leads to an increase in IM

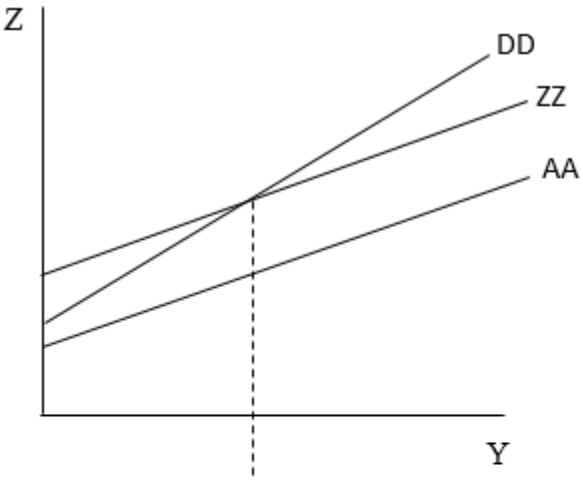
- **Determinants of Exports:**
  - Unlike imports, the level of exports is not determined by the domestic level of production (Y) but by the level of output of a country's trading partners (Y*) as well as the real exchange rate (ε)
  - $X = X(Y^*, \varepsilon)$
  - If foreign income increases this leads to higher demand of all goods, therefore an increase in X
  - If real exchange rate increases then X will decrease, because our goods are relatively more expensive than the goods produced in the rest of the world.
  - Remember that X is exogenous, since a change in the domestic level of production does not influence the level of exports

Putting the components together: Derive the Net Exports (NX) curve using the IM and X function

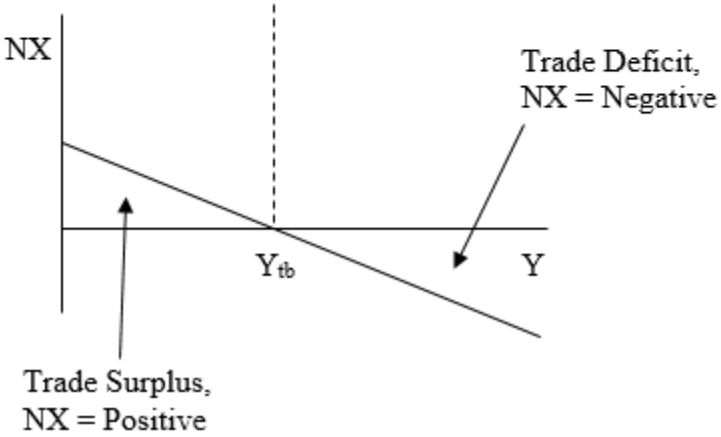


AA is flatter than DD: as income increases, some of the additional domestic demand is for foreign goods rather than on domestic goods

As long as some of the additional demand is for domestic goods, AA has a positive slope.



The distance between ZZ and AA equals exports. Because exports do not depend on domestic income, the distance is constant



At Y_{tb} we have a trade balance and NX will equal 0 because X = IM.

At output level Y, exports are given by the distance AC and imports by AB, so net exports equal BC.

The relation between net exports and output is represented by line NX.

Net exports are a decreasing function of output: as output increases, imports increase and exports are unaffected, so net exports decrease.

Equilibrium output and the trade balance

Goods market is in equilibrium when Y = Z
Therefore:

$$Y=C(Y-T) + I(Y, r) + G – IM(Y,\varepsilon)/\varepsilon + X(Y^*,\varepsilon)$$

This equation contains the important variables that influence the demand for goods in an open economy. Given this equilibrium level of output and income, there is a corresponding trade balance position which can be either a trade surplus (NX > 0), a trade deficit (NX < 0) or a point where exports equal imports (NX = 0).

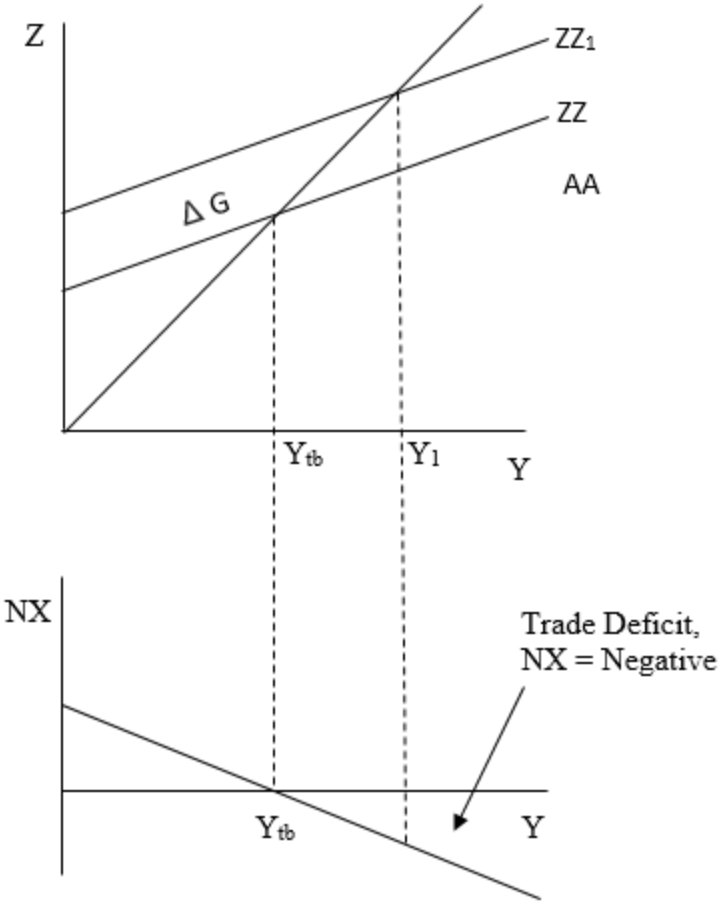
A change in any of the variables that affect the demand for goods, will also affect the equilibrium level of output and income. A change in the equilibrium level of output and income, in turn, leads to a change in the trade balance.

Increases in demand, domestic or foreign

Increase in domestic demand

A rise in domestic demand for example, through an increase in government spending:

- increases the demand for goods and the equilibrium level of output and income increases
- Part of this additional demand will fall on imported goods and the level of imports will increase. This will cause the trade balance to decrease.
- In figure below, the original equilibrium position Y corresponds with a trade balance equilibrium position (NX = 0) and demand is given by ZZ
- The increase in government spending here shifts demand relation up by ΔG to ZZ_1
- Equilibrium point moves from point A to point A' and output increases from Y to Y_1.
- The increase in output is larger than increase in government spending →multiplier effect.
- Note: **because government spending doesn't enter export or import relation, there is no shifting of the NX curve**. So the increase in output leads to a trade deficit (NX < 0) equal to BC: imports go up, exports unchanged. In other words, the trade balance worsens or decreases.
- Also, effect of government spending is smaller in an open economy than a closed economy since some of the increased demand falls on imported goods. Remember ZZ is flatter than DD → multiplier is smaller.



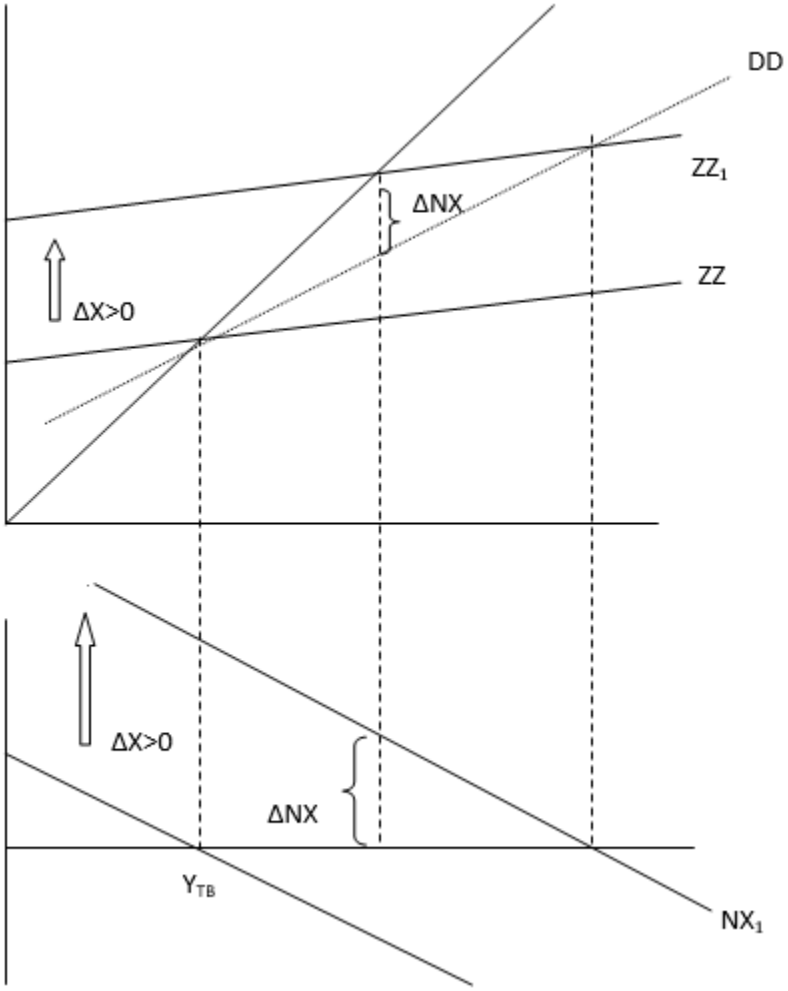
Chain of events:

G↑—>Z↑→Y↑→IM↑→NX↓

Increases in foreign demand → Y*↑

- The figure below explains the effects of an increase in foreign activity on domestic output and the trade balance.
- Initial demand for domestic goods is given by ZZ with equilibrium point A and output Y. we again assume trade is balanced $Y=Y_{TB}$
- We include the line DD showing the *domestic demand for goods.* Remember it is steeper than ZZ and the difference between the two is net exports.
- Now higher foreign demand includes higher foreign demand for SA goods, SA exports increase
    - The increase in exports, ΔX, causes ZZ line to shift up to ZZ'
    - net exports go up by ΔX, so NX line shifts up to NX'
- New equilibrium is at point A' with output at Y'. The increase in foreign output leads to an increase in domestic output. Why?
    - Increased foreign output →higher exports of SA goods →increases domestic output and domestic demand through multiplier.
- Trade balance? When foreign demand increases, demand for domestic goods shifts up, ZZ', but DD (domestic demand for goods) is unchanged. So at new equilibrium output Y' domestic demand = DC and demand for domestic goods = DA'. Net exports = CA' which is positive because DD is below ZZ'.

Therefore, although imports increase, it does not offset the increase in exports → trade balance improves!



Chain of events:

X↑→ Z↑→Y↑→IM↑

Movement along the NX curve	Shift of the NX curve
Change in autonomous government spending (G)	Change in foreign demand (X)
Change in autonomous investment spending (I)	

Depreciation, the trade balance and output

Depreciation and the trade balance: The Marshall-Lerner condition

The depreciation of the currency has a positive and negative effect on the trade balance:

- **Positive:** A depreciation reduces the price of exports and increases the price of imports. Exports therefore increase and imports decrease and the trade balance improves.
- **Negative:** 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. For this to occur, the positive effect on the trade balance must outstrip the negative effect.

The effects of a depreciation

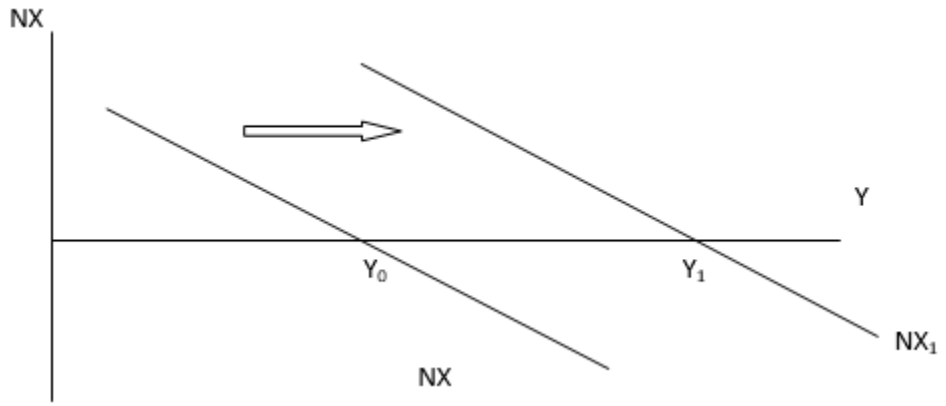
Given that the Marshall-Lerner condition holds:

- A depreciation leads to an increase in net exports which results in an improvement in the trade balance and the level of output and income.
- The level of output and income increases since the demand for domestic goods increases in the economy.
- The increase in the demand for domestic goods is the result of a rise in exports, which increases the demand for goods and the level of output.

Chain of events

X↑→Z↑→Y↑

*To summarize: the depreciation leads to a shift in demand, both foreign and domestic, towards **domestic goods**. This shift in demand leads to both an increase in domestic output and an improvement in the trade balance.*



The IS-LM Model in an Open Economy

When we examine the IS-LM model for an open economy, we open the discussion to exchange rates. W**hat determines the exchange rate? How can policy makers affect it?**

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 caused by the multiplier effect.

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

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.

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

Consider the following assumptions:

- Real exchange rate and nominal exchange rate move together. Therefore, a decrease in the nominal exchange rate (nominal depreciation) leads, one-for-one, to a decrease in the real exchange rate.
- Domestic price level is given, there is no inflation, expected nor actual. Therefore, the nominal and real exchange rates are the same. We replace the real interest rate, r, with the nominal, i.
- Increase in Y increases IM and NX will worsen
- Increase in Y* increases X and will improve NX

With these assumptions, we can write our goods market equilibrium equation:

$$\mathbf{Y = C(Y–T) + I(Y,i) + G + NX(Y,Y^*,E)}$$

2. **<u>Equilibrium in Financial Markets (Open Economy)</u>**

<u>Money versus bonds</u>

In unit 3, we looked at the determination of the interest rate using the following:

$$\frac{M}{P} = YL(i)$$

We took the real supply of money as given and assumed the real demand for money depended on the level of transactions and the opportunity cost of holding money rather than bonds (nominal interest, i). Now in an open economy, nothing has changed. The interest rate must be such that the supply and demand for money are equal. An increase in the money supply leads to a decrease in the interest rate. An increase in the money demand, as a result of an increase in output and income, leads to an increase in the interest rate.

Domestic bonds versus foreign bonds

Investors, foreign or domestic, go for the highest expected rate of return. This implies that in equilibrium, both domestic and foreign bonds must have the same expected rate of return, otherwise investors would switch investment to the bonds with the higher return.

This assumption allows a relationship between the **domestic interest rate** and the **nominal exchange rate** to be derived. This is done by using the interest parity equation (equation 20.4 in the prescribed book) and by assuming that the expected exchange rate is unchanged. The positive relationship between the domestic interest rate and the nominal exchange rate is then derived with the aid of equation 20.5.

$$E_t = \frac{(1 + it)}{(1 + it*)} E^e_{t+1}$$

$$E = \frac{(1 + it)}{(1 + it*)} \overline{E^e}$$

This relation tells us that the current exchange rate depends on the domestic interest rate, the foreign interest rate and on the expected future exchange rate. Therefore:

- An increase in the domestic interest rate leads to an increase in the exchange rate
- An increase in the foreign interest rate leads to a decrease in the exchange rate
- An increase in the expected future exchange rate leads to an increase in the current exchange rate

The following numerical example illustrates this positive relationship between the domestic interest rate (i) and the nominal exchange rate (E).

Assume the following:

The nominal exchange rate (E) is R1 = $0.20
The expected exchange rate (at the end of the period E^e) is R1 = $0.20
The domestic interest rate (i) is 4%
The interest rate in the USA (i*) is 4%

Expressing this in terms of the exchange rate using equation 20.5, it follows that

$$0.20 = \frac{1+0.04}{1+0.04} \text{ x } 0.20$$

In the above example, the **interest parity condition holds** which means that the domestic interest rate approximately equals the foreign interest rate minus the expected rate of appreciation of the domestic currency.
But what happens if, for some reason, the domestic interest rate increases to 10%? At a domestic interest rate of 10%, given that the nominal exchange rate is R1 = $0.20, the interest parity condition no longer holds since the expected rate of return on domestic bonds is greater than that of foreign bonds.

For interest parity to be re-established, the **exchange rate will have to appreciate** to R1 = $0.21. This is calculated by using equation 20.5 as follows:

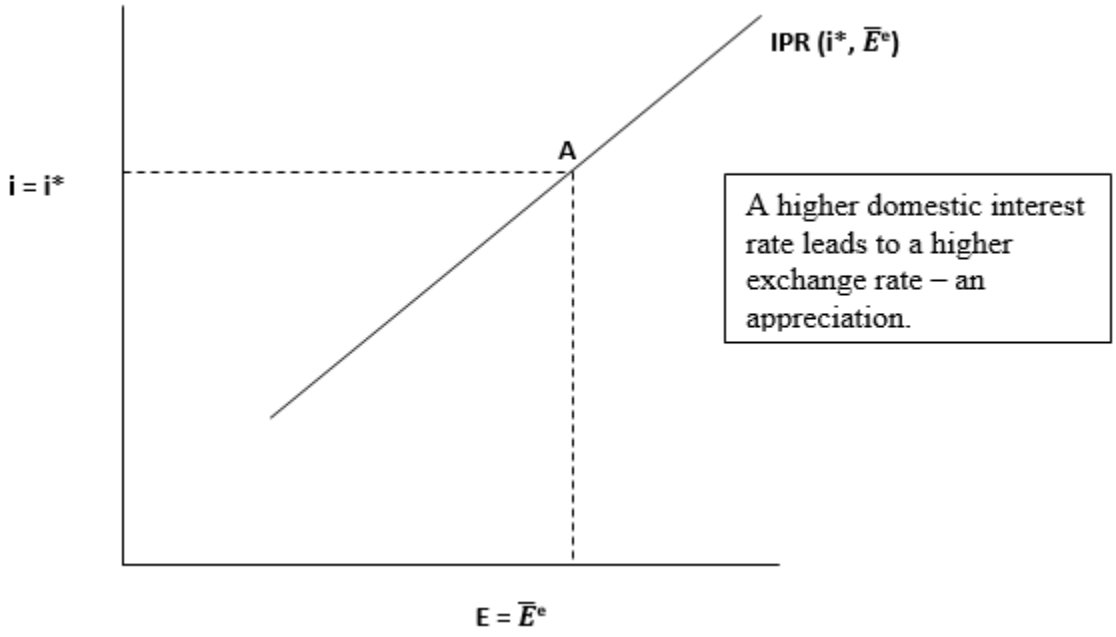
$$0.21 = \frac{1+0.10}{1+0.04} \times 0.20$$

The rand appreciates against the dollar to such an extent that interest parity is restored.

Why does the Rand appreciate if the domestic interest rate rises relative to the interest rate in the rest of the world? The reasoning behind this is that an increase in our domestic interest rate relative to that of the rest of the world **increases the attractiveness of our bonds** since the rate of return offered on our bonds is higher than that offered in the rest of the world. On the balance of payments side, a capital inflow occurs and we experience a higher demand for Rands on the foreign exchange market. This increase in the demand for rand results in an appreciation of the domestic currency (in this case rand).

Figure below shows this **positive relationship** between the domestic interest rate and the exchange rate. Note that this relationship is derived under the conditions in which interest rates in the rest of the world are fixed at i* and the expected exchange rate is fixed at Ē*. In terms of our example above, it is assumed that the interest rates in the rest of the world remain at 4% and the expected exchange rate remains unchanged at R1 = $0.20.

Interest Parity Relation: relation between interest rate and exchange rate implied by interest parity



3. Putting the Goods and Financial Markets Together

Downward slope of the IS curve reflects a negative relationship between interest rate and the level of output $i \downarrow I \uparrow Z \uparrow Y \uparrow$

- In an open economy, there is an additional channel through which interest rates impact on the level of output and income.
  - A decline in the interest rate causes a depreciation of the nominal exchange rate. The depreciation of the nominal exchange rate is the result of the decrease in the domestic interest rate, relative to the interest rate in the rest of the world, which causes domestic bonds to be less attractive and a capital outflow occurs.
  - This capital outflow reduces the demand for the domestic currency (it increases the demand for foreign currency) and the exchange rate depreciates.
  - The depreciation of the exchange rate reduces the price of exports and exports increase, which increases the demand for goods and the level of output and income.
  - $i \downarrow E \downarrow X \uparrow Z \uparrow Y \uparrow$

- The LM relation is exactly the same as the closed economy. Upward slope of the LM curve reflects a positive relationship between interest rate and level of output (remember that for a given increase in M/P, an increase in output leads to an increase in the demand for money which leads to an increase in the interest rate)

The IS-LM model in an open economy

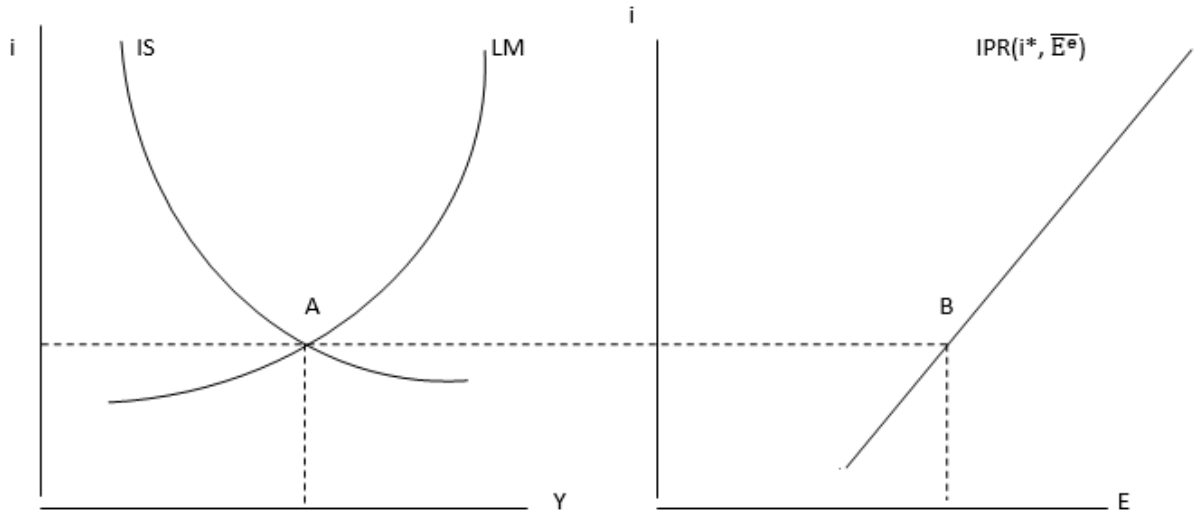


Figure a **Figure b**

In terms of the figure a, equilibrium in both the goods and financial markets occurs at point A. At point A, the equilibrium interest rate is i_1 and output is at Y. Given this equilibrium interest rate of i_1 and the interest parity relation in figure b, the corresponding exchange rate can be derived.
This is done by extending the i-line in figure a to figure b. At the intersection of this extended dotted i-line with the interest parity relation (point B) in figure b, the corresponding equilibrium exchange rate is indicated as E on the horizontal axis.

Therefore, given the foreign interest rate and the expected future exchange rate, the equilibrium interest rate determines the equilibrium exchange rate

4. <u>Effects of Policy changes in an Open Economy</u>

<u>Fiscal policy in an open economy</u>

Suppose the government decided to increase spending, without raising taxes → run a budget deficit, which will affect the trade balance.

The first impact of an increase in government spending is on the **goods market**. An increase in government spending causes a rise in the demand for goods and the level of output and income increases. This has a multiplier effect on the level of output and income, and in the process, the level of consumption spending increases as well. This is indicated by a **rightward shift in the IS curve.**

G↑ Z↑ Y↑ →Y↑C↑ →Y↑ I↑

The increase in the level of output and income, resulting from the rise in government spending, increases the demand for money in the **financial market** and the interest rate increases.

Y↑ M^d↑ i↑

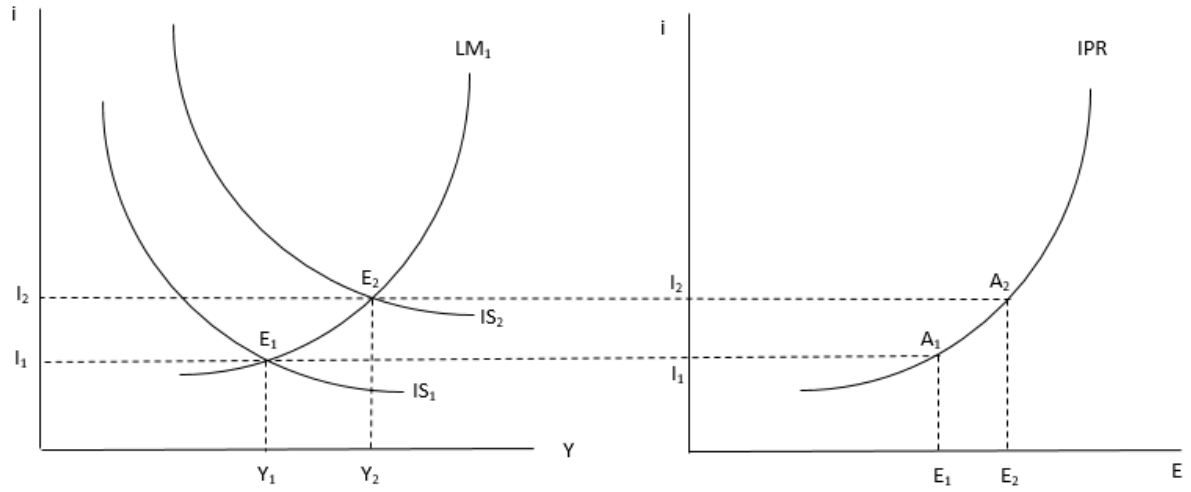
The increase in the interest rate causes investment spending to decrease in the **goods market**. The rise in output and income, however, increases investment spending and the change in investment spending is **uncertain**.

i↑ I↓ →Y↑I↑

In an open economy, the increase in the interest rate influences the **exchange rate**, which in turn impacts on the trade balance.

The rise in the interest rate, which makes domestic bonds more attractive, leads to an increase the nominal exchange rate and the domestic currency appreciates. This is represented by an **upward movement along the interest parity relation.** As the domestic currency appreciates, exports decrease and the trade balance deteriorates. The appreciation of the currency also causes imports to be cheaper, and imports thus increase, which contributes to a further worsening of the trade balance. The rise in domestic output itself contributes to an increase in imports which also causes a decline in the trade balance. **G↑ E↑**

Effects of an increase in government spending



Monetary policy in an open economy

Suppose we had a **monetary contraction**. The initial impact of a decrease in the money supply is on the **financial market**.

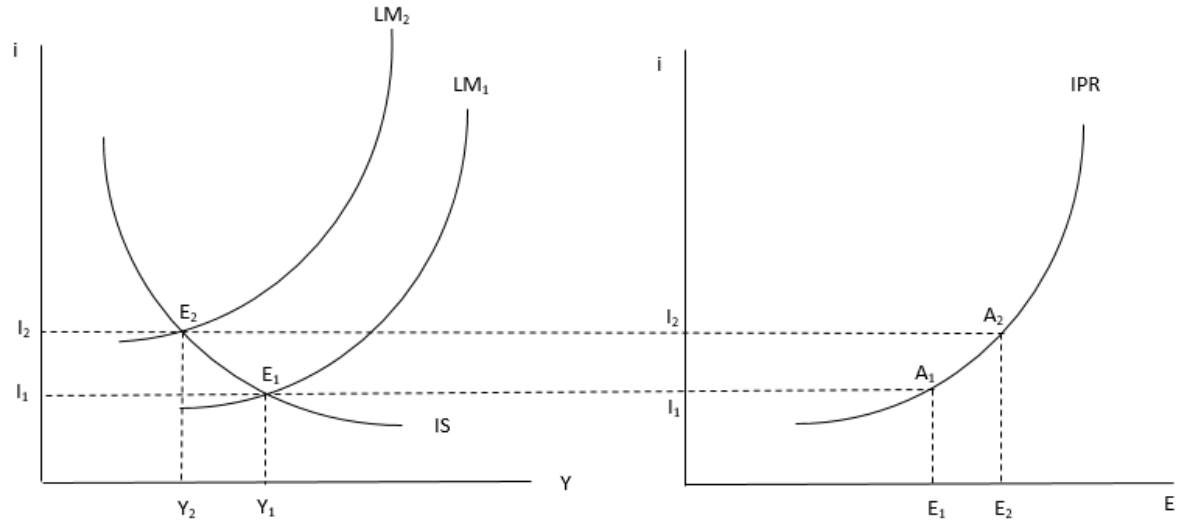
A decrease in the nominal money supply causes a decrease in the real money supply and an increase in the interest rate in the financial market. In terms of the financial market, this is represented by a **shift of the supply of money curve (Ms) to the left** (see study unit 4, sec 4-2). **M↓ M/P↓ i↑**

In the **goods market**, an increase in the interest causes a decline in investment spending, which decreases the demand for goods and the level of output and income declines. As the level of output and income declines, there is a further decrease in investment spending.
i↑ I↓ Z↓ Y↓ → Y↓ I↓ Z↓ Y↓

The rise in the interest rate causes an increase in capital inflows; the nominal exchange rate increases and the domestic currency appreciates. An appreciation of the domestic currency increases the price of exports and the net exports position worsens. **i↑ E↑ X↓ NX↓**

In terms of the IS-LM model, the above is represented in figure 20-4(a) in the prescribed book by a **shift of the LM curve to the left**. A movement from point A to point A' **along the IS curve** is the result of the increase in the interest rate, which reduces investment spending as well as the appreciation of the domestic currency that decreases exports.
The rise in the interest rate increases the nominal exchange rate and the domestic currency appreciates. This is represented by an **upward movement along the interest parity relation** in figure 20-4(b).

Effects of monetary contraction



Comparing the impact of fiscal and monetary policy

Let us see what happens when an expansionary fiscal policy is compared with an expansionary monetary policy.

In terms of the IS-LM model the results are as follows:

Expansionary fiscal policy

From the diagrams, we can see that the interest rate is higher, the level of output and income is higher and the exchange rate appreciated.

Expansionary monetary policy

From the diagrams, we can see that the interest rate is lower, the level of output and income is higher and the exchange rate depreciated.

Comparison

In both cases the level of output and income is higher. The reason why it is higher however differs. In the case of fiscal policy, it is higher since either government spending is higher and/ or taxes are lower. In the case of monetary policy, it is higher since the interest rate is lower which increases investment spending.

The difference in the interest is due to the fact that in the case of an expansionary fiscal policy the increase in the demand for money leads to an increase in the interest rate while in the case of monetary policy the increase in the money supply causes a decrease in the interest rate.

The reason the exchange rate appreciate in the case of an expansionary fiscal policy is because the increase in the domestic interest rate relative to the world interest rate causes a capital inflow and consequently the exchange rate appreciated.

The reason the exchange rate depreciated in the case of an expansionary monetary policy is because the decrease in the domestic interest rate relative to the world interest rate causes a capital outflow and consequently the exchange rate depreciated.

The impact on the trade balance therefore differs. In the case of an expansionary fiscal policy where the exchange rate appreciates the trade balance worsen since exports are now more expensive and imports cheaper.

In the case of an expansionary monetary policy where the exchange rate depreciates the trade balance improves since exports are cheaper and imports more expensive.

The following table provides a summary of the change in the variables for an expansionary fiscal and expansionary monetary policy. Make sure you understand why the variables are higher, lower or unchanged.

Variables	**Expansionary fiscal policy**	**Expansionary monetary policy**
The demand for goods	Higher	Higher
Level of output and income	Higher	Higher
Government spending and/or taxes	Government spending higher and/or taxes lower	Unchanged
Money supply	Unchanged	Higher
Interest rate	Higher	Lower
Investment	Indeterminate	Higher
Consumption spending	Higher	Higher
Capital flows	Inflow	Outflow
Exchange rate	Appreciate	Depreciate
Exports	Lower	Higher
Imports	Higher	Lower
Trade balance	Worsens	Improves

Labour Market

In this study unit, we look at **wage and price determination** and **equilibrium in the labour market**. We examine the natural rate of unemployment, in other words, the rate of unemployment to which the economy tends to return in the medium to long run.

6.1. Tour of the Labour Market

- **EAP** – people between the ages of 15 to 64, who are willing, and able to work. The EAP includes both the employed and the unemployed. Excluded, are those people of working age who are not available for work, such as students, full-time home workers, retired people and those who are unwilling or unable to work.
- **Unemployment Rate** – is the number of unemployed over the EAP or Labour Force. In other words, the unemployment rate is the number of unemployed persons taken as a percentage of the economically active population.
- **Labour Force Absorption Capacity** – is the percentage of people entering the labour force that are actually able to find work in the formal sector of the economy.

The role of changes in the unemployment rate is important as it is a **disciplinary measure with regard to wage demands**. An increase in unemployment decreases the bargaining position of workers and their wage demands will decline.
An increased demand for goods results in an increased demand for labour, which improves the bargaining position of labour. Labour will then bargain for higher nominal wages.

6.2. Bargaining power of workers: movements in unemployment and the position of workers

Note: *When the demand for labour declines, workers are more likely to lose their jobs but also, the probability of finding a new job is lower. A higher unemployment rate erodes the bargaining position of workers, which has implications for wage-setting behaviour in the economy.*

- **Bargaining power** of workers depends on two factors: **nature of the job** (nonskilled/highly skilled) and **labour market conditions** (if the unemployment rate is high, finding suitable replacement workers is easier for firms, while finding another job is harder for the workers; thus, because they are in a weak bargaining position, workers may have no choice but to accept a lower wage).
  - An increase in the unemployment rate decreases the bargaining position of workers and wage demands decrease
  - Other factors that affect the bargaining power are labour laws, minimum wages, and unemployment benefits

During periods of *decreased demand* firms need to reduce their employment, either by hiring fewer new workers or laying off currently employed workers. When unemployment is high, workers are worse off in two ways:

- Employed workers face a higher probability of losing their jobs
- Unemployed workers face a lower probability of finding a job and they can expect to remain unemployed for a longer time.

6.3. Wage Determination

Workers are typically paid a wage that exceeds their **reservation wage.** A reservation wage, is the minimum wage that a worker will accept. Any wage below this and the worker will prefer to be unemployed rather than employed. **Wages depend on market conditions** (the lower the unemployment rate, the higher the wages will be).
Note: Regardless of workers' bargaining position, firms may want to pay more than the reservation wage for reasons such as increasing the productivity of workers or decreasing the turnover rate of workers.

There are important factors that influence the **behaviour of workers** when negotiating for wages. This is captured by the following equation:

$$W = P^eF(u, z)$$
$$+ \quad -, +$$

- Nominal wage (W): actual wage expressed in terms of money

Factors that impact on the Nominal Wage:

  - Expected price level (P^e), unemployment rate (u) and all other factors (z)
  - [z = institutional factors such as unemployment benefits; labour laws and minimum wages]
- Real wage (W/P) = quantity of goods/services that can be bought with the nominal wage.
- Increase in the general price level (P) will lead to a decrease in real wage.

Now why is the real wage important?
Workers do not really care about how many Rand they receive, but rather how many goods they can BUY with those Rands (W/P). Firms do not care about the nominal wages (W) they pay, but rather nominal wage relative to the price of the goods they SELL (W/P). If workers expect the price of goods they buy to double, they will ask for a doubling of their nominal wage in order to protect their purchasing power

If the unemployment rate is high, finding suitable replacement workers is easier for firms, while finding another job is more difficult for the workers. The unemployment rate therefore influences the bargaining position of workers: a higher unemployment rate weakens the workers' bargaining power, forcing them to accept lower wages.

- An increase in z implies an increase in nominal wage demands.

The workers' bargaining position is affected by institutional factors such as

- unemployment insurance or benefits to workers who lose their jobs (at a given unemployment rate, higher unemployment benefits increase the wages)
- minimum wages (an increase in minimum wages will increase nominal wages at a given unemployment rate)
- labour laws and regulations that protect employment (more protection will increase the bargaining position of workers and there will be a rise in wages at a given unemployment rate)
- collective bargaining

6.4. Price Determination

- When a market is **imperfect**, a firm has some control over the price of its products. Therefore, price depends on costs and costs depend upon the Production function. Firms charge a price that is higher than MC.
- Assumption: Firms produce using only labour as an input. The price per unit of output is determined by firms as **mark-up over labour cost per unit.** Also, this production function implies that labour productivity (the output per worker) is constant and equal to 1.
- Price per unit is determined as a markup over labour cost per unit:

$$P = (1 + \mu)W \quad \text{So:} \quad W/P = 1/1 + \mu$$

- Remember: If mark-up increases, the real wage decreases; if markup decreases, then real wage increases.

Example: the relation between a change in the mark-up and the price
Assume the following:
The cost of a unit of labour (W) is R50 (the nominal wage).
A unit of labour produces one unit.

Price per unit if mark-up is 20% will be:
P = (1 + **μ**)W
P = (1 + **20%**)R50
P = (1 + **0.2**)R50
P = R60

Price per unit if mark-up is 40% will be:
P = (1 + **μ**)W
P = (1 + **40%**)R50
P = (1 + **0.4**)R50
P = R70

An increase in the mark-up (μ) from say 20% to 40%, *given the nominal wage of R50,* will increase the price per unit and vice versa.
The mark-up (μ) and the price per unit (P) are therefore **positively** correlated:
μ↑ ⇒ P↑
μ↓ ⇒ P↓

Example: the relation between a change in the nominal wage and the price
Assume the following:
A unit of labour produces one unit.
Mark-up is 20%.

Price per unit if nominal wage is R50 will be:
P = (1 + μ)**W**
P = (1 + 20%)**R50**
P = (1 + 0.2)**R50**
P = R60

Price per unit if nominal wage is R70 will be
P = (1 + μ)**W**
P = (1 + 20%)**R70**
P = (1 + 0.2)**R70**
P = R84

An **increase in the nominal wage** (W) from, R50 to R70, *given the mark-up of 20%,* will also increase the price per unit and vice versa.
The nominal wage (W) and the price per unit (P) are therefore **positively** correlated:

W↑ ⇒ P↑ W↓ ⇒ P↓

6.5. Natural Rate of Unemployment

- **Wage-setting relation**: *the higher the unemployment rate, the lower the real wage that workers can bargain for*. This is because unemployment erodes the bargaining power of labour. The **wage-setting relationship** does not tell us what the actual real wage will be. Workers can try to achieve a desired or targeted real wage by bargaining for a nominal wage, but whether the desired or targeted real wage is achieved will depend on what happens to the price level. And the price level is determined by the mark-up used by firms.
- Derive the relationship between real wage and the rate of unemployment:

Real wage: $W/P = F(u, z)$ where $P = P^e$

$-, +$

There is a negative relationship between u and W/P

- NB: assume that the price level is constant and the actual price level and expected price level are the same, $P = P^e$

The following numerical example illustrates the construction of the wage setting relationship:

Assume:

Price level is R960 per unit

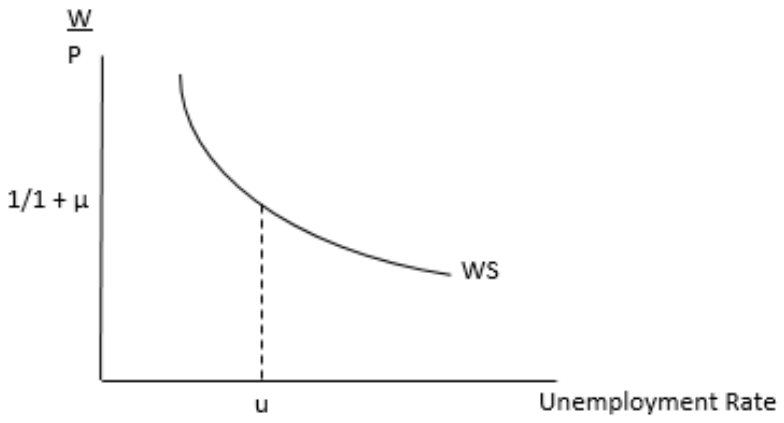
Output per worker is one unit

Unemployment rate	Nominal wage per labour unit (W)	Real wage per labour unit (W/P)
5%	920	920/960 = 0.96
10%	800	800/960 = 0.83
15%	600	600/960 = 0.63

Therefore, at an unemployment rate of 5%, workers will bargain for a nominal wage of R920 per unit of labour, which gives them a targeted real wage of 0.96.

This means that 96% of every unit produced accrues to the worker and 4% to the firm.

Wage setting, price setting and the natural rate of unemployment



What will cause the WS curve to change?

- Any factor that increases bargaining power of workers other than the unemployment rate.
- E.g. If legislation provides workers with more protection against layoffs, WS curve shifts right this increased bargaining power but also the unemployment rate. Workers will bargain for higher wages and firms will not be able to hire as many employees at the higher wage.

Price setting relation

- The real wage that is eventually paid to workers, is a function of the price-setting behaviour of the firm.
- Price level is influenced by the nominal wage and the mark-up. Therefore, the price level is **$P = (1 + \mu)W$**
- This implies that whatever the level of nominal wages, the price of the products produced will always be a certain percentage (as determined by the mark-up) higher than the wages paid to workers.

The following example illustrates this:

Real wage: a change in the nominal wage versus a change in the mark-up

Assumptions:

- One worker
- there is one firm in the economy
- in employing this one worker, the production of the firm is 100 units
- mark-up is 20%
- the cost of employing this worker is R10 000 (nominal wage)

Labour cost/nominal wage per unit (W)	Price of the product/unit (P)	Real wage of the worker (W/P)
R10 000/100 = R100	P = (1 + 0.2)100 = R120	W/P = R10 000/120 =83.33
		Of the 100 units produced, the workers claim is 83.33 units The rest of the products represent the firms claim

What happens to the real wage of the worker if the **nominal wage increases** to R12 000?

Labour cost/nominal wage per unit (W)	Price of the product/unit (P)	Real wage of the worker (W/P)
R12 000/100 = R120	P = (1 + 0.2)120 = R144	W/P = R12 000/144 =83.33
		Of the 100 units produced, the workers claim is 83.33 units The rest of the products represent the firms claim

Conclusion:
The **real wage is unchanged** because of the way in which prices are determined in the economy.

What happens to the real wage of the worker if the **mark-up decreases** from 20 to 10%?

Labour cost/nominal wage per unit (W)	Price of the product/unit (P)	Real wage of the worker (W/P)
R10 000/100 = R100	P = (1 + 0.1)100 = R110	W/P = R10 000/110 =90.9
		Of the 100 units produced, the workers claim is 90.9 units The rest of the products represent the firms claim **Conclusion: labours' claim is now higher and the firm's is lower.**

This is all captured in equation 6.6 in the prescribed book which expresses the claims of labour in terms of a unit of production: $P^e = P$ (assumption). → $W/P = 1/1 + \mu$
This is the **implied** real wage.

According to this equation, the price-setting decisions determine the real wage paid by firms.
An increase in the mark-up leads firms to increase their prices given the wage they have to pay. This leads to a decrease in the real wage (W/P) (and vice versa).

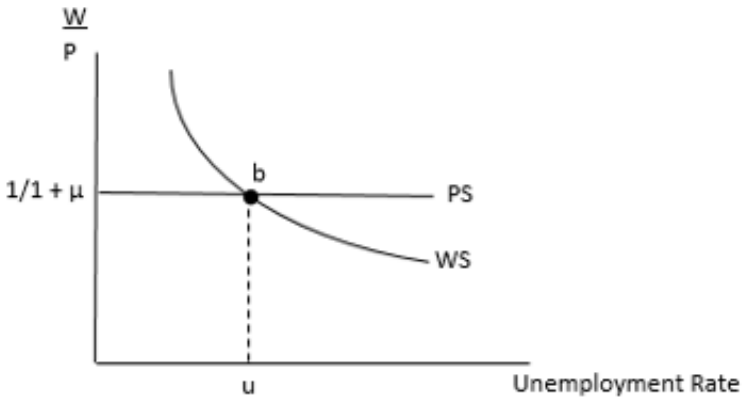
This is the real wage **implied** by price setting which is drawn as a horizontal line.
Why? The mark-up is not influenced by the unemployment rate (u).

The real wage implied by price setting is also known as the **price determined real wage, implied real wage or feasible real wage**. As you will see later it is this wage that will be paid to labour regardless of the nominal wage.

Equilibrium real wage and unemployment

In this model, equilibrium in the labour market does not imply that the quantity demanded for labour equals the quantity supplied of labour. It means that the *targeted real wage implied by wage setting is equal to the real wage implied by price setting*.

What does this mean? Using the wage-setting relation and the price-setting relation in the previous sections, this equilibrium point is presented by **point b** in the following diagram:



The higher the unemployment rate, the lower the real wage.

The natural rate of unemployment is the unemployment such that the real wage chosen in wage setting is equal to the real wage implied by price setting.

- **Equilibrium rate of unemployment is called the natural rate of unemployment (u)**. At any other unemployment rate, the real wage implied by wage setting differs from the real wage implied by price setting.
- **Change in the natural rate of unemployment takes place if:**
  - The **bargaining position** of workers changes due to factors other than the unemployment rate (unemployment benefits, minimum wages, labour laws and regulations to protect employment). An increase in the bargaining position shifts the WS curve upwards and the natural rate of unemployment increases. *It now takes a higher natural rate of unemployment to ensure that the bargained real wage is equal to the implied real wage.*
  - There is a change in the **markup**. An increase in markup shifts the PS curve downwards and the natural rate of unemployment increases. *It now takes a higher rate of unemployment to ensure that the bargained real wage is equal to the implied real wage.*
  - ***Note:*** *If there is an INCREASE in mark-up, the price setting relation will shift DOWNWARDS. this is due to the fact that the equation for the price setting relation is 1/ (1 + μ).*

Obtaining an increase in the real wage

The implication of this particular model of the labour market is that there are only two ways in which labour can obtain a higher real wage:

- If firms decrease their mark-up. This causes a lower price level, and for a given nominal wage, a higher real wage. This is referred to as the battle for the mark-ups.
- If productivity increases. If more goods are produced per unit of labour then more goods are available to be divided between firms and labour.

The following example illustrates this:

Assumptions:

- there is one worker
- there is one firm in the economy
- the mark-up is 10%
- the cost of employing this worker is R10 000 (nominal wage)

If production is 100 units	If production is 110 units
Labour cost per unit R10 000/100 = R100 **Price per unit** P = (1+0.1)R100 = R110 W/P = R10 000/R110 = 90.9 In this instance, the claim of the worker in terms of production is 90.9 units out of 100 units and that of the firm is 9.1 units.	**Labour cost per unit** R10 000/110 = R90.90 **Price per unit** P = (1+0.1)R90.90 = R99.99 W/P = R10 000/R99.99 = 100 In this instance, the claim of the worker is 100 units out of 110 units and that of the firm is 10 units. Note that in percentage terms, the worker still receives 90.9%, but since production is higher, more units accrue to both the worker and the firm

- If WS shifts downwards (i.e. because of a decrease in the bargaining position of workers) and PS stays the same, then u will decrease.
- If PS shifts downwards (i.e. mark up increases) and WS remains the same, the u will increase.

From unemployment to employment to output

1. **From unemployment to employment**

The argument is that if we know what the natural *rate* of unemployment is, we can derive the natural *level* of employment, and from the natural level of employment, through a production function, we can derive the *natural level of output*.

$$u = \frac{U}{L} = \frac{L - N}{L} = 1 - \frac{N}{L}$$

Where:
u – Unemployment rate
U – Unemployment (Note Labour force minus Employment)
N – Employment
L - Labour force
Rearranging to get employment in terms of labour force and unemployment rate, gives:

$N = L(1 - u)$
For example, if the labour force is 150 million and the natural rate of unemployment is 5%, then the natural level of employment is 142.5 million

$N_n = L(1 - u_n)$

Where
• Natural rate of unemployment is $\mathbf{u_n}$
• The labour force is **L**
• Natural level of employment $\mathbf{N_n}$

$N_n = L(1 - u_n)$
= 150 (1 – 5%)
= 150 (1 – 0.05)
= 150 (0.95)
= 142.5 million workers

2. From employment to output

Associated with the natural *level* of employment (N_n) is the *natural level of output* Y_n (the level of production when employment is equal to the natural level of employment).

To move from employment to output, we need a production function. Assuming that according to our production function, each employed worker produces one unit, it follows that the natural level of output is: $Yn = Nn = L(1 - u_n)$

Therefore, the natural level of output (Y_n) that is associated rate of unemployment ($u_n = 1 - Y_n/L$)

Y_n = number of workers employed x output per worker
= 142.5 workers x 1
= 142.5 million units

Summary: (assuming $P = P^e$)

- Real wage chosen in wage setting is a decreasing function of unemployment rate (downward sloping curve)
- Real wage implied by price setting is constant (straight line)
- Equilibrium in labour market requires real wage chosen in wage setting be equal to real wage implied by price setting.
- This equilibrium determines the natural rate of unemployment (equilibrium unemployment rate)
- This is associated with natural rate of employment and natural rate of output.

According to Blanchard:

- The fact that equilibrium in the labour market determines the unemployment rate and by implication the level of output only really occurs in the medium run.
- In the short run the factors that determine movements in output in the short run = monetary policy, fiscal policy, etc.
- In the medium run unemployment tends to return to the natural rate and output tends to return to the natural level.

The AD-AS Model

1. <u>Aggregate Supply</u>

The AS relationship is represented by the following equation. It consists of all the variables that influence wage setting and price setting in the economy, which we dealt with in study unit 8.
The AS relation captures the effects of output and income (Y) on the price level (P) and is derived from the behaviour of wages (W = PeF(u,z)) and prices (P = (1 + μ)W) in the labour market. In study unit 8, we assumed that the actual price level was equal to the expected price level (P = Pe), but in this study unit, this is only true for the short run.
Remember from SU 8:

WS: $W = P^eF(u, z)$

PS: $P = (1 + \mu)W$

Now: drop assumption that Pe = P

- $P = P^e(1 + \mu)F(u, z)$
- This is relationship between price level, the output level and the expected price level
- Assume that markup (μ) and catchall variable (z) are constant.
- Replace u with 1 – Y/L, z (unemployment in terms of output)

Remember $u = \frac{U}{L} = \frac{L-N}{L} = 1 - \frac{N}{L} = 1 - \frac{Y}{L}$

Therefore, $u = 1 - \frac{Y}{L}$

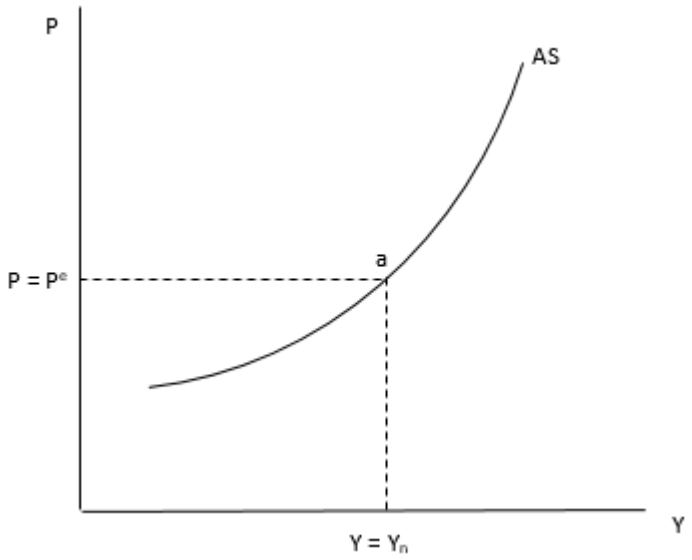
In words: for a given labour force, the higher the output, the lower the unemployment rate

- So: $P = P^e(1 + \mu)F(1 - Y/L, z)$
- The price level P, depends on the expected price level, P^e, and the level of output, Y and also on the mark-up, μ, the catchall variable z, and the labour force L.

<u>Properties of the aggregate supply curve</u>

An increase in output leads to increase in employment. This will in turn lead to decrease in unemployment and the unemployment rate. A lower unemployment means higher nominal wages. This increase in nominal wage leads to increase in price level that is set by firms. SO, the relationship between Y and P is positive, and the AS curve is **upward sloping** curve. Y↑ N↑ u↓ W↑ P↑

The AS curve



1. An increase in the expected price level leads, one-for-one, to an increase in the actual price level.
a. This effect works through wages. If labourers expect a higher price level, they will bargain for higher nominal wages in order to keep their purchasing power the same. This increase in nominal wages leads to an increase in costs for firms, which leads to an increase in the prices they charge and therefore the price increases.
NOTE: Any change in the **expected price level** (P^e) will cause the AS curve to shift. (increase → shift up)
P^e↑ W↑ P↑
1. When output Y, is equal to the natural level of output, Yn, the price level, P, is equal to the expected price level P^e. Therefore, we see the AS curve passing through point a. In terms of our labour market, this is the point where the unemployment rate is such that the bargained real wage is equal to the real wage implied by price setting.

2. At any point on the AS curve the real wage is the same. An increase in employment leads to a rise in nominal wages, which in turn increases the price level. The increase in the nominal wage is therefore offset by an increase in the price level, causing the real wage to remain unchanged. In other words, if an increase in output and employment leads to a 10% increase in nominal wages, then prices will also rise by 10% and the real wage will remain unchanged.

Shift of the AS curve

A shift in the AS curve occurs when the **expected price level** changes. An increase in the expected price level (at a given level of Y and correspondingly at a given unemployment rate u) leads to a rise in nominal wages, which in turn increases prices and at each output level, the price level will be higher. This is represented as follows by a chain of events:
Pe↑ ⇒ W↑ ⇒ P↑

Movement along the AS curve

As the **level of output** increases, employment rises and unemployment decreases. A decline in unemployment strengthens the bargaining power of workers, and nominal wages increase, which eventually leads to a rise in the price level.

This is represented by a chain of events as follows:

$Y\uparrow \Rightarrow N\uparrow \Rightarrow u\downarrow \Rightarrow W\uparrow \Rightarrow P\uparrow$

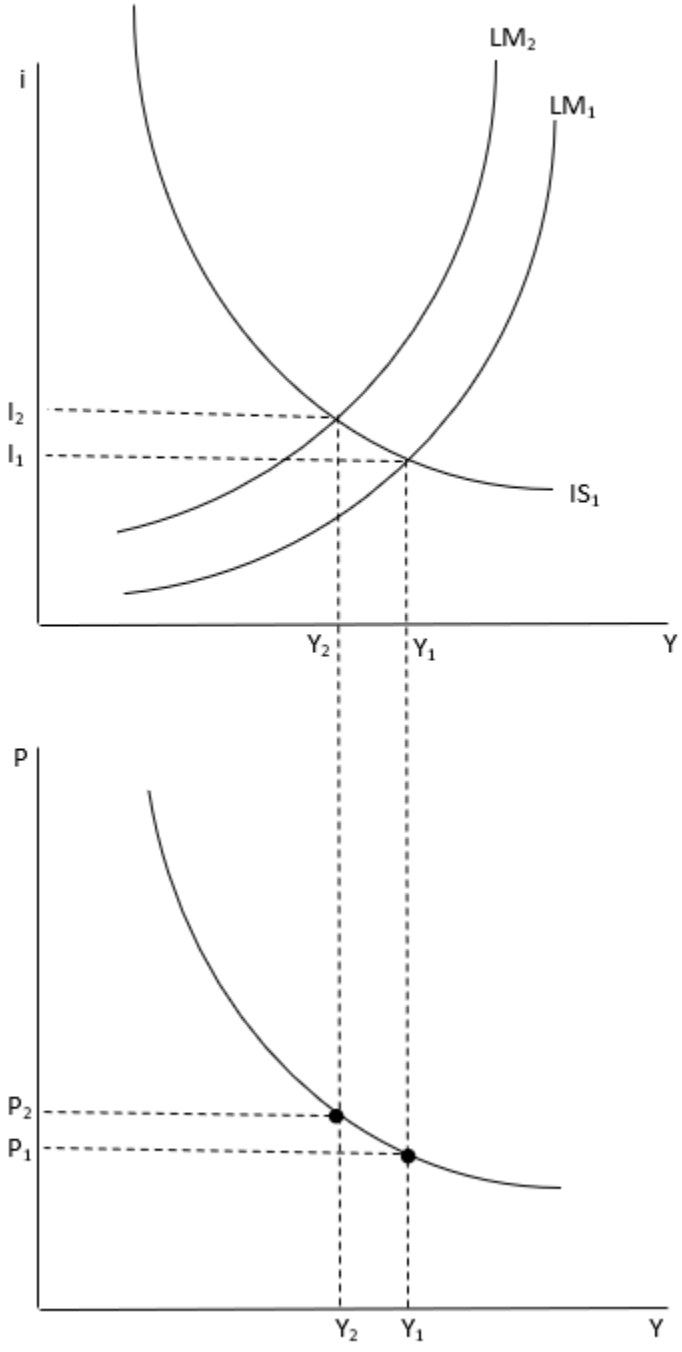
A movement along the AS curve therefore indicates a change in the level of output, employment, unemployment, nominal wages and the price level.

2. Aggregate Demand

AD curve reflects the negative relationship between output and price level (AD relation) and is derived from the equilibrium conditions in the goods and financial market in chapter 5.

- Derive AD curve (**Note that when the AD curve is derived it is done by assuming a change in the price level.)**
    1. At a given price level of P in figure b, there are corresponding IS and LM curves in figure a. Using the IS-LM model, assume an equilibrium interest rate and level of output for a given price level. Extend a vertical line down to figure b, this is the first point on the AD curve.
    2. Assume a change in the price level, for example, an increase in the price level, from P to P' in figure b
    3. The increase in price causes a decrease in the money stock (M/P) which causes the LM curve to shift to the left in figure a. A new equilibrium is established at a higher interest rate and lower level of output. This is the second point on the AD curve, A', showing that as prices rise the level of output will decrease via the increase in interest rate.
    4. **$P\uparrow (M/P)\downarrow \rightarrow i\uparrow \rightarrow I\downarrow \rightarrow Z\downarrow \rightarrow Y\downarrow$**

Derivation of AD curve using IS-LM



1. Step 1: At a given price level of P in figure b, there are corresponding IS and LM curves in figure a. The IS curve is drawn for a given level of G and T and the LM curve is drawn for a given value of M/P.
2. Step 2: In figure a, at a price level of P, equilibrium in the goods and financial markets occurs at point A. At this equilibrium position, the equilibrium level of output and income is Y and the equilibrium interest rate i.
3. Step 3: To plot the first point of the AD curve, the equilibrium level of output and income in figure a is extended as a dotted vertical line to figure b. The first point of the AD curve is plotted at the intersection of the dotted vertical Y-line with the dotted horizontal P-line, and this is called point A. This point A indicates that at a price level of P the goods and financial markets are in equilibrium at an output and income level of Y. This point A in figure b corresponds to point A in figure a.
4. Plotting the second point A'.
5. Step 4: Assume an increase in the price level from P to P' in figure b.
6. Step 5: This increase in the price level implies that the real money supply (M/P) is lower. A lower real money supply shifts the LM curve to the left in figure a. As the real money supply decreases, the interest rate rises. As the interest rate rises, investment spending and the demand for goods decreases and the level of output and income declines. There is an upward movement along the IS curve.
7. Step 6: This increase in the interest rate, which causes a decrease in investment spending, the demand for goods and the level of output and income, continues until a new equilibrium is reached at point A'. At this new equilibrium position, the interest rate is i' and the equilibrium level of output and income is Y'.
8. Step 7: To plot the second point of the AD curve, the new equilibrium level of output and income Y' in figure a is extended as a dotted vertical line to figure b. The second point of the AD curve is then plotted at the intersection of the dotted vertical Y'-line with the broken horizontal P'-line, and is called point A'. This point A' indicates that at a price level of P' the goods and financial markets are in equilibrium at an output and income level of Y'. This point A' in figure b corresponds to point A' in figure a.
9. **The AD curve shows a negative relationship between the price level and the level of output and represents combinations of the price level and the level of output and income where the goods and financial markets are in equilibrium**.
10. An increase in the price level decreases the real money supply and in the financial market the interest rate rises. This increase in the interest rate causes a decline in investment spending and the demand for goods decreases and, as a result, the equilibrium level of output and income declines.

Movements of the AD curve

A movement **along** the AD curve is caused by a change in the **price level**, while a **shift** of the AD curve is caused by a change in any of the autonomous (or **exogenous**) variables, such as taxes, government spending or nominal money supply. Remember that exogenous variables include factors such as autonomous consumption and autonomous investment.

Movement along	Rightward shift	Leftward shift
Change in price level	Increase in autonomous government spending (G)	Decrease in autonomous government spending (G)
P↑: upwards	Decrease in autonomous taxation (T)	Increase in autonomous taxation (T)
P↓: downwards	Increase in nominal money supply (M)	Decrease in nominal money supply (M)

Equations:

$Y = C(Y- T) + I (Y, i) + G$ → Goods market equilibrium and $M/P = YL(i)$ → Financial market equilibrium.

$Y = Y(M/P, G, T)$ → AD relation

(+, +, -)

Output (Y) is an increasing function of the real money stock (M/P), an increasing function of government spending (G), and a decreasing function of taxes (T).

3. Distinguish between equilibrium in the Short Run and Medium Run:

The AS and AD relations are combined to give us the AS-AD model. The point of equilibrium is represented by the point of intersection of the AS and AD curves.

$$\text{AS relation: } P = P^e(1 + \mu)F(1 - Y/L, z)$$

$$\text{AD relation: } Y = Y(M/P, G, T)$$

Note that equilibrium depends on the value of P^e, which determines the position of the AS curve and the position of the AS curve affects the equilibrium. In the short run, we take P^e as given. But over time it is likely to change, shifting the AS curve and changing the equilibrium.

Short Run:

- In the short run, it is possible to be at a position away from the natural level of production and employment.
- The short run will last for as long as the expected price level remains unchanged. Once the expected price level changes, the medium run starts.
- A position away from the natural level of production and employment implies that the actual price level and the expected price level differ.

2. Medium Run:

1. In the medium run the adjustment process will continue until the level of Yn has been restored and P = Pe.
2. As long as the level of Y exceeds Yn, the expected price level increases, shifting the AS curve upwards/left. As the AS curve shifts, the economy moves upwards along the AD curve and equilibrium output decreases.
3. In real life: As workers revise their price expectations upwards, they increase their nominal wage demands. Firms react to this rise in the nominal wages by increasing the prices of goods and services.
4. This increase in the price level, however, affects the financial market (movement along AD curve), where an increase in the price level reduces the real money supply, which in turn causes an increase in the interest rate and a decrease in investment spending, which lowers the demand for goods and the level of output declines.

In terms of a chain of events, this can be represented as follows:

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

Adjustment of output over time

To summarize:

In the **short run**, output can be below or above natural level. Changes in any of the variables that enter either the AS or AD relation lead to changes in output and to changes in price level.

$$\mathbf{Y \neq Yn}$$

In the **medium run**, output eventually returns to its natural level. The adjustment works through changes in the price level. When output is above its natural level, the price level increases. The higher price level decreases demand and output. When output is below its natural level, the price level decreases, increasing demand and output. **Y – Yn**

The effects of a monetary expansion NB: Exam Question

Impact of expansionary monetary policy, increase in nominal money from M to M'

Short run:

$$\text{Financial market: } M\uparrow \rightarrow M/P\uparrow \rightarrow i\downarrow$$

The initial effect of an increase in the nominal money supply is on the financial market. To increase the money supply, the central bank buys bonds on the financial market. As a result, the real money supply increases and the interest rate declines.

$$\text{Goods market: } i\downarrow I\uparrow Z\uparrow Y\uparrow$$

Firms react to the decline in the interest rate by increasing their investment spending. The rise in investment spending increases the demand for goods and, through the multiplier process, the level of output and income increases.

In terms of the AS-AD model, this is represented by a **rightward shift in the AD** curve.

Labour market: Y↑ ⇒ N↑ ⇒ u↓ ⇒ W↑ ⇒ P↑

Employment increases, unemployment rate decreases and the bargaining position of workers increases. Given this increase in the bargaining position of workers, the nominal wage increases. Firms react to this increase in wages by increasing the price level.

In the AS-AD model, this is indicated by an **upward movement along the AS curve** and a **short-run equilibrium** position is reached at point A'.

Medium run:

Labour market: Pe↑ ⇒ W↑ ⇒ P↑

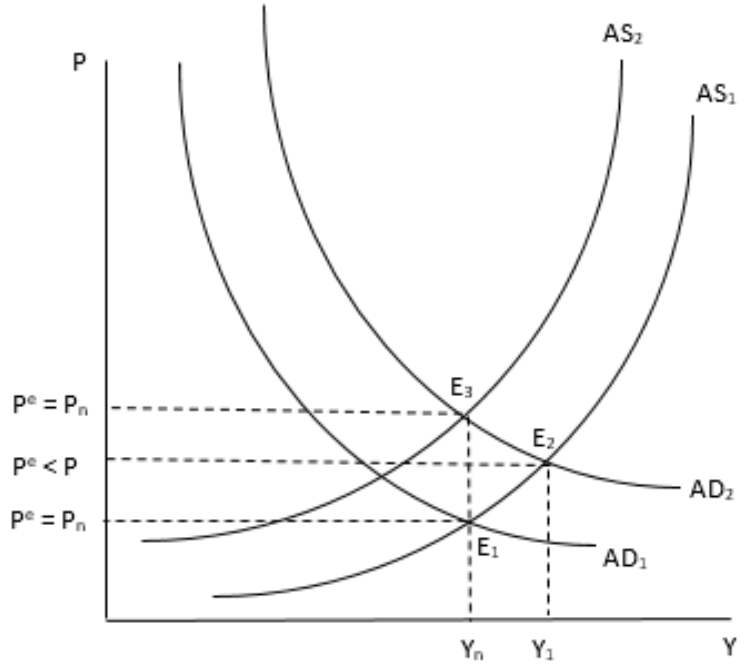
At point A', output is higher than its natural level, the expected price level on which workers based their real wage negotiations turned out to be lower than the actual price level. Workers then revise their expected price level upwards and negotiated for higher wages. In reaction to the higher nominal wages, firms increased the price level.

Financial and Goods Market: P↑ ⇒ M/P↓ ⇒ i↑ ⇒ I↓ ⇒ Z↓⇒ Y↓

As the price level increases, the real money supply decreases in the financial market leading to a rise in the interest rate. The increase in the interest rate causes firms to reduce their investment spending, and aggregate demand and the level of output and income therefore decrease.

This is shown by the **upward movement along the AD' curve**. This process continues until point A'' is reached where the level of output is at the natural level of output, and the unemployment rate by implication, is equal to the natural rate of unemployment. This is the long-run equilibrium position.

Effects of a monetary expansion



The neutrality of money

When we examine the impact of an expansionary monetary policy, we can see that in the medium run to long run, it is neutral, meaning that it only changes nominal variables and not the real variables. Comparing point E_3 (the long run position) with point E_1 (the initial position), it is clear that not only are the level of output and income, the level of employment and the unemployment rate what they were before the increase in the nominal money supply, but the real money supply, the interest rate, investment spending, government spending and the real wage are also equal to their original values. What has changed? In this case, the nominal variables namely the **nominal money supply, the nominal wage and the price level, are higher.**

In this model:

Nominal variables:

- Nominal money supply (Ms)
- Price level (P)
- Nominal wage (W)

Real variables:

- Real money supply (M/P)
- Interest rate (i)
- Investment spending (I)
- Demand for goods (Z)
- Level of output and income (Y)
- Real wage (W/P)

The nominal variables increase in the medium to long run

- Ms↑ owing to the assumed increase in nominal money supply
- W↑ owing to an increase in employment and then an increase in Pe
- P↑ since the nominal wage is higher

The real variables all remain **unchanged**

- M/P first increases, because of higher Ms, but then starts to decrease because of a higher P
- i first decreases, then increases
- I first increases, then decreases
- Z first increases, then decreases
- Y first increases, then decreases
- W/P remains unchanged throughout the process

The real variables remain unchanged because the increase in the nominal money supply (Ms) is exactly offset by an increase in the price level (P).

In other words, a 10% increase in money supply eventually leads to a 10% increase in the price level, which means that the real variables return to their original values as does the real wage, because the increase in nominal wage is offset by an increase in the price level.

Neutrality of money does not mean that monetary policy cannot or should not be used to affect output. But it is a warning that monetary policy cannot sustain higher output forever.

Decrease in Budget Deficit (Contractionary Fiscal Policy) NB: Exam Question

To reduce the budget deficit, government spending must decrease and/or taxation must increase which initially affects the goods market: demand for goods decreases as does the level of output.

Short run

In the goods and financial market:

A decrease in government spending initially affects the goods market where the demand for goods and the level of output and income decrease.

$$G\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

A decline in output and income decreases the demand for money in the financial market and the interest rate declines.

$$Y\downarrow \Rightarrow Md\downarrow \Rightarrow i\downarrow$$

Whether or not investment spending increases at this stage is ambiguous. While a decrease in the interest rate increases investment spending, a decline in output and income reduces investment spending.

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

In terms of the IS-LM model, this is represented by a **leftward shift in the IS curve to IS_1**, and in terms of the AS-AD model, this is represented by a **leftward shift in the AD curve to AD_1.**

The labour market

As the level of output declines, the level of employment decreases and the unemployment rate increases. The increase in the unemployment rate reduces the bargaining position of workers and the nominal wage declines. A decline in the nominal wage in turn causes a decrease in the price level.

$$Y\downarrow \Rightarrow N\downarrow \Rightarrow u\uparrow \Rightarrow W\downarrow \Rightarrow P\downarrow$$

In terms of the AS-AD model, a **downward movement along the AS curve to point E_2** occurs. This is the **short run equilibrium** position.

Medium term

In the labour market:

At point E_1, the expected price level on which workers based their real wage negotiations turned out to be higher than the actual price level. Workers revise their expected price level downwards and the nominal wage decreases.

In reaction to the lower nominal wages, firms reduce their price levels.

$$Pe\downarrow \Rightarrow W\downarrow \Rightarrow P\downarrow$$

In the AS-AD model, this effect is captured by a **rightward shift of the AS curve to AS_1**.

In the financial and goods market:

The decrease in the price level causes an increase in the real money supply and the interest rate declines. A decrease in the interest rate increases investment spending, the demand for goods and the level of output and income.

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

In the IS-LM model, this is represented by a **rightward shift of the LM curve** and in the AS-AD model by a **movement along the AD** curve. This process continues until point E_3 is reached, where the level of output is at the natural level of output and the unemployment rate by implication is equal to the natural rate of unemployment. This is the medium to long run position.

Comparing the equilibrium point E_3 with the initial equilibrium position E_1, it is clear that:

1. Level of output and income, the level of employment and the unemployment rate are the same as before the decrease in government spending.
2. However the real money supply is higher (owing to the decrease in the price level), the interest rate is lower (owing to the higher real money supply), investment spending is higher (owing to the lower interest rate) and government spending is lower (by assumption).
3. What has happened in the economy is that the **decrease in government spending has been replaced by an increase in investment spending.**

Effects of a decrease in the budget deficit