

Macroeconomics

Only study guide for ECS2602

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Printed and distributed by the University of South Africa Muckleneuk, Pretoria

Compiled by the Department of Economics

ECS2602/1/2018

70618178

CONTENTS

	Page
INTRODUCTION	
HOW TO STUDY MACROECONOMICS AND USE THIS STUDY GUIDE	iv
LEARNING UNIT 1	
AN OVERVIEW OF THE SOUTH AFRICAN MACROECONOMIC ENVIRONMENT	1
LEARNING UNIT 2	
THE GOODS MARKET	5
LEARNING UNIT 3	
THE FINANCIAL MARKET	51
LEARNING UNIT 4	
THE IS-LM MODEL	75
LEARNING UNIT 5	
OPENNESS IN GOODS AND FINANCIAL MARKETS	110
LEARNING UNIT 6	
THE GOODS MARKET IN AN OPEN ECONOMY	120
LEARNING UNIT 7	
OUTPUT, THE INTEREST RATE AND THE EXCHANGE RATE:	
THE IS-LM MODEL FOR AN OPEN ECONOMY	136
LEARNING UNIT 8	
THE LABOUR MARKET	150
LEARNING UNIT 9	
THE AS-AD MODEL	166
SUMMARY: EXOGENOUS VS ENDOGENOUS VARIABLES	183
SUMMARY OF ASSUMPTIONS FOR THIS MODULE	185
SUMMARY: CHAIN OF EVENTS AND DIAGRAMS	187

How to study macroeconomics and use this study guide

THE FOCUS OF THE MODULE

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

In this module, the emphasis is mainly on developing your understanding of different models on the determination of output and income (Y) and the impact of fiscal and monetary policy on the level of output and income. We concentrate on stabilisation policies as opposed to structural policies that deal with the important issue of economic growth. Keep this in mind as you work through the prescribed content.

You will be exposed to the different assumptions that underlie the theoretical models, the interaction between the various macroeconomic variables, the different analytical tools that have been developed and the impact of economic policy measures.

The module consists of three interrelated sections. In the first section, which consists of learning 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.

In the IS-LM model, the focus is on the role of the demand for goods. We assume that firms are willing to supply any quantity at a given price – in other words, we ignore supply constraints. Learning unit 2 looks at the goods market. Learning unit 3 focuses on the financial market and in learning unit 4 we combine the goods market and the financial market in what is known as the IS-LM model. This is an extremely useful model for analysing the determination of output and the impact of fiscal and monetary policy on the level of output and income. It is also a vital building block for the rest of the module. This is the working horse of macroeconomics. It is therefore imperative that you make an effort to master this section before you move to the other learning units. Failure to do this will result in a great deal of frustration when working through the remaining learning units.

A closed economy does not participate in any international trade, while an open economy has significant trade and financial relationships with other economies. In this section (learning 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 learning unit 5, a number of key concepts and relationships are introduced. In learning unit 6, with learning unit 2 as background, the focus is on the demand for goods in an open economy. Learning 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 (learning unit 4) as a building block.

In the next section (learning 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. In learning unit 8, the labour market is introduced and in learning unit 9 the goods market, the financial market and the labour market are combined in the AS-AD model. The IS-LM model (learning unit 4) is a critical building block of this AS-AD model.

The content is divided into nine learning units. The various topics, learning units and corresponding chapters in the prescribed book are indicated in the following table:

Topic	Learning unit	Chapter in prescribed book
How to study macroeconomics and use the study guide		
An overview of the South African macroeconomic environment		
	1	1, 2
The goods market	2	3
The financial market	3	4
Goods and financial markets: the IS-LM model	4	5
Openness in goods and financial markets	5	18
The goods market in an open economy	6	19
Output, the interest rate and exchange rate: the IS-LM model for an	7	20
open economy		
The labour market	8	6
The AS-AD model	9	7

Please note the following:

Each level of study in economics builds on previous knowledge. You will find that the study material takes as its point of departure various concepts and analyses that you encountered in your first-level study of economics. We assume that you know and understand these concepts and analyses. If you are uncertain about them, it would be worthwhile to refer back to the relevant material to refresh your memory.

THE FUNCTION OF THE STUDY GUIDE

The study guide has been designed to lead you through the prescribed book in a systematic and informative way and to help you to become acquainted with and understand the material. You cannot therefore study the prescribed book without consulting the study guide.

The study guide provides you with additional material and explanations to help you master the content. You will therefore have to study some parts of the study guide as well as the prescribed book.

The study material contains a mixture of verbal, graphical and mathematical explanations.

Graphical material is an important aid in understanding arguments that may be complicated because of the sometimes intricate interaction between many economic variables. Bear in mind that graphs are not and should never be goals in their own right. Diagrams must be used to complement your explanation.

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 labelled. 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.

Unless indicated otherwise, mathematical material, such as the derivation of formulae, may be omitted. In some instances, however, you will be expected to apply the formulae to numerical examples.

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:

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

The study guide has the following functions:

- It specifies the outcomes of each learning unit.
- It outlines the content of the module. In other words, it indicates which parts of the prescribed book are prescribed material.
- It indicates how you should approach each chapter and the main topics and diagrams (figures) that you have to master.
- It indicates which activities you must do in the workbook in order to assess your progress and prepare for the examination.

HOW TO USE THE STUDY GUIDE

At the beginning of each learning unit, there is a study instruction that indicates where you will find the relevant study material in the prescribed book.

This instruction is followed by the learning unit outcomes. The learning unit outcomes are the things you should be able to do once you have studied a particular learning unit.

The content you should master in the learning unit is divided into subsections. Each subsection has a heading, followed by the section outcomes, which indicate the things you should be able to do once you have completed a particular subsection.

In some instances, the section outcomes are followed by a prior knowledge section. The purpose of this section is to indicate the prior knowledge you require in order to understand this particular subsection of the learning unit. Included in the prior knowledge section is a true-or-false activity you can use to test your prior knowledge. These activities you will find in the workbook.

In the subsections, you will find references to activities in the workbook. An activity is a task that you must do. It can be in various forms such as answer true-or-false questions, choose the correct option, do calculations, draw a diagram, write down an equation or answer short or long questions.

The questions included in these activities indicate the content that we expect you to know and understand. These activities have been included to help you master the content, to help you evaluate your performance and prepare for the examination. The answers to the activities are provided in the workbook.

ONLINE LEARNING

Note that the Study Guide only contains the Learning Units and TL102 contains the self-assessment activities that relate to the Learning Units. You must visit the module's main my*Unisa* site regularly for additional correspondence from your lecturers as well as additional self-assessment activities. If you are allocated to an e-tutor you are highly encouraged to make use of this additional support system, you can post your questions to your e-tutor's discussion forum.

CHECKLIST IN THE WORKBOOK

In the workbook you will find a checklist. Use the checklist to determine whether you have achieved the outcomes for each section. The checklist indicates what you should be able to do. There are different categories, such as **concepts**, **relationships**, **diagrams**, **policy** and **application**. These categories should give you an indication of possible categories of questions you can expect in the examination.

Let us now see, in terms of the checklist, what the above means:

In the checklist for the goods market (learning unit 2), the **concepts** you must be able to explain are listed. In the examination we may test your ability to explain these concepts by asking you to explain a concept in writing or by asking a multiple-choice question.

Under the category of **relationships**, you must be able to explain certain relationships using words, equations and/or a chain of events. In the examination, your ability to explain these relationships may be tested in short questions and multiple-choice questions.

Under the category **diagrams**, you must be able to present and explain certain things with the aid of diagrams. In the examination your ability to do so may be tested by means of short questions, multiple-choice questions and short essay questions.

The category policy lends itself to essay questions. The focus of this module is on the impact of fiscal and monetary policy on the level of output and income in the different models. You can therefore expect a number of essay questions on this topic. In answering an essay question, where applicable, you should make use of words, equations, chains of events and diagrams. Next to the items in the checklist you will find a number of check boxes labelled *well*, *satisfactorily*, *must redo*. If you think you are able to do something really well, say, explain the impact of some policy measure on the level of output, check the *well* box. If you think you are able to explain it, but are unsure about certain aspects or find it a bit difficult, check *satisfactorily*. If you are a somewhat lost, but know something about the topic and will benefit from spending more time on it, check *must redo*.

HOW TO STUDY

Experience has shown repeatedly that students who work diligently and consistently have a much greater chance of passing. You cannot cram for this module – you simply have to allow sufficient time to develop your understanding of the issues, the theory and the different policy choices. Such an understanding is usually only obtained after studying the material a second or third time. There are no shortcuts to success! The best approach is to be active. Economics is not a subject that can simply be memorised – it has to be understood. This means that you always have to think about what you are studying and try to understand the work. The solution is to study **actively**. You should use a pen (or pencil) and paper and work out each argument by drawing diagrams (figures), doing calculations and writing out the logic of the argument. It is simply not enough to read the prescribed book and underline or highlight the key concepts.

Do not omit any of the prescribed learning units. The learning units are arranged in a logical sequence and if you skip some of them you will not be able to follow or understand the reasoning of subsequent chapters.

An overview of the South African macro-economic environment

1

Study instruction

Read

The introduction part of chapters 1 and 2 of the prescribed book in order to orientate yourself.

Study

Prescribed book: chapters 1 and 2 Subsections: 1.1, 1.2, 2.1 and 2.2 Study guide: learning unit 2

Learning unit outcomes

Once you have worked through this learning unit, you should be able to give an overview of the performance of the South African economy with regards to the following macroeconomic aspects:

- the economic crisis
- economic growth, unemployment rate and inflation rate for South Africa

Once you have worked through this learning unit, you should be able to

- describe economic growth and its measurement
- describe the gross domestic product (GDP)
- distinguish between nominal GDP and real GDP
- describe stabilisation policies
- define and describe the measurement of unemployment in South Africa

Contents

1.1 THE ECONOMIC CRISIS

Read through chapters 1.1 and 1.2 of the prescribe book for background information about the economic crisis and how it has impacted on the South African economy.

1.2 ECONOMIC GROWTH

Economic growth takes place when the total output (production) of goods and services in an economy increases. It is traditionally defined as the annual rate of increase in total output (production) or income in the economy. This definition has to be qualified in two important respects. Firstly, production, or income, should be measured in real terms – that is, the effects of inflation should be eliminated.

Secondly, the figures should also be adjusted for population growth. In other words, they should be expressed in per capita terms.

The growth in total production (economic growth) can be measured by calculating the percentage change in the real gross domestic product (GDP) from one year to the next.

Real GDP growth rate =
$$\frac{\text{GDP}_{\text{t-}} - \text{GDP}_{\text{t-}1}}{\text{GDP}_{\text{t-}1}} \times \frac{100}{1}$$

Gross domestic product (GDP)

The GDP is the total value of all final goods and services produced within the boundaries of a country during a particular period (usually one year). GDP is an official measure of how much output was produced in a country or region during a specified time period. It is also the broadest, best-known and most frequently used measure of economic activity.

GDP is a **gross** measurement because it includes the total amount of goods and services produced, some of which are simply replacing goods that have depreciated or worn out.

GDP measures the goods and services produced **inside the borders** of a country by both the citizens and foreigners. This then reflects the level of economic activity that is taking place in the country.

Total value is measured by expressing the value of production in terms of the **prices of the various final goods and services**. GDP is usually valued at market prices, but it is also possible to value it using basic prices or factor cost (or factor income).

Only **final goods and services** are included. **Final goods and services** refer to those goods and services that are consumed by households and firms. Final goods are things such as television sets, clothes, chairs, bookcases, hats, and so on, while services are things such as the services provided by lawyers, doctors, teachers, plumbers, beauticians, and so forth. In the production of the final goods and services, intermediate goods are used. **Intermediate goods** are purchased to be used as inputs in producing other goods before they are **sold to end users**. Intermediate goods, such as the crude oil used to manufacture petrol, or flour for baking bread, are excluded to avoid double counting.

GDP measures the production of **new goods and services** (also called current production) during a specified period and is an annual flow because it measures the value of goods and services produced over a year. A GDP of R60 billion implies that the South African economy produced R60 billion worth of final goods and services during a specific year.

Nominal GDP versus real GDP

Nominal GDP or GDP at current prices 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 or GDP at constant prices is a measure of GDP in which the quantities produced are valued at the prices in a base year instead of at current prices. Real GDP therefore measures the actual physical volume of production. A base year is used to overcome the problem of price changes by expressing the prices of goods and services in terms of prices in a particular year.

Real per capita GDP

Positive economic growth actually occurs only when total real production or income grows at a faster rate than the 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. There are, however, a number of problems with using real GDP per capita as a measure of economic welfare. Apart from the measurement problems associated with GDP, there is also a problem with the composition of output and the distribution of income. If a factor such as an increase in defence expenditure was responsible for the increase in GDP, it does not necessarily follow that there was a concomitant increase in economic welfare. 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.

1.3 INFLATION

Inflation is defined as the sustained rise in the general level of prices. In the goods market, financial market and IS-LM model we are looking at the short run and assume that the price level is fixed. However in the labour market we look at the relationship between workers' nominal wage demands and the price level. This comes together in the AS-AD model where we see that expectations about the future price level can influence the actual price level in the economy.

1.4 STABILISATION POLICY

In this module, our main concern is how fiscal and monetary policy can be used to stabilise the economy as opposed to analysing the determinants of economic growth.

The following two policies play a major role here:

Fiscal policy

Fiscal policy is the government's policy in respect of the nature, level and composition of government spending, taxation and borrowing, aimed at pursuing particular economic goals. The main instrument of fiscal policy is the budget, while the main policy variables are government spending and taxation. In South Africa, the budget is presented to Parliament annually by the Minister of Finance, usually in February.

A distinction can be made between an expansionary and contractionary fiscal policy. An expansionary fiscal policy entails an increase in the demand for goods in the economy by increasing government spending and/or decreasing taxes. A result of such a policy is that the budget deficit increases. A contractionary fiscal policy entails a decrease in the demand for goods in the economy by decreasing government spending and/or increasing taxes. A result of such a policy is that the budget deficit decreases.

At the macroeconomic level, fiscal policy is one of the main elements of demand management or stabilisation policy. In the models you will be studying in this module fiscal policy has a vital impact on the equilibrium level of output and income.

Monetary policy

This involves all deliberate actions by the monetary authorities to influence the monetary aggregates, the availability of credit, interest rates and exchange rates, with a view to affecting monetary demand, output, income, prices and the balance of payments.

A distinction can be made between an expansionary and contractionary monetary policy. An expansionary monetary policy entails an increase in the money supply to bring about a decrease in the interest rate in order to increase the demand for goods in the economy. A contractionary monetary policy entails a decrease in the money supply to bring about an increase in the interest rate in order to decrease the demand for goods in the economy.

It is mainly the impact of the interest rate on the equilibrium level of output and income that we will study in this module.

1.5 UNEMPLOYMENT

Study chapter 2.2 of the prescribed book and note how unemployment is defined and measured.

∠ Do activity 1.1 in the workbook.

The goods market

2

Economics in action

Read the following extract: from Stanlib:

At the time of the global financial market crisis in 2008, government decided to embark on a policy of counter-cyclical fiscal policy. While the idea of government stimulating economic activity at a time when the private sector was in recession is to be applauded, government chose to dramatically increase spending on government salaries. This included a rise in both employment as well as salary increases. Consequently, the public sector's salary cost doubled over a period of five years. At the same time, because of the prevailing economic recession, tax revenue became constrained in 2009/2010. This reflected in a revenue shortfall of around R66 billion in 2009/2010. Consequently, the budget deficit expanded dramatically to over 6% of GDP. Since then the fiscal authorities have endeavoured to reduce the deficit to around 3% of GDP, but the combination of high levels of consumption spending coupled with sluggish economic growth has meant that the fiscal deficit has remained stubbornly high. This contributed to South Africa losing its A credit rating. Ideally, instead of boosting salary payments, government should have tried to stimulate economic activity through an increase in infrastructure related projects. This could have included fast-tracking projects that were already at an advanced stage of preparation or projects that have stalled due to changes in personnel.

In conclusion, over the past twenty years the demands on the state have been extensive and relentless. The fiscal authorities have done a remarkable job in establishing a credible policy of fiscal discipline, while at the same time improving the process of tax collection. However, the combination of subdued economic growth and high unemployment has meant that the tax base has remained relatively constrained. Looking forward the authorities need to focus on introducing measures that ultimately help create employment and broaden the tax base. Without a rapid rise in tax revenue it is going to become increasingly difficult for the government to satisfy the demands of the population.

Stanlib. SA National Budget 2014/2015. A solid budget with few surprises that adheres to fiscal discipline. [web log]. May, 2014, from http://www.stanlib.com/EconomicFocus/Pages/SANationalBudget20142015.aspx

Study instruction

Read

The introduction part of chapter 3 of the prescribed book in order to orientate yourself.

Study

Prescribed book: chapter 3

Subsections: 3.1, 3.2, 3.3 and 3.5 Study guide: learning unit 2

Learning unit outcomes

The demand for goods which consist of consumer spending, investment spending, government spending, exports and imports is an important factor 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. In this learning unit, you will study a *theoretical model* that supports this viewpoint. Some of the constraints on the use of stabilisation policies, especially fiscal policy, to address the problem of unemployment in the South African economy will also be discussed.

Once you have worked through this learning unit, you should be able to

- explain the way in which demand for goods determines the equilibrium level of output and income in the goods market in words and with the use of a chain of events, equations and diagrams
- explain the way in which stabilisation policy can be used to influence the level of output and income in the goods market in words and with the use of a chain of events, equations and diagrams
- explain the way in which fiscal policy can be used to decrease unemployment and reach full employment in words and with the use of a chain of events, equations and diagrams
- apply the goods market model to explain changes in the level of output and income for the South African economy
- identify the limitations of the goods market model and the factors that are present in the South African economy that limit the use of stabilisation policies, especially fiscal policy, to address the unemployment problem

To achieve these objectives we will proceed as follows:

First, we identify the different components of the demand for goods and then look at the different variables that influence these components.

We then represent the different variables (consumption spending, investment spending and government spending) as functions and with the aid of diagrams.

With the different variables as background, we then construct the demand for goods function and, with the aid of equations and diagrams, show how the demand for goods determines the level of output and income.

Next, we explain how changes in the demand for goods impact on the level of output and income and on the multiplier process. We do these using words, events chains, equations and diagrams.

This is followed by an explanation of how fiscal policy can be used to influence the level of output and income and we also pay attention to the balanced budget multiplier.

We then explain how fiscal policy can be used to reach full-employment and we end the unit with a discussion of the limitations of using fiscal policy to reach full employment.

Contents

2.1 THE DEMAND FOR GOODS

In this section we take a closer look at the different components of the demand for goods.

Study chapter 3.2 of the prescribed book

Composition of expenditure

Section outcomes

Once you have worked through this section, you should be able to

- define the goods market
- define expenditure on the gross domestic product (GDP)
- identify and describe the different components of expenditure on GDP in South Africa

Importance of the demand for goods

There are literally thousands of different producers of goods and services and millions of different consumers of these goods and services in the economy. In macroeconomics, all these different markets for goods and services, which include both producers and consumers, are lumped together under the heading of the **goods market**. In economics, this "lumping together" is known as aggregation.

It is in the goods market that producers decide what and how much to produce, and consumers decide what and how much to consume. Because this sector is concerned with real things, such as the production and consumption of goods and services, it is also referred to as the real sector.

In this study unit, we will argue, as Keynes did, in *The general theory of employment, interest and money* (in 1936), that the level of output and income in the economy is determined in the goods market by the demand for goods and services (also known as the aggregate [or total] demand for goods and services). We will provide you with a theoretical model that captures some of the important variables that influence the demand for goods and services and consequently the level of output and income.

To deal with the issue of the demand for goods (or aggregate expenditure), macroeconomists break down the expenditure on the gross domestic product (GDP) of a country in terms of the different consumers (or users) of such goods and services.

The breakdown of expenditure on the GDP in South Africa is therefore an excellent starting point for studying the dynamics of the goods market.

Expenditure on the GDP and gross domestic expenditure (GDE) in South Africa

Expenditure on the gross domestic product is spending on goods and services produced inside the borders of a country, including exports and excluding imports [C + I + G + (X - IM)]. This differs from gross domestic expenditure (GDE), which is the total value of spending within the borders of a country (C + I + G), including imports but excluding exports, since spending on exports takes place outside the borders of the country.

In South Africa, GDE is calculated by adding all consumption spending by households (C), investment spending by firms i.e. the private sector (I) and spending by government i.e. by the public sector (G). This amount includes imports since they were purchased by these three groups of users within the country but excludes exports because they are purchased by other countries i.e. the foreign sector.

From GDE, the expenditure on GDP can be calculated by adding exports and subtracting imports. Therefore if GDE is greater than GDP it follows that the country is importing more than it's exporting whilst if GDP is greater than GDE the country is exporting more than it's importing.

Table 2.1 shows the composition of expenditure on the GDP in South Africa for 2013. According to the table, real gross domestic expenditure (GDE) is equal to final consumption expenditure by households + final consumption expenditure by general government + gross capital formation + residual item = R2 143 140 million, while expenditure on the GDP is GDE + exports – imports = R1 993 433 million.

TABLE 2.1 Composition of gross domestic expenditure and expenditure on GDP in South Africa at constant prices 2005 for 2013			
	R millions	% of expenditure on GDP	
Final consumption expenditure by household (C)	1 325 105	66.47	
Final consumption expenditure by general government (G)	424 220	21.28	
Gross capital formation (I)	408 230	20.48	
Gross fixed capital formation	406 927		
Change in inventories	1 303		
Residual item	-14 415		
Gross domestic expenditure (GDE)	2 143 140		
Exports of goods and services (X)	491 071	24.63	
Minus Imports of goods and services (IM)	640 778	32.14	
Expenditure on GDP	1 993 433		

Source: South African Reserve Bank, Quarterly Bulletin, June 2014

The four major spenders in South Africa

There are four major spenders in the economy, namely households (C), government (G), private firms (I) and the foreign sector (X - IM).

The biggest spender is households, which accounted for 66.47% of the total expenditure in South Africa in 2013. This makes it a crucial sector for the South African economy, and changes, even small changes, in consumption expenditure by households therefore have a major impact on the South African economy.

Final consumption expenditure by households (C) includes anything from spending on refrigerators to medical services to movie tickets to food. In the national accounts of South Africa, final consumption expenditure by households is classified in terms of durable goods, semi-durable goods, nondurable goods and services. If you would like to know more about how South African households spend their income, you will find valuable information in the *Quarterly Bulletin* of the South African Reserve Bank (http://www.reservebank.co.za/).

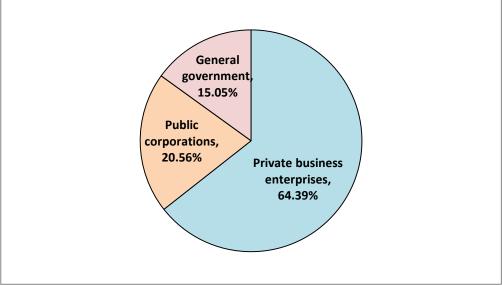
Final consumption expenditure by government (G) consists of the expenditure of the central government on final goods and services. In 2013 it represented 21.28% of the expenditure on GDP. It includes not only the buying of final goods, such as textbooks for schools and medication for hospitals, but also the services provided by government employees, such as teachers and medical personnel.

Excluded from this figure are transfer payments (e.g. old age pensions, child grants and disability grants) and interest on debt, since these are not part of the purchase of final goods and services by government.

Gross capital formation (I) is the spending by households, private firms and government on residential and non-residential capital goods. In 2013, this item of expenditure accounted for 20.48% of expenditure on GDP in South Africa. A distinction is also made between gross fixed capital formation and inventory investment.

If we break down gross fixed capital formation according to type of organisation, the following picture emerges:

Gross fixed capital formation 2013



Source: South African Reserve Bank, Quarterly Bulletin, June 2014

In 2013 64.39% of gross fixed capital formation in South Africa originated from private business enterprises, which indicates that this is an extremely important sector of the South African economy. One would therefore expect changes in the investment behaviour of private firms to have a major impact on the economy of South Africa.

The **international sector** is represented by exports and imports.

Exports are goods that are produced within the country but sold to the rest of the world. South Africa's exports consist mainly of gold and other minerals.

Imports are goods that are produced in the rest of the world but purchased for use in the domestic economy and they therefore do not form part of expenditure on GDP. South Africa's imports consist mainly of capital and intermediate goods, which are used in the production process.

In table 2.1 you will see that, in 2013, exports accounted for approximately 24.63% of total expenditure and imports for 32.14%. South Africa can therefore be regarded as an open economy since it has significant trade and financial relationships with other economies. A study of the determination of the level of output and income would be incomplete if this sector were not included.

In this study unit we will ignore the impact of the foreign sector on the demand for goods and the level of output and income, but we will return to this vital issue in learning units 5 to 7.

After having worked through this section, you should have a clear understanding of the following concepts and identity:

Concepts	Identity
 goods market expenditure on gross domestic product gross domestic expenditure final consumption expenditure by households final consumption expenditure by government gross capital formation exports imports identity 	Open economy $Z \equiv C + I + G + X - IM$ Closed economy $Z \equiv C + I + G$

Do activity 2.1 in the workbook.

CONSUMPTION EXPENDITURE (C)

If you look at table 2.1, you will see that consumer spending is the largest component of expenditure on GDP in South Africa. This makes it a key component of the demand for goods and services in the economy and it is therefore worth studying in more detail.

Introduction to consumption behaviour

Section outcomes

Once you have worked through this section, you should be able to

- describe the consumption behaviour by households
- describe the marginal propensity to consume
- describe the marginal propensity to save

Households are responsible for consumer spending in the economy and a change in their spending behaviour, even a small one, will result in a change in the demand for goods. And as the demand for goods changes the level of output and income in the economy changes.

Keynes (1936:96) had the following to say about the behaviour of households:

The fundamental psychological law, upon which we are entitled to depend with great confidence both a priori from our knowledge of human nature and from the detailed facts of experience, is that men are disposed to increase their consumption as income increases, but not as much as the increase in income.

Consumption spending by households is determined mainly by their current income (Y). In other words, consumption is a function of income (C = f(Y)) and a positive relationship exists between income and consumption since an increase in income leads to an increase in consumption.

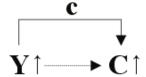
An increase in income increases consumer spending, but the increase in consumer spending is less than the increase in income. In other words, if the income of households increases by R100 million, we can expect consumer spending to increase, but the increase will be less than R100 million. This is due to the marginal propensity to consume.

⊘ Do activity 2.2 in the workbook.

Marginal propensity to consume

This relationship between an increase in income and corresponding but smaller increase in consumption is captured by the marginal propensity to consume (c).

Using a chain of events, the above can be represented as follows:



The above chain of events indicates that 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. The value for the marginal propensity to consume is usually between 0 and 1.

Households earn an income from owing the factors of production

But where do households obtain their income, and what causes their income to increase or decrease?

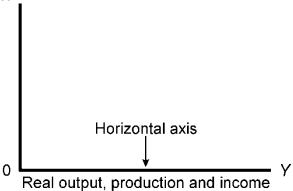
Households are the owners of the factors of production (natural resources, labour, capital and entrepreneurship) and they earn an income by making available the services of these factors of production to firms, which in turn use these factors of production to produce goods and services. In return for these services of the factors of production, households receive an income from firms in the form of rent, wages, interest and profits.

The higher the level of production the greater the number of factors of production employed and the higher the level of income of households will be which causes a higher consumption spending in the economy.

Total income and total production

Note that what firms pay out to the factors of production as income (Y) is also equal to the value of total production (TP) – hence income and output (production) are two sides of the same coin and will always be equal.

This variable (production and income) is usually measured on the horizontal axis of a goods market diagram. The determination of this variable is what we are trying to explain in this module and it is our endogenous variable. In terms of our national accounts this variable is measured by the real gross domestic product.



Total production, employment and unemployment

Not only is total production related to total income, but there is also a relationship between total production, employment and unemployment. An increase in total production implies an increase in employment and a decrease in unemployment.

In this goods market model, the demand for goods determines not only the level of output and income, but also the level of employment and unemployment.

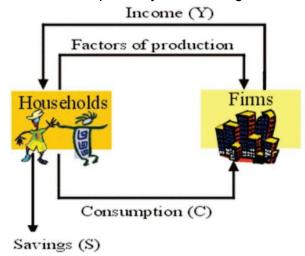
Do activity 2.3 in the workbook.

11

Households also save

But, as you know, households do not spend all their income on consumption. The part that is not consumed is saved.

This can be depicted by the following circular flow:



Households receive an income from selling the services of the factors of production to firms that use these factors of production to produce goods and services. Households use this income to buy the goods and services that are produced, but do not spend all their income on consumption. The part that they do not consume is saved.

Marginal propensity to save (s)

While the marginal propensity to consume (c) indicates the proportion of a change in income that households will spend, the marginal propensity to save (s) indicates the proportion of a change in income that will be saved. These two concepts are related since what is not spent by households is saved. In other words, if the marginal propensity to consume is c then the marginal propensity to save is s = 1 - c.

∠ Do activity 2.4 in the workbook.

Households' behavioural equation

Section outcomes

Once you have worked through this section, you should be able to

- describe the households' behavioural equation
- define disposable income
- describe the impact of income taxes on consumption spending
- define induced consumption
- describe the impact of the marginal propensity to consume on consumption spending
- define autonomous consumption
- identify the factors that influence autonomous spending
- describe the impact of autonomous consumption on consumption spending
- show the relationship between the consumption function and savings function

Income (Y)

Taxes (T)

Factors of production

Disposable

Households

Savings (S)

income (YD)

Description of consumption function

The behaviour of households is captured by the following behavioural equation called the consumption function:

$$C = c_o + cY_D$$

This equation states that consumption spending C is equal to autonomous consumption co plus a proportion of disposable income cYn

Let's start with the concept disposable income Y_D.

Consumption (C) Disposable income (Y_D), taxes and consumption

A distinction is made between **income** (Y) and **disposable income** (Y_D).

The reality for households that earn an income - which they get from taking part in the production of goods and services – is that before they can spend, they must first pay their taxes (T).

Consumption spending by households therefore depends on their disposable income, which is the income they receive from the production of goods and services minus the income taxes they pay to government.

In symbols it is written as:

$$Y_D = Y - T$$

If the income they receive from taking part in production is R100 million and taxes are R20 million, the disposable income of households is R80 million.

$$Y_D = Y - T$$

R80m = R100m - R20m

Taxes reduce disposable income available to households and, as disposable income declines, so too does consumption spending decline in the economy.

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

The opposite is also true. If taxes decrease, disposable income increases and so does consumption spending by households.

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

It is not only taxes that influence disposable income. A change in the level of output and income (Y) will also change it. An increase in production also increases disposable income since income is derived from production. The higher the level of production, the higher the income received by households and the higher their disposable income and consumption.

$$Y \uparrow \Rightarrow Y_D \uparrow \Rightarrow C \uparrow$$

Do activity 2.5 in the workbook. Ø

The impact of the marginal propensity to consume (c)

Households do not spend the whole amount of any increase in their disposable income but rather an amount equal to the marginal propensity to consume (c), times their disposable income (Y_D).

The cY_D part of the consumption function is also known as **induced consumption** since it is caused by or results from a change in income.

In our example of a disposable income of R80 million, households will spend less than R80 million on consumption spending. How much they spend will depend on the value of the marginal propensity to consume (c). The value of the marginal propensity to consume is between 0 and 1.

Assuming a marginal propensity to consume of 0.8 their consumption spending will be 0.8 (R80 million) = R64 million.

A change in the marginal propensity to consume will change the proportion of income that is spend on consumption. For instance, if the marginal propensity to consume increases to 0.9 in the above example households will spend $0.9 \times (R80 \text{ million}) = R72 \text{ million}$.

Do activity 2.6 in the workbook.

Impact of taxes on induced consumption

What do you think would happen with induced consumption if the government were to decide to lower taxes by R10 million in the above example?

This would increase disposable income to R90 million and, as disposable income increased, induced consumption spending would also increase.

By how much would households increase their induced consumption spending?

By an amount of R10 million, or of less than R10 million? This would depend on the households' marginal propensity to consume. If the marginal propensity to consume is 0.8, the households would increase their consumer spending by 0.8 x R10 million = R8 million. Lower taxes increase consumer spending but the increase is less than one to one.

Remember the above as it will play a crucial role in our model.

Autonomous consumption (c₀) and consumption spending (C)

There is also a part of consumption spending that is not influenced by the level of disposable income. This is known as autonomous consumption, and it is represented by c_0 in the equation.

This reflects the influence of the non-income determinants of consumption spending. **Non-income determinants** are all the factors – other than the level of income – that influence consumer spending, such as interest rates, expectations, wealth, income distribution, access to credit, health, and so on.

Autonomous consumption can also be regarded as consumption that is financed from sources other than income, say, inheritances, past savings, gifts or credit.

What happens to consumption spending if autonomous consumption, due to a rise in consumer confidence, increases? This will have the effect of increasing consumption spending.

$$c_0 \uparrow \Rightarrow C \uparrow$$

∠ Do activity 2.8 in the workbook.

Consumption function and savings function

The relationship between consumption spending (C) and savings (S) is an important relationship in our model. Consumption spending and savings are both a positive function of the level of output and income. The higher the level of output and income in the economy, the higher are consumption spending and savings too.

While the consumption function is $C = c_0 + cY_D$ the savings function is $S = -c_0 + (1-c)Y_D$. The (1-c) is the marginal propensity to save (s).

Between the marginal propensity to consume (c) and the marginal propensity to save (s) a negative relationship exists. The higher the marginal propensity to consume, the lower the marginal propensity to save. In other words, as households consume a larger proportion of their income they save a smaller proportion.

Do activity 2.9 in the workbook.

Consumption function as a diagram

Section outcomes

Once you have worked through this section, you should be able to

- present consumption function as a diagram
- indicate what happens to the consumption curve if the marginal propensity to consume changes
- indicate that happens to the consumption curve if autonomous consumption changes
- distinguish between a movement and shift of the consumption curve
- identify exogenous and endogenous consumption variables

The consumption diagram

With the consumption function $C = c_o + cY_D$ behind us we can now draw the consumption curve:

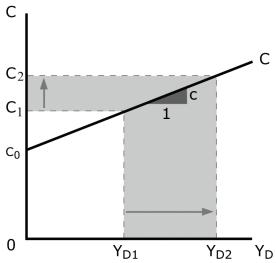


Diagram 2.1: Consumption function

- Consumption spending (C) is measured on the vertical axis and disposable income (Y_D) on the horizontal axis.
- Autonomous consumption (c₀) is indicated by the vertical intercept of our consumption curve.
- The consumption curve is upward sloping indicating that, as disposable income increases from Y_{D1} to Y_{D2}, consumption spending increases as well from C₁ to C₂. The slope of the consumption curve is determined by the marginal propensity to consume (c) and it determines how much consumption spending increases for a change in income.

Different textbooks use different notations to describe the same consumption function. For instance, Mohr and Fourie (2008) use the following notation C = C + cY, while Fourie (2002) uses C = a + bY. The only difference is the notation that is used, the rest remains the same.

Mohr and Fourie (2008) also refer to the goods market model as the simple Keynesian model.

Do activity 2.10 in the workbook.

A change in marginal propensity to consume

A change in the marginal propensity to consume changes the slope of the consumption curve.

An increase in the marginal propensity to consume implies that at each level of disposable income households spend a larger proportion of that disposable income on consumption and that the consumption curve is steeper.

A decrease in the marginal propensity to consume, on the other hand, implies that a lower proportion of disposable income is spent on consumption and that the consumption curve is flatter.

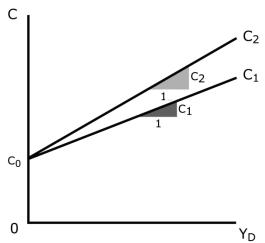


Diagram 2.2: Change in marginal propensity to consume

Note that the vertical intercept – which indicates autonomous consumption (c_0) – is unchanged.

What happens to savings as the marginal propensity to consume changes? Since c + s = 1 and an increase in c decreases s – it follows that as households consume more they save less.

∠ Do activity 2.11 in the workbook.

A change in autonomous consumption

A change in autonomous consumption changes the vertical intercept and the consumption curve shifts. This might be due to a change in consumer confidence.

An increase in autonomous consumption increases the vertical intercept and the consumption curve shifts upwards by an amount equal to the increase in autonomous consumption.

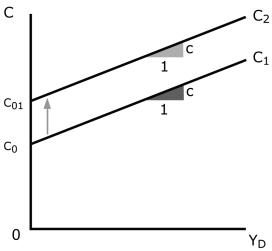


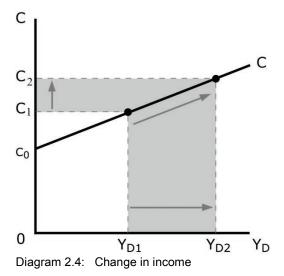
Diagram 2.3: Shift of consumption function

A decrease in autonomous consumption, on the other hand, decreases the vertical intercept and the consumption curve shifts downwards by an amount equal to the decrease in autonomous consumption.

Note that the slope – which indicates the marginal propensity consume – is unchanged.

A shift of and movement along the consumption curve

A shift of the consumption curve takes place if autonomous spending changes – while a movement takes place when disposable income changes.



Note that an increase in disposable income from Y_{D1} to Y_{D2} increases consumption spending from C_1 to C_2 and this is indicated as a movement along the consumption curve. Also note that the change in C is less than the change in Y due to the marginal propensity to consume that is less than 1.

Do activity 2.13 in the workbook.

Exogenous and endogenous variables of the consumption function

Remember that an exogenous (autonomous) variable is independent of the endogenous variable – the variable we are trying to explain – and, while it influences the endogenous variable, it is not influenced by it. In the model that we are developing, the endogenous main variable is the level of output and income (Y).

In terms of the consumption function the variables that are independent from the level of output and income are therefore autonomous and are the following:

Autonomous consumption (c_0) , which is influenced by variables other than output and income. A change in this variable shifts the curve.

Marginal propensity to consume (c) which is our behavioural coefficient. A change in the marginal propensity to consume changes the slope of the consumption function.

Note that an autonomous or exogenous variable influences the endogenous variable, but it is not influenced by the endogenous variable.

The **endogenous variable** in the consumption function is that part of consumption spending which changes if the level of output and income changes. It is represented as a movement along the consumption function.

Do activity 2.14 in the workbook.

From income to consumption to spending (demand) to income

Section outcomes

Once you have worked through this section, you should be able to

describe the relationship between income, consumption and spending

Looking a bit forward, the relationship between output and consumption spending will play an important role in our model.

Output and income determine consumption spending (C) and consumer spending, in turn, is one of the factors that determine the demand for goods (Z) and output and income (Y).

As output rises, consumption rises and this causes the demand for goods to increase which, in turn, increases output and consumption spending. The multiplier – which we will look at shortly – is in operation.

$$Y \longrightarrow C \longrightarrow Z \longrightarrow Y \longrightarrow C$$

You will see later that this relationship plays a significant role in determining the multiplier effect and the equilibrium level of output and income – which is the thing we wish to explain.

∠ Do activity 2.15 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equations and relationships listed in the table that follows.

Concepts	Equations	Relationships
 consumption autonomous consumption induced consumption marginal propensity to consume disposable income behavioural equation 	$C = c_0 + cY_D$ $Y_D = Y - T$	$\begin{matrix} \mathbf{C} \\ \mathbf{Y} \uparrow & \rightarrow \mathbf{C} \uparrow \end{matrix}$ $T \downarrow \Rightarrow Y_D \uparrow \Rightarrow C \uparrow$ Lower taxes increase consumer spending but by less than one to one

INVESTMENT SPENDING (I)

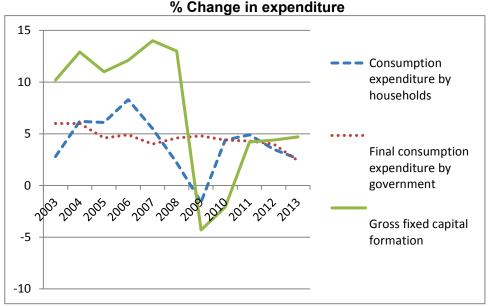
Section outcomes

Once you have worked through this section, you should be able to

- distinguish between real and financial investment
- describe the importance of investment spending for the demand for goods
- explain why investment is so volatile
- explain why investment is an autonomous variable and what influences it
- comment on the relationship between investment spending and savings

The importance of investment

From table 2.1 you will notice that investment spending is 20.48% of total spending and, if you compare changes in it with changes in consumption spending and government spending, it is indeed very volatile.



Source: South African Reserve Bank, Quarterly Bulletin, various issues

Before we proceed with a discussion of investment spending we need to distinguish between real investment and financial investment in order to avoid confusion.

The difference between real investment and financial investment

Investment or **real investment** is spending on additions to the capital stock (machinery, structures, inventories, etc.). Such investment is undertaken in order to make profits in the future. This is an important definition and should not be confused with the definition of financial investment.

Financial investment is investment in shares and other financial instruments. When people put money on deposit with a bank or buy bonds or shares, they are making a financial investment, on which they will earn a return. Financial investment in shares and other financial instruments is obviously crucial in the economy, but does not directly create production capacity.

When an economist refers to investment, he or she usually means real investment. Throughout this module we follow this convention.

Importance of investment

Investment is important for the following two reasons:

Firstly, it **creates production capacity** and therefore makes higher levels of production possible. The more machines, factories and tools we have, the more goods and services we can produce. This is a vital topic and relates to the issue of economic growth, which is beyond the scope of this module but which is dealt with in chapters 10 to 13 in the prescribed book.

For our purpose it is the fact that investment **creates a demand for consumer goods and services** that is important. To follow this argument we need to go back to consumption spending by households.

From the consumption function we have learned that households do not spend all their income on consumption. They save some part of it. This behaviour of households might result in insufficient demand to take up the goods and services produced.

Imagine the following:

The level of total production in the economy is R100 million, which also represents the income households receive. If households spend only 90% of this income, the consumer demand for goods and services will only be R90 million. There is thus a shortfall of R10 million in spending (or demand). Firms will be left with unsold goods and services and start to cut back on their production. As production declines, income starts to decline, followed by a decline in consumption, and ultimately a downward spiral.

According to Keynes (1936) additional spending is needed to make sure that there is a sufficient demand for goods to ensure that the total production of society is taken up. The nature of this additional spending in a closed economy can be in the form of investment spending and government spending.

Investment is one way of providing this additional spending that is needed to take up the production of society. When a capital good such as a machine is produced, factors of production are employed to create this capital good, and since households are the owners of the factors of production, their income increases, which makes higher consumer spending possible in the economy and additional spending is created to take up the "overproduction". The "overproduction" is the R10 million in the above example.

Keynes (1936:27) wrote the following about this issue:

"... to justify any given amount of employment there must be an amount of current investment sufficient to absorb the excess of total output over what the community chooses to consume when employment is at a given level."

✓ Do activity 2.16 in the workbook.

Determinants of investment

Investment usually requires a substantial capital outlay, and a lot of thinking and planning goes into the decision whether or not to invest. A guideline used in this decision-making process is to compare the internal rate of return of the project with the market interest rate. If the internal rate of return is higher than the market interest rate, it would be profitable to undertake the investment. If, however, the internal rate of return is lower than the market interest rate, it would be better not to undertake investment. The calculation of the internal rate of return is complicated by the fact that the income from the sales of the products, produced by the capital goods, lies in an uncertain future. In calculating this internal rate of return, firms have to take this uncertainty into account, together with the initial cost and depreciation of the capital good in question.

Keynes (1936:149-150) aptly explains this as follows:

"If we speak frankly we have to admit that our basis for knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of patent medicine, an Atlantic liner, a building in the City of London, amounts to very little and sometimes to nothing."

It is therefore not surprising that investment is so volatile since we are dealing with a fundamentally uncertain environment.

Investment is an autonomous variable

For now in the goods market we will simply assume that investment is an autonomous variable that is determined by exogenous factors such as:

- interest rates a higher interest rate decreases investment
- expectations improved expectations about the future increase investment
- business confidence higher business confidence increases investment
- regulations a more investment-friendly environment increases investment

This means that the value of investment is not determined by a variable such as the level of output and income (which is an endogenous variable in the model). Later, in learning unit 4, we will change this assumption.

In your prescribed book, the investment function is therefore for now indicated as

 $I = \overline{I}$

and is graphically represented as follows:

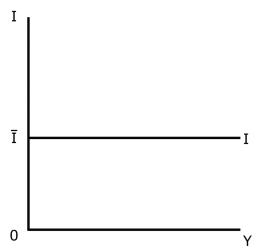


Diagram 2.5: Investment spending

A change in autonomous investment changes the vertical intercept. In the event of an increase in investment the vertical intercept increases and the investment curve shifts upwards. The opposite occurs if autonomous investment declines.

Do activity 2.17 in the workbook.

Investment and savings

An unresolved issue in macroeconomics is the issue of whether savings causes investment or if it is investment which causes savings.

In the list of factors given for the determinants of investment, you might have noticed that savings by households were not listed as one of the determinants. In the Keynesian view of the world, this is an important point. While it is true that in order for investment to occur, savings are needed and that, in equilibrium, savings equal investment, it does not follow that the decision to save and the decision to invest are two sides of the same coin. In other words, an increase in savings does not automatically lead to an increase in investment. However, in this goods market model, an increase in investment does lead to an increase in savings.

The argument is that the decision to save is taken by households on the basis of their income, and the decision to invest by firms on the basis of the factors listed above – and there is no mechanism present in this model to ensure that these decisions correspond to each other. It is quite possible that households might decide to save more, while at the same time, firms decide to invest less. This combined effect might have disastrous consequences for the level of output in the economy.

In the Keynesian world it is investment that creates savings.

Briefly, the argument is as follows: An increase in investment causes an increase in the demand for goods and consequently output and income increases. As income increases, savings increase since savings are a positive function of income.

The statement "do not worry about savings since investment will create its own savings" is sometimes made in this regard. We will return later to this important topic once we have finished building our model.

∠ Do activity 2.18 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the following concepts and relationship:

Concepts	Relationship
 investment real investment financial investment endogenous variable exogenous variable 	I = Ī

GOVERNMENT SPENDING (G) AND TAXATION (T)

Section outcomes

Once you have worked through this section, you should be able to

- describe the importance of government spending and taxes for the demand for goods
- explain why government spending and taxes are exogenous (autonomous) variables
- define fiscal policy
- distinguish between a budget deficit and a budget surplus
- distinguish between an expansionary fiscal policy and a contractionary fiscal policy
- distinguish between the impact of an expansionary fiscal policy and a contractionary fiscal policy on the budget deficit or budget surplus

Importance of government spending and taxation

The importance of the government is that it influences the demand for goods through government spending, taxes and transfer payments and thereby the level of output and income. Looking at table 2.1 government spending represented 21.28% of the expenditure on GDP in 2013. Government spending can provide the additional spending that is required by directly influencing the demand for goods while taxes can influence the demand for goods indirectly via the consumption function by changing disposable income.

Government spending and taxes are exogenous variables

Both government spending and taxes are regarded as exogenous variables in the model.

See section 3.2 in the prescribed book for the reasons why government spending is regarded as exogenous (or autonomous). The use of taxes as an exogenous (or autonomous) variable is more controversial. Tax revenue is indeed a function of the level of output and income in the real world, and in many models it is treated as an endogenous variable. In other words, as income changes, so too does tax revenue. For the sake of simplicity, and given the fact that the results are more or less the same, little is lost by treating it as an autonomous (or exogenous) variable.

Fiscal policy

Fiscal policy is the government's policy on the level and composition of government spending, taxes and borrowing. The main instrument of fiscal policy is the budget and the two policy variables are government spending and taxes. Government spending and taxation are therefore the two policy instruments of fiscal policy that can be used to influence the level of aggregate demand, output and income in the economy. In South Africa, the budget is presented to Parliament annually by the Minister of Finance, usually in February.

The budget is the annual announcement of the government's fiscal policy changes. In the budget, the Minister outlines the tax changes as well as the planned spending for the financial year. The budget is essentially a reflection of political decisions about how much to spend, what to spend it on and how to finance the spending.

A **budget deficit** exists when the government's total expenditure, consisting of purchases of goods and services (G) exceeds its revenue, consisting of taxes (T).

Budget deficit = G > T

A **budget surplus** exists when government's revenue, consisting of taxes (T), exceeds its total expenditure, consisting of purchases of goods and services (G).

Budget surplus = G < T

Remember that T stands for taxes minus government transfers.

An **expansionary policy** is used to stimulate economic activity by increasing the demand for goods (aggregate demand). An **expansionary fiscal policy** means that government spending has to be increased and/or taxes have to be decreased. This will have the impact that the budget deficit will increase or the budget surplus will decrease.

A **contractionary policy** is used to "cool down" economic activity by decreasing the demand for goods (aggregate demand). A **contractionary fiscal policy** means that government spending has to be reduced and/or taxes have to be increased. This will have the impact that the budget deficit will decrease or the budget surplus will increase.

Do activity 2.19 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the following concepts and relationships:

Concepts	Relationships
 government spending taxes fiscal policy expansionary fiscal policy contractionary fiscal policy budget budget deficit budget surplus 	G = G T = T

2.2 THE DETERMINATION OF EQUILIBRIUM OUTPUT

Study section 3.3 in the prescribed book

This section contains the core material of this learning unit and it is essential that you are able to follow the arguments in this section of the learning unit and the prescribed book.

This section relates to the outcome that you should be able to explain in words and by means of events chains, equations and diagrams, how the demand for goods determines the equilibrium level of output (production) and income in the goods market.

Equilibrium condition in the goods market

Section outcomes

Once you have worked through this section, you should be able to

- describe the demand equation
- describe equilibrium
- describe the equilibrium condition in the goods market
- calculate the equilibrium level of output and income
- identify the factors that cause a change in the equilibrium level of output and income
- describe the role of inventories to ensure equilibrium in the goods market

Demand equation

We are in the process of developing an economic model that explains how the demand for goods determines the level of output and income.

$$Z \rightarrow Y$$

In the previous section on the demand for goods, we identified that the demand for goods consists of consumer spending (C) plus investment spending (\bar{I}) and government spending (G).

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

We then described these components in terms of functions and identified the variables that will influence these components. These variables that we identified are also the variables that will influence the demand for goods and hence the level of output and income.

The functions that we identified are as follows:

 $C = c_0 + c(Y-T) - consumption function$

 $I = \bar{I} - investment function$

G = G - government function

Substituting these into the demand function $C + \overline{I} + G$, it follows that:

$$Z = c_0 + c(Y-T) + \bar{I} + G$$

which can be further broken down as:

$$Z = c_0 + cY - cT + \overline{I} + G$$

All we did with the above was to uncouple c(Y-T) as cY - cT.

We can further divide this equation into autonomous spending components, which consist of those variables that are independent of the level of output and income, and an induced component, that is dependent on the level of output and income. If we rearrange the equation in order to group the autonomous and induced components, the equation can be written as follows:

Induced spending
$$Y = (c_0 + \overline{I} + G - cT) + \overline{cY}$$
Autonomous spending

This is then the demand equation that we will be using to explain how demand determines the equilibrium output and income. We will use the notation z_0 to indicate autonomous spending $(c_0 + \bar{l} + G - cT)$

Do activity 2.20 in the workbook.

Equilibrium condition in the goods market

An important element of our model is the concept of equilibrium in the goods market. Equilibrium can be described as a situation in which all forces of change are neutralised or balanced – that is, a situation that will be maintained in the absence of new forces (or changes in existing forces). In this goods market model we will demonstrate that there are different equilibrium positions, depending on the demand for goods, and that these equilibrium positions need not necessarily be at the level of full employment.

The importance of this goods market model is that it shows that the economy can be at an equilibrium position that is not necessarily the level of full employment, and that there are no automatic forces that ensure that full employment is reached.

In our goods market model, equilibrium occurs when the level of output and income (Y) is equal to the demand for goods (Z). The equilibrium condition can therefore be written as:

Y = Z: equilibrium condition in the goods market

Given that we now know that the demand for goods is $Z = c_0 + \overline{l} + G - cT + cY$ and that Y = Z we can write the equilibrium condition as:

$$Y = c_0 + \overline{I} + G - cT + cY$$

Looking at the above you will notice that Y is on both sides of the equation. Since we wish to solve for Y, we will rearrange it as follows so as to have both instances of Y on the same side:

$$Y - cY = c_0 + \overline{I} + G - cT$$

We then rewrite the left side as:

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

To get rid of the (1-c) we divide both sides by (1-c) and end up with the following:

$$Y = \frac{1}{1-c} (c_0 + \bar{l} + G - cT)$$

We can now solve for Y.

What this equation tells us is that the equilibrium level of output and income is a multiple (1/1-c) of autonomous spending ($c_0 + \bar{l} + G - cT$). The 1/1-c part, as we will explain shortly, is the famous and controversial Keynesian multiplier.

✗ Do activity 2.21 in the workbook.

Calculating the equilibrium level of output and income

If you have the values for the different variables on the right-hand side of the equation, you can calculate the equilibrium level of income.

Using the following values:

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

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

$$Y = \frac{1}{1 - 0.8} (500 + 300 + 400 - 0.8 [300])$$
$$= \frac{1}{1 - 0.8} (960) = \frac{1}{0.2} (960) = 5 \times 960 = 4800$$

In the goods market model, the equilibrium level of output and income is determined by the following two forces:

- autonomous spending: (c₀ + Ī + G cT)
- the marginal propensity to consume: c

If you wish to calculate the equilibrium level of output and income, you need the value for autonomous spending and the value for the marginal propensity to consume. Once you know these values, it is fairly easy to calculate the equilibrium level of output and income.

What will cause changes in the equilibrium level of output and income?

Looking at the equilibrium equation, the equilibrium level of output and income will change if the marginal propensity to consume (c) or any of the autonomous factors change. The way in which changes in the marginal propensity to consume and autonomous spending influence the equilibrium level of output and income is the topic we will address shortly.

B Do activity 2.22 in the workbook.

What are the forces present in the model to ensure equilibrium?

Since our model makes use of equilibrium we also need to understand what forces in the model ensure that equilibrium is reached. In this model it is through changes in inventories that the message whether to produce more or less is transmitted to producers. In this goods market model, price is assumed to be fixed, which means that it is not regarded as an important variable in explaining the level of output and income.

In the event of an increase in the demand for goods, firms will experience a decline in their inventories, prompting them to increase their production. A decrease in the demand for goods, on the other hand, will cause an increase in inventories, thus prompting producers to cut back on their production.

Adjustment to equilibrium

Whenever the demand for goods exceeds the level of output and income, there is an excess demand for goods, and producers (firms) will become aware of it through a decline in their inventories.

They will then 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 consumption spending. This process continues until equilibrium is reached.

In terms of a chain of events, the above adjustment process can be represented as follows:

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

If the demand for goods is smaller than the level of output and income, there is an excess supply of goods and services, and firms will notice this through an increase in their inventories. They will then respond to this excess supply by reducing their production. As firms reduce their production, they employ fewer factors of production and the income of households' declines, causing them to decrease their consumer spending. This process will continue until equilibrium is reached.

In terms of a chain of events, the above adjustment process can be represented as follows:

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

Keep the following in mind: While the above adjustment process ensures that equilibrium is reached in the goods market it does not necessarily ensure that full-employment is reached.

∠ Do activity 2.23 in the workbook.

Equilibrium in the goods market as a diagram

Section outcomes

Once you have worked through this section, you should be able to

- the equilibrium condition as a diagram
- represent the demand equation as a diagram
- show how the demand for goods determine the equilibrium output and income on a diagram
- calculate the equilibrium level of income
- identify positions of an excess demand and excess supply
- indicate on a diagram the adjustment to equilibrium in the event of an excess demand and excess supply

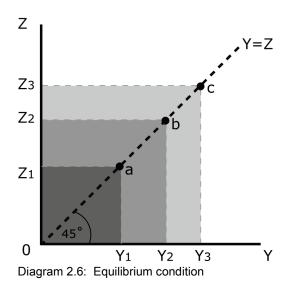
Equilibrium condition

Given our equilibrium equation we can now represent the equilibrium condition graphically.

Our equilibrium condition states that Y = Z.

With the level of output and income Y on the horizontal axis and the demand for goods Z on the vertical axis, the 45° line indicates possible equilibrium positions.

Points such as a, b and c indicate possible points where Y = Z. In our model it is the demand for goods that will determine at what point equilibrium occurs.



The demand equation as a curve

By adding our demand equation as:

 $Z = c_0 + \bar{l} + G - cT + cY$ to the above diagram the equilibrium level of output and income can be established.

Our demand equation can be represented graphically as a curve (ZZ) as follows:

The autonomous spending components ($c_0 + \bar{l} + G - cT$) are represented as the vertical intercept as z_0 .

The curve is upward sloping because an increase in Y increases Z as indicated by cY. The slope is less than one since the marginal propensity to consume is smaller than one, implying that while an increase in Y increases Z, the increase in Z is smaller than the increase in Y.

This reflects the behaviour of households to increase their consumption spending as income increases, but not by the full amount of the increase in income.

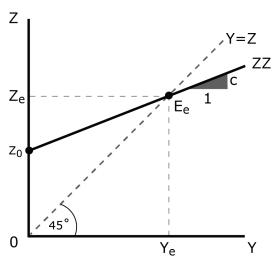


Diagram 2.7: Equilibrium in the goods market

Given the demand for goods function (ZZ) equilibrium is established at point E_e where the level of output and income (Y) is equal to the demand for goods (Z). At this equilibrium E_e a position of rest is reached.

At this equilibrium position households consume goods and services in accordance with their income and autonomous consumption and will not change their consumer spending unless their income changes – or one or more of the factors that determine their autonomous consumption change.

Firms make and implement their investment decisions and have no intention of changing their behaviour unless one or more of the factors that determine their investment behaviour change, while the government has made and implemented its spending and taxation plans.

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

■ Do activity 2.25 in the workbook.

Adjustment to equilibrium

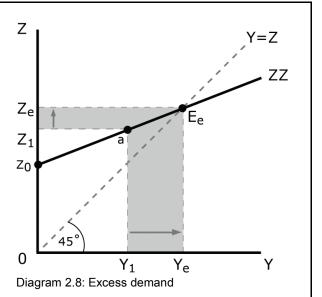
At points to the left of the equilibrium condition an **excess demand** exists.

At a point such as a, the demand for goods Z_1 exceeds the level of output and income Y_1 . Remember it is at point a on the 45^0 line that Y = Z.

Producers will increase their production and, on the horizontal axis, Y will move closer to $Y_{\rm e}$. As Y increases, Z increases on the vertical axis and a movement closer to $Z_{\rm e}$ occurs. This process continues until equilibrium is reached at $Y_{\rm e}$.

Excess demand:

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



At points to the right of the equilibrium position an **excess supply** exists.

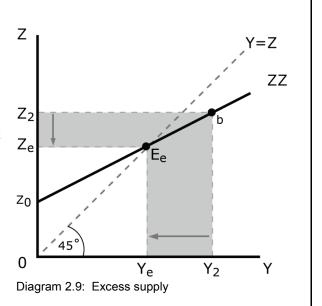
At a point such as b, the demand for goods Z_2 is less than the level of output and income Y_2 .

Producers will cut back on their production and, on the horizontal axis, a movement closer to Y_{e} will occur.

As the level of production declines, the demand for goods Z also declines, and on the vertical axis, a movement closer to $Z_{\rm e}$ occurs. This process continues until equilibrium is reached at $Y_{\rm e}$.

Excess supply:

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



Do activity 2.26 in the workbook.

2.3 CHANGES IN THE EQUILIBRIUM LEVEL OF OUTPUT AND INCOME

With the determination of the equilibrium level of output and income behind us it is time to explain what causes a change in the equilibrium level of output and income.

You might recall that we indicated in learning unit 1 that one of the characteristics of our GDP is that changes in it are not a smooth process and that one of the aims of this module is to explain these short run changes in our GDP. This is what we will attempt now.

Section outcomes

Once you have worked through this section, you should be able to

- use the equilibrium equation to explain the impact of a change in autonomous spending on the equilibrium level of output and income
- describe the multiplier process
- explain the impact of the marginal propensity to consume on the multiplier

We already have a very useful tool in the form of the equilibrium equation for the goods market to provide an explanation for changes is the level of output and income.

Let's look at the equilibrium equation again.

$$Y = \frac{1}{1-c} (c_0 + \bar{l} + G - cT)$$

According to this equation, the equilibrium level of output and income is determined by the marginal propensity to consume (c) and the autonomous spending components ($c_0 + \bar{l} + G - cT$). A change in any of these variables will cause a change in the equilibrium level of output and income and output.

∠ Do activity 2.27 in the workbook.

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

Let's see what happens when there is a change in investment spending, which is one of our autonomous variables.

There can be number of factors that will bring about a change in investment. These factors range from the interest rate to expectations to the "animal spirit" of the entrepreneurs.

Let's assume that investors' confidence and expectations improve in the economy and that this results in an increase in investment. In terms of our equilibrium equation I will have a higher value and, since it is higher, the equilibrium level of income and output will be higher.

The revolutionary idea behind this equilibrium equation is not that Y will be higher but that the increase in Y will be a multiple of the increase in \overline{I} .

Using values

Using our previous example we can demonstrate this by increasing investment spending from 300 to 310.

Assuming investment is 300:

c = 0.8, $c_0 = 500$, $\bar{l} = 300$, G = 400 and T = 300 the equilibrium level of output and income can be calculated as follows:

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

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

$$= \frac{1}{0.2} (960) = 5 \times 960 = 4800$$

Assuming investment increases to 310:

c = 0.8, $c_0 = 500$, $\bar{l} = 310$, G = 400 and T = 300 the equilibrium level of output and income can be calculated as follows:

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

$$= \frac{1}{1 - 0.8} (970)$$

$$= \frac{1}{0.2} (970) = 5 \times 970 = 4850$$

An increase of 10 in investment spending increases the equilibrium level of income by 50 (from 4 800 to 4 850). For every 1 unit increase in autonomous spending, output and income increase by 5 units. What we are seeing here is the workings of the Keynesian multiplier. The symbol for the multiplier is α and is equal to 1/1-c.

From our equilibrium equation we can therefore conclude that the impact of change in autonomous spending on equilibrium level of output and income is equal to the multiplier times the change in autonomous spending.

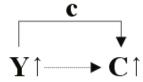
This sounds almost too good to be true and many people (and economists) indeed disagree with this idea. If you go to the following You Tube video clip on the <u>Keynesian multiplier</u> and read through the comments section you will see how heated this discussion can be.

∠ Do activity 2.28 in the workbook.

What lies behind this multiplier concept?

Looking at the equilibrium equation, the explanation lies in the value of the marginal propensity to consume c. It has a value of less than 1 and therefore 1/1-c has a value greater than 1.

The multiplier effect results from the behaviour of households which increase their consumption spending whenever their income increases.



Looking back at the section on consumption spending, we mentioned that a significant relationship to keep in mind when dealing with the goods market is that output and income (Y) determine consumer spending (C) and that consumption spending, in turn, is one of the factors that determines output and income (Y). It is now time to explain exactly what this means.

∠ Do activity 2.29 in the workbook.

Multiplier process

The following explanation is based the assumption that investment increase by 100 and that the marginal propensity to consume is 0.8.

The initial effect of an increase in investment is to increase the demand for goods, as well as production and income, by an amount equal to the increase in investment spending. There is now an increase in the production of capital goods and income of households.

If I increases by 100 then Z increases by 100 and Y increases by 100 ($I^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow}$).

As income increases, households increase their consumption spending. The amount by which they increase their consumption spending depends on the marginal propensity to consume and will be less than the increase in income.

The increase of 100 in Y increases C, but by less than 100. If the marginal propensity to consume is 0.8 the increase in C = 0.8(100) = 80 (Y $\uparrow \Rightarrow$ C \uparrow by cY).

This increase in consumption spending means a further increase in the demand for goods and the level of output and income. There is now an increase in the production of consumer goods. At this stage the increase in the demand for goods and the level of output and income is the increase in investment spending of 100 plus the increase in consumption spending of 80 = 180.

If C increases by 80 there is a further increase of 80 in the demand for goods and output and also income ($C\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$).

The increase in output and income then causes a further increase in consumption spending equal to the marginal propensity to consume times the change in income.

As Y increases by 80, consumption spending increases by $0.8(80) = 64 \ (Y^{\uparrow} \Rightarrow C^{\uparrow})$.

At this stage the increase in the demand for goods is the increase in investment spending of 100 plus the increase in consumption spending of 80 plus the increase in consumption spending of 64 = 244.

And as consumption increases, the demand for goods increases again – as do the levels of output and income. The process continues and the multiplier is in operation.

Will this process continue indefinitely?

The answer is "no" because the increase in income becomes progressively smaller after every round of spending, since households spend only a proportion of their increases in income on consumption.

The end result of this process is that investment increases by 100, consumer spending by households rises by 400 and the demand for goods and income increases by 500. In this case, an increase of 100 in investment spending increases output and income by 500. The multiplier is therefore 5, which indicates that a one-unit increase in autonomous spending increases the equilibrium level of output and income by five units.

∠ Do activity 2.30 in the workbook.

Multiplier and equilibrium equation

Getting back to our equilibrium equation:

$$Y_0 = \frac{1}{1-c}$$
 $(c_0 + \bar{l} + G - cT)$

The $\frac{1}{1-c}$ part represents the multiplier and, if we know the value of c, we can calculate the multiplier. Once we know the value of the multiplier, it is possible to calculate the impact of a change in autonomous spending on the equilibrium level of output and income. This is done by multiplying the value of the multiplier by the change in autonomous spending.

∠ Do activity 2.31 in the workbook.

A change in marginal propensity to consume

The marginal propensity to consume determines the size of the multiplier. A change in the marginal propensity to consume will cause a different value for the multiplier and, consequently, the impact of autonomous spending differs.

The following example illustrates this:

Assuming c = 0.8 and autonomous spending is 800:

The value for the multiplier is 1/1- 0.8 = 5.

The equilibrium level of output and income is:

 $5 \times 800 = 4000$

For every 1 unit change in autonomous spending, the equilibrium income changes by 5 units.

For instance, a change of 100 in autonomous spending increases output and income by 500.

Assuming c = 0.9 and autonomous spending is 800:

The value for the multiplier is 1/1- 0.9 = 10.

The equilibrium level of output and income is:

 $10 \times 800 = 8000$

For every 1 unit change in autonomous spending the equilibrium income changes by 10 units.

For instance, a change of 100 in autonomous spending changes output and income by a 1 000.

Using a diagram to explain the multiplier

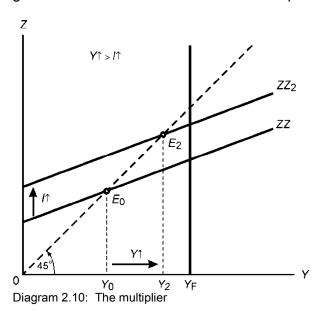
Section outcomes

Once you have worked through this section, you should be able to use diagrams to

- show the impact of a change in autonomous spending on the equilibrium level of output and income
- describe the multiplier
- explain the impact of the marginal propensity to consume on the multiplier

Change in autonomous spending

Investment is part of autonomous spending and a rise in investment increases the demand for goods and shifts the demand for goods curve upwards, equal to the increase in autonomous spending. The vertical intercept is higher, and given the new demand for goods function ZZ_2 , the equilibrium level of output and income increases. The equilibrium level of output and income rises from Y_0 to Y_2 , which is greater than the increase in autonomous spending. The reason for this is the multiplier effect.



35

Do activity 2.32 in the workbook.

The multiplier effect

In the prescribed book, the multiplier effect is also explained graphically using the example of an increase in autonomous consumption (c₀). One could just as well assume that investment spending has increased. Keep the above explanations of the multiplier in mind when you work through the graphical explanation and make sure you can explain the multiplier with the aid of a diagram.

Change in marginal propensity to consume

An increase in the marginal propensity to consume 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.

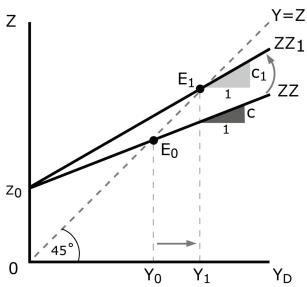


Diagram 2.11: Multiplier and change in marginal propensity to consume

You can see from this diagram that the equilibrium level of output and income increases.

Using the formula for the equilibrium level of output and income, a higher c implies a higher value for the multiplier $\frac{1}{1-c}$, and the equilibrium level of output and income rises.

The larger the marginal propensity to consume the larger is the multiplier and a given increase in autonomous spending will have a greater impact on the equilibrium level of output and income.

On a technical note:

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

See the below example, using the following values:

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

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

$$Y = \frac{1}{1 - 0.8} (500 + 300 + 400 - 0.8 [300]) = \frac{1}{1 - 0.8} (960)$$

then assume the marginal propensity to consume changes to 0.9:

$$Y = \frac{1}{1-0.9} (500 + 300 + 400 - 0.9 [300]) Y = \frac{1}{1-0.9} (930)$$

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

To summarise: a change in the marginal propensity to consume (c) will change the **slope** of the ZZ curve (vertical intercept Z_0 does not change) whilst a change in any of the autonomous spending components ($c_0 + \bar{l} + G - cT$) will **shift** the curve (thus the vertical intercept will move from its initial position of Z_0).

2.4 USING FISCAL POLICY TO INFLUENCE THE EQUILIBRIUM IN THE GOODS MARKET

Section outcomes

Once you have worked through this section, you should be able to

- explain the impact of government spending on the equilibrium level of output and income
- explain the impact of taxes on the equilibrium level of output and income
- explain the impact of an expansionary fiscal policy on the equilibrium level of output and income and the budget of government
- explain the impact of a contractionary fiscal policy on the equilibrium level of output and income and the budget of government

The two policy variables of fiscal policy that we will consider are government spending and taxes.

Government spending

Looking at our equilibrium equation you will see that government spending G is part of autonomous spending.

$$Y = \frac{1}{1-c} (c_0 + \bar{l} + G - cT)$$

A change in government spending changes autonomous spending and, consequently, the demand for goods changes. In addition, via the multiplier effect, the level of output and income changes. The impact of a change in government spending is the same as that for any other change in autonomous spending in that it has a multiplier effect on the equilibrium level of output and income. See the above section on the multiplier if you are not sure what this means. Instead of assuming that investment spending increases, assume that government spending increases.

Do activity 2.35 in the workbook.

Using values

The following example illustrates the impact of a change in government spending on the equilibrium level of output and income.

Assuming government spending of 400:

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

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

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

$$=\frac{1}{1-0.8}$$
 (960) $=\frac{1}{0.2}$ (960) $=5 \times 960 = 4800$

Assuming government spending increases to 450:

$$c = 0.8$$
, $c_0 = 500$, $\bar{I} = 300$, $G = 450$ and $T = 300$

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

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

$$=\frac{1}{1-0.8}$$
 (1010) $=\frac{1}{0.2}$ (1 010) $=5 \times 1010 = 5050$

An increase of 50 in government spending increases the level of output and income by 250 – that is by 50 times the multiplier of 5.

■ Do activity 2.36 in the workbook.

Using a diagram

Representing it as a diagram, it appears as follows:

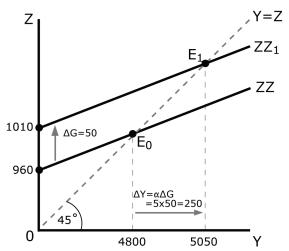


Diagram 2.12: Increase in government spending

Government spending is part of autonomous spending and a rise in government spending increases the demand for goods and shifts the demand for goods curve upwards, equal to the increase in government spending. The vertical intercept is now 1 010. The vertical intercept is higher and, given the new demand for goods function ZZ₁, the equilibrium level of output and income increases from 4 800 to 5 050. The equilibrium level of output and income rises more than the increase in government spending due to the multiplier. In this case the increase in income is 50 times 5 = 250.

The chain of events for an increase in government spending is:

$$G^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow}$$

Do activity 2.37 in the workbook.

Taxes

Looking at our equilibrium equation:

$$Y = \frac{1}{1-c} (c_0 + \bar{l} + G - cT)$$

taxes T is part of autonomous spending.

A change in taxes changes autonomous spending and, consequently, the demand for goods changes. In addition, via the multiplier effect, the level of output and income changes. Note that the change in autonomous spending is cT and not T.

The following example illustrates the impact of change in taxes on the equilibrium level of output and income.

Assuming taxation is 300:

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

the equilibrium level of income can be calculated as follows:

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

= $\frac{1}{1 - 0.8} (960) = \frac{1}{0.2} (960) = 5 \times 960 = 4800$

Assuming taxation declines to 250:

$$c = 0.8$$
, $c_0 = 500$, $\bar{I} = 300$, $G = 400$ and $T = 250$

the equilibrium level of income can be calculated as follows:

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

$$= \frac{1}{1 - 0.8} (960) = \frac{1}{0.2} (960) = 5 \times 960 = 4800$$

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

$$= \frac{1}{1 - 0.8} (1000) = \frac{1}{0.2} (1000) = 5 \times 1000$$

$$= 5000$$

A decrease in taxation of 50 increases the level of output and income by 200 - that is by 0.8 (50) times the multiplier of 5.

Do activity 2.38 in the workbook. Ø

Using a diagram

Representing it as a diagram, it appears as follows:

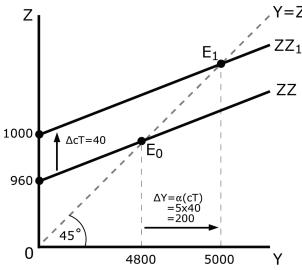


Diagram 2.13: A decrease in taxes

Taxes is part of autonomous spending and a decrease in taxes increases the demand for goods and shifts the demand for goods curve upwards, equal to c(T).

Why by c(T) and not T?

The reason is that initial effect of a change in taxes is on the disposable income of households, while a change in government spending directly influences the demand for goods. As disposable income changes, consumption spending changes, but the change in consumption spending is smaller than the change in disposable income because the marginal propensity to consume is less than one. In other words, a decrease of 50 in taxes will initially increase consumption spending by c(50). In this case, the upward shift of the demand for goods curve is c(50) = 40 and not 50. Consequently, the impact of a change in taxes on output and income is indirect via the consumption function.

The vertical intercept is now 1 000. The vertical intercept is higher, and given the new demand for goods function ZZ_1 , the equilibrium level of output and income increases from 4 800 to 5 000. The equilibrium level of output and income rises more than the decrease in taxation due to the multiplier. In this case the increase in income is 40 times 5 = 200.

The chain of events for a decrease in taxation is as follows:

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

B Do activity 2.39 in the workbook.

Expansionary fiscal policy

An expansionary fiscal policy can be used to increase the demand for goods and the level of output and income. This means that government spending has to be increased and/or taxes have to be decreased. This will have the impact that the budget deficit will increase or the budget surplus will decrease.

The following example illustrates the impact of an increase in government spending and a decrease in taxes on the equilibrium level of output and income.

Assuming government spending is 400 and taxation is 300:

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

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

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

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

$$= \frac{1}{0.2} (960) = 5 \times 960 = 4800$$

Assuming government spending increases to 450 and taxation declines to 250:

$$c = 0.8$$
, $c_0 = 500$, $\bar{I} = 300$, $G = 450$ and $T = 250$

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

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

$$= \frac{1}{1 - 0.8} (1 \ 050) = \frac{1}{0.2} (1 \ 050) = 5 \ x \ 1 \ 050 = 5 \ 250$$

The impact of the expansionary fiscal policy is to increase the level of output and income by 450.

The impact of the budget deficit is as follows:

Before the implementation of an expansionary fiscal policy the budget deficit was:

$$G - T = 400 - 300 = 100$$
.

After the implementation of an expansionary fiscal policy the budget deficit is:

$$G - T = 450 - 250 = 200$$
.

The budget deficit therefore increases by 100.

Graphically, the above can be presented as follows:

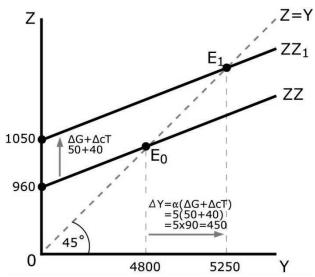


Diagram 2.14: Expansionary fiscal policy

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

Do activity 2.40 in the workbook.

Contractionary fiscal policy

Ø

A contractionary fiscal policy can be used to decrease the demand for goods and the level of output and income. A contractionary fiscal policy means that government spending has to be reduced and/or taxes have to be increased. This will have the impact that the budget deficit will decrease or the budget surplus will increase.

The following example illustrates the impact of a decrease in government spending and an increase in taxation on the equilibrium level of output and income.

Assuming government spending is 400 and taxation is 300:

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

the equilibrium level of income can be calculated as follows:

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

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

$$= \frac{1}{0.2} (960) = 5 \times 960 = 4800$$

Assuming government spending decreases to 350 and taxation increases to 350:

$$c = 0.8$$
, $c_0 = 500$, $\bar{I} = 300$, $G = 350$ and $T = 350$

the equilibrium level of income can be calculated as follows:

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

$$= \frac{1}{1 - 0.8} (870)$$

$$= \frac{1}{0.2} (870) = 5 \times 870 = 4350$$

The impact of the contractionary fiscal policy is to decrease the level of output and income by 450.

The impact of the budget deficit is as follows:

Before the implementation of a contractionary fiscal policy the budget deficit was:

$$G - T = 400 - 300 = 100$$
.

After the implementation of a contractionary fiscal policy the budget deficit is:

$$G - T = 350 - 350 = 0$$
.

The budget deficit therefore decreases by 100 and we have a balanced budget.

Graphically, the above can be presented as follows:

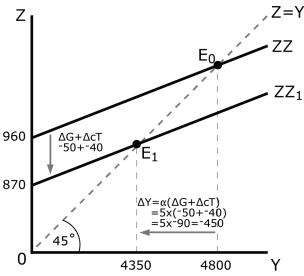


Diagram 2.15: Contractionary fiscal policy

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

∠ Do activity 2.41 in the workbook.

2.5 USING FISCAL POLICY TO REACH FULL EMPLOYMENT

Section outcomes

Once you have worked through this section, you should be able to

- present a goods market diagram with an equilibrium output and income that is less than full employment.
- describe the unemployment gap (full-employment gap)
- explain how government spending can be used to achieve full employment
- explain how taxes can be used to achieve full employment

In our goods market model we have demonstrated that there can be different equilibrium positions depending on the value of the multiplier and autonomous spending.

Keynes (1936:25) further argues that:

"... this level cannot be greater than full employment ... But there is no reason in general for expecting it to be *equal* to full employment."

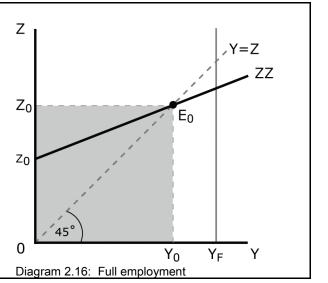
Full employment can be described as a situation in which all available resources (labour, capital, land and entrepreneurship) are used to produce goods and services, and this is one of the macroeconomic objectives. This goal is commonly indicated by the employment of labour resources (measured by the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

Not only is it quite possible for the economy to become stuck in an equilibrium position that is less than full employment, it is also the general case. In terms of our goods market diagram, this is represented as follows:

The equilibrium level of output and income, given the marginal propensity to consume and autonomous spending, is at Y_0 , which is less than the level of full employment (Y_F) .

At this point, the economy is in a state of rest with unemployment, and there are no forces present to ensure that a movement to full employment will occur. The unemployed have no power to effect a change in the model.

The unemployment (or full employment or output and income) gap is the distance between the equilibrium level of output and income Y_0 and full employment Y_F .



Since the economy tends to settle at a point of less than full employment it is important that we figure out how the economy can be moved to full employment.

In the section on the multiplier we have demonstrated that by increasing investment spending in the economy, it is possible to move the economy to a higher equilibrium position. In theory this is easy to achieve – we can just assume that investment spending will increase. In the real world, however, it is much harder to generate the necessary increase in investment spending. For investment spending to increase, it is necessary to change the variables that influence investment behaviour by firms and this may not be easy, at least not in the short run.

When Keynes was writing his book, *The general theory of employment, interest and money,* the world was in the grips of the Great Depression. Production, income, wages and prices were falling, making it impossible for households to increase their consumption spending. Business confidence was at rock bottom and firms were not prepared to increase investment or even consider new investments.

Keynes therefore argued that the increase in autonomous spending needed to come from some other source. And in a closed economy, the only other source is the government through the use of fiscal policy.

During the Great Depression, governments all over the world made extensive use of government spending in the form of public works programmes. Today, people still benefit from these spending programmes. Many of the great city parks of the world such as Central Park in New York and Volendam in Amsterdam, as well as many of the museums, were the result of active public spending programmes during the 1930s.

During the Great Recession, which originated in the financial markets of the USA in 2007, fiscal policy was also used to ensure a sufficient aggregate demand for goods and services and, in this way, helped to stave off an economic depression.

Do activity 2.42 in the workbook.

Ø

Using government spending

The following example demonstrates the algebra of the use of government spending to reach full employment.

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

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

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

Graphically the above example is presented as follows:

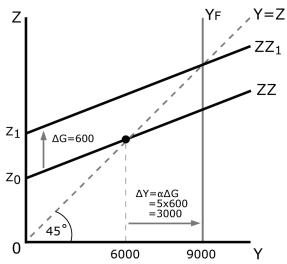


Diagram 4.17: Full employment and government spending

Do activity 2.43 in the workbook.

Using taxation

Ø

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

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

The answer is by more than 600 since taxes impacts the equilibrium level of output and income indirectly via the consumption function.

By how much should taxes then decrease to increase the income and output level by 3 000?

One way to calculate it is as follows:

$$0.8(T) = 600$$

$$T = 600/0.8 = 750$$

The decrease in taxes should be 750 to ensure an increase in output and income of 3 000.

Graphically, the above can be presented as follows:

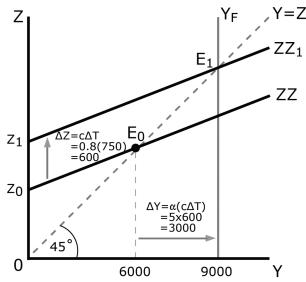


Diagram 4.18: Taxes and full employment

∠ Do activity 2.44 in the workbook.

2.6 BALANCED BUDGET MULTILIER AND THE PARADOX OF SAVINGS

Section outcomes

Once you have worked through this section, you should be able to

- define a balanced budget
- demonstrate why a balanced budget still has an expansionary impact on the level of output and income
- explain the paradox of savings

Interesting results arising from the above model are that a balanced budget will have an expansionary effect on the economy and the issue of the paradox of savings.

Impact of a balanced budget

A balanced budget is one where the change in G is equal to the change in T ($\Delta G = \Delta T$). Let's see why an equal increase in government spending and taxes will have a stimulatory impact on the level of output and income.

The reason for this is that the multiplier effect for an increase in government spending is greater than the backwards multiplier effect for an increase in taxes.

Using a numerical example, the explanation is as follows:

When government increases its spending, say by buying more books for schools to the value of 100, output and income directly increase by 100 and the multiplier starts to operate from this 100. The government has injected 100 directly into the economy.

When government increases taxes by 100 it withdraws 100 from the economy. However, households do not decrease their spending by 100, but only by $c \times 100$. The multiplier starts to operate not from 100 but from $c \times 100$.

The following example illustrates this expansionary effect:

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

$$100 \times 5 = 500$$

An increase of 100 in taxes decreases Y by

$$0.8(100) \times 5 = 400$$

The net effect is an increase of 100 (500 – 400) in output and income.

In other words the balanced budget multiplier is equal to one – that is for every 1 unit increase in government spending, output and income increase by 1 unit.

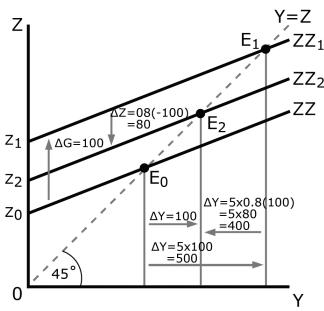


Diagram 2.19: Balanced budget multiplier

In the above diagram the increase in government spending of 100 shifts the ZZ curve upwards to ZZ_1 by 100. Output and income consequently increases by 500 (100 x 5). The increase in taxation of 100 shifts the ZZ_1 curve downwards to ZZ_2 by 80, that is by 0.8 x 100. Consequently the level of output and income decreases by 400 (80 x 5). The net effect is therefore and increase in output and income of 100 (500 – 400) and the balanced budget multiplier is equal to 1.

Note: Compare next page

Alternatively the above can be demonstrated as follows:

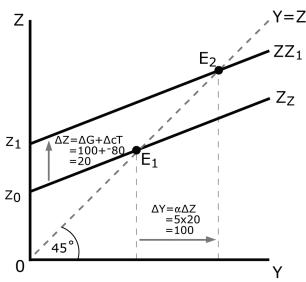


Diagram 2.20: Balanced budget multiplier

In the above diagram the balanced budget multiplier is presented by considering the impact of a increase of a 100 in government spending and an increase of 100 in taxation on the demand for goods. An increase of 100 in government spending increases autonomous spending by a 100 while an increase of 100 in taxation decreases autonomous demand by 80 (0.8 x 100).

The net increase in autonomous demand is therefore 100 - 80 = 20. The net increase in output and income is therefore $20 \times 5 = 100$. This gives us a balanced budget multiplier of 1.

The paradox of savings

The paradox of savings is explained in the box on page 67 of the prescribed book.

The argument is that if households increase their savings the end result is that the level of output will decrease and households will end up with the same amount of savings.

The reason for this is that an increase in savings implies a decrease in consumption spending. As consumption spending decreases the demand for goods also decreases and, consequently, the level of output and income decrease too. In addition, as output and income decrease savings also decrease since savings are a positive function of output and income.

Do activity 2.46 in the workbook.

2.7 UNEMPLOYMENT AND THE LIMITATIONS OF DEMAND POLICIES

Study section 3.5 of the prescribed book

Section outcomes

Once you have worked through this section, you should be able to

identify and explain the limitations of demand policies to solve unemployment

From our theoretical model of the goods market, the solution to unemployment seems to be fairly straightforward. Pump up the demand for goods through increases in autonomous spending until full employment is reached. According to our goods market model, these autonomous variables are autonomous consumption, autonomous investment, government spending and taxes.

Before you start sending e-mails and faxes to the Minister of Finance advising him to use an increase in government spending and a decrease in taxes to solve the unemployment problem in South Africa, there are a number of constraints that need to be taken into account.

Structural unemployment requires a different remedy

Whether the demand for goods can be used to solve the unemployment problem depends on the type of unemployment being experienced. If unemployment is caused mainly by a deficiency in the demand for goods, an increase in the demand for goods may be used to address it. However, a large part of the unemployment experienced in South Africa is of a structural nature.

Structural unemployment occurs when there is a mismatch between workers' qualifications and job requirements, or when jobs disappear because of structural changes in the economy.

Structural unemployment is usually confined to certain industries, sectors or categories of workers and is caused by factors such as a lack of education, training and skills, changes in production methods and techniques, changing consumer preferences, foreign competition, structural decline in certain industries, and discrimination.

It would take more than an increase in the demand for goods to solve structural unemployment. 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.

A lack of an appropriately trained, qualified and skilled workforce also places a constraint on the ability of an economy to create jobs. The economy becomes supply constrained and demand policy alone is not enough.

Jobless growth

A related issue is 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. If an increase in output is accompanied by an increase in capital-intensive production methods where relatively more capital and less labour are used, then there will be little or no increase in job opportunities.

Wage increases might upset the chart

Even if unemployment is caused by a deficiency in the demand for goods, 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 in turn 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. The vital topic of the functioning of the labour market and the reaction of prices to a change in the demand for goods is dealt with in learning units 8 and 9.

A budget deficit constraint

Then there is the thorny issue of the budget deficit. Conventional wisdom today requires that a limit be placed on the budget deficit, 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 the medium-term expenditure framework, of which one of the goals is to reduce the budget deficit and the ratio of taxes to GDP, there is little scope for using government spending and taxes to pump up the demand for goods.

Crowding out might occur

Increased government spending also impacts on the financial market, where the interest rate is determined and, in certain circumstances, crowding out might occur. "Crowding out" is the term used to describe the situation in which the rise in interest rates owing to increased government spending reduces investment spending by the private sector. The financial market is discussed in learning unit 3 and crowding out surfaces in learning units 4 and 9.

The balance of payments might act as a constraint

In an open economy, that is, an economy that has significant trading and financial relationships with other economies, things become even more complicated. 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 in turn might lead to balance of payment problems. There is also the linkage between the interest rate and capital flows which impact on the exchange rate. This topic is dealt with in learning units 5 to 7.

The Financial Market

3

We are still in the process of developing a macroeconomic model that can be used to explain changes in the real GDP and how fiscal and monetary policy can be used to influence and stabilise the real GDP.

In learning unit 2 we built the goods market model and showed how the demand for goods determines the level of output and income in the economy. In this learning unit we build a model of the financial market that we will use later, in learning unit 04, to show how the interaction between the goods market and the financial market determines the level of output and income.

The economic crisis of 2007 reminded us again that events in the financial market have a major impact on events in the goods market and that the determination of the level of output and income cannot be studied without taking financial market events into account.

Economics in action

Please read through the following extract from the The Economist:

BEFORE the financial crisis life was simple for central bankers. They had a clear mission: temper booms and busts to maintain low and stable inflation. And they had a seemingly effective means to achieve that: nudge a key short-term interest rate up to discourage borrowing (and thus check inflation), or down to foster looser credit (and thus spur growth and employment). Deft use of this technique had kept the world humming along so smoothly in the decades before the crash that economists had declared a "Great Moderation" in the economic cycle. As it turned out, however, the moderation was transitory—and the crash that ended it undermined not only the central bankers' record but also the method they relied on to prop up growth. Monetary policy has been in a state of upheaval ever since.

The recession that accompanied the credit crunch in the autumn of 2008 delivered a massive blow to demand. In response central banks in the rich world slashed their benchmark interest rates. By early 2009 many were close to zero, approaching what economists call the "zero lower bound". Even so, growth remained elusive. Pushing rates below zero, though technically possible, would not have helped. Negative rates would merely have encouraged depositors to withdraw their money from banks and hold it as cash, on which the rate of return, at zero, would have been higher. Central banks in the developed economies faced a frightening collapse in output and soaring unemployment without recourse to the tool that had been the mainstay of monetary policy-making for a generation.

The Economist. 2013. Monetary policy after the crash: Controlling interest. [web log]. April 2013, from http://www.economist.com/news/schools-brief/21586527-third-our-series-articles-financial-crisis-looks-unconventional

Study instruction

Read

The introductory part of chapter 4 in the prescribed book to orient yourself.

Study

Prescribed book: chapter 4
Subsections: 4.1 and 4.2
Study guide: learning unit 3

Learning unit outcomes

In this learning unit we will show how the interest rate is determined, what the role of monetary policy is in determining the interest rate and what happens if interest rates reaches zero.

Once you have worked through this learning unit, you should be able to

- explain, in words and by means of a chain of events, equations and diagrams, how the interest rate
 is determined
- explain, in words and by means of a chain of events, equations and diagrams, what causes a change in the interest rate
- explain in words and by means of a chain of events, equations and diagrams, the impact of monetary policy on the interest rate
- briefly describe monetary policy in South Africa

To achieve these objectives we will proceed as follows:

First, we first consider the portfolio decisions of financial market participants – we simplify things here by assuming that, in our model, financial market participants have to decide between keeping bonds or money only.

We then look at the demand for money. In doing so, we identify the variables that have an impact on the demand for money, construct a demand for money function, and present it as a diagram.

After we have constructed the demand for money function, we go on to construct the supply of money function.

With the demand for money and the supply of money functions as background, we then build a model to show how the demand for money and the supply of money together determine the interest rate – and what causes a change in the interest rate.

With our financial market model in place, we then analyse the impact of monetary policy on the interest rate and consider what happens in the case of a liquidity trap.

We conclude this unit by giving a brief overview of the conduct of monetary policy in South Africa.

Contents

3.1 PORTFOLIO DECISONS

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following

- the difference between income, wealth and money
- the portfolio decisions of financial market participants

The difference between income, wealth and money

The first thing you need to understand is that the demand for money refers to the need by economic participants to keep money and have it available. This is referred to as their liquidity preference. It is also important to distinguish between the concepts "income", "money" and "wealth".

Work through the focus box, "Semantic traps: money, income and wealth", in the prescribed book. Make sure you know why it is possible for a person to be wealthy without having an income or money.

Portfolio decisions

A fundamental aspect of our financial market model is the portfolio decisions of financial market participants. A portfolio decision refers to the choice by a financial market participant as to how much of various assets to hold.

There are many different kinds of assets in which financial wealth can be held. Examples are shares, bonds (of which there are large variety such as treasury bills), real assets (e.g. houses, paintings, residential property and gold coins), foreign exchange as well as money. A decision to hold more of one asset – for instance, treasury bills – and less of another asset is a portfolio decision. A portfolio decision also includes the decision to hold more money or less money.

In this financial market model we will simplify things by assuming that there are only two assets available in which wealth can be held, namely money and bonds. We will further simplify things by assuming that the only financial asset available on the bonds market is treasury bills. So you have a choice of keeping your wealth either in bonds (treasury bills), or in money, or in a combination of both.

Treasury bills, also called TBs, are short-term financial market instruments issued by government when it borrows from the public in order to finance its spending. This instrument is fully secured and guaranteed by the government. In South Africa, the South African Reserve Bank (SARB) acts as an issuing agent of treasury bills on behalf of the government.

Since we have only two assets, namely money and bonds, the market for money and the market for bonds are mirror images of each other. An increase in the demand for money implies a decrease in the demand for bonds. If a market participant wishes to hold more money, this also implies that he or she wishes to hold fewer bonds and vice versa.

A portfolio equilibrium exists when market participants have made their decisions – based on the current and expected market conditions – as to how much money and how many bonds to hold and will change their behaviour only if there is a change in one or more of the variables that determine how much money and how many bonds they wish to hold.

But what then are the variables that determine a financial market participant's demand for money and bonds? To answer this question, we need to take a closer look at what determines the demand for money.

3.2 THE DEMAND FOR MONEY

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- distinguish between the demand for active and passive balances
- describe in words and an events chain the link between output and income and the demand for active balances
- describe in words and an events chain the link between the interest rate and the demand for passive balances
- explain the demand for money equation
- describe with the aid of diagrams the demand for money

In your study of the monetary sector in your first year, you were introduced to the motives for holding money. A vital distinction was made between the demand for active balances and the demand for passive balances. The demand for active balances is influenced by people's need to do transactions, while the demand for passive balances is related to the need to keep wealth in the form of money – in this sense, money is viewed as a financial asset. Sometimes we wish to hold money not because we want to do transactions, but because we have a need to keep our wealth in the most liquid asset there is – money. That is why it is called the liquidity preference theory of money.

Demand for active balances

The demand for active balances is influenced by peoples' need to do transactions and the more transactions there are, the higher the demand for money. The question, then, is on what does the level of transactions depend?

The level of transactions – and therefore the demand for active balances – is determined by the level of output and income in the economy. The higher the level of output and income in the economy, the more transactions there will be. As the level of output increases, the income of households also increases and they will want to do more transactions. They will therefore need more active balances and their demand for money will rise. As producers produce more output they will need more money to finance their transactions as well.

Using the symbol M^d for money, we can therefore, in terms of an events chain, state that:

```
Y \uparrow \Rightarrow active transactions \uparrow \Rightarrow M^{d} \uparrow

Y \downarrow \Rightarrow active transactions \downarrow \Rightarrow M^{d} \downarrow
```

As the level of output and income (Y) rises in the economy the level of transactions increases and the demand for money (M^d) rises – and vice versa.

In the previous unit we learned that the level of output and income is determined in the goods market. With this link between Y and M^d we have now established a link between the goods market, where Y is determined, and the financial market, where the demand for money is one of the variables that determine the interest rate (i). This link between the goods market and the financial market will play a crucial role in the rest of the module. Make a note of this important relationship.

Demand for passive balances

The demand for passive balances, also referred to as the speculative demand for money, is related to the need by financial participants to keep wealth in the form of money – in this sense, money is viewed as a financial asset. Sometimes financial market participants wish to hold money not because they want to do active transactions, but because they have a need to keep their wealth in the most liquid asset there is – money.

In our model, financial market participants have the choice between keeping money and bonds (treasury bills). Keeping money has the benefit that it is the most liquid form in which wealth can be kept. The disadvantage is that it earns no return (interest). Keeping treasury bills, on the other hand, has the benefit that it provides a return, interest, but it is less liquid.

So why hold treasury bills instead of money? The reason is that the opportunity cost of holding money is the interest rate that is given up. The higher this interest rate, the higher the opportunity cost of holding money since keeping money earns no interest.

Based on this opportunity cost of holding money, we can expect that financial participants will be less inclined to hold money the higher the opportunity cost of holding money becomes (that is, the higher the interest rate). A negative relationship therefore exists between the interest rate (i) and the quantity of money demanded (M^d). In other words, an increase in the interest rate reduces the quantity of money demanded and a decrease in the interest rate increases the quantity of money demanded.

In terms of an events chain, this is represented as follows:

```
i ↑ ⇒ passive demand for money ↓ ⇒ M^d↓ i ↓ ⇒ passive demand for money ↑ ⇒ M^d↑
```

There is, however, another important reason why money is held in passive balances and that has to do with the expected change in the price of treasury bills. If financial market participants expect the price of treasury bills to fall in the future they will be more inclined to hold money instead of treasury bills. If, on the other hand, they expect the price to increase in the future they will prefer to hold treasury bills since there is the possibility of a capital gain. This is why the demand for passive balances is also referred to as the speculative demand for money. In the rest of this unit we will, however, ignore this aspect of the demand for money.

∠ Do activity 3.2 in the workbook.

Demand for money as an equation

With the above information we can now represent the demand for money as the following equation:

$$M^d = RYL(i)$$

The above function states that the demand for money is a function of the nominal level of output and income and the interest rate. The RY indicates nominal income in Rands. We will simplify things by just using Y, which in this learning unit implies nominal income in Rands. In the next learning unit we will specify the financial market in real terms in order to build a model that shows how the real level of output and income in the economy is determined by the interaction of the goods market and the financial market.

The positive sign under income Y indicates that a positive relationship exists between the demand for money and the level of output and income. The negative sign under the interest rate i indicates that a negative relationship exists between the quantity of money demanded and the interest rate.

∠ Do activity 3.3 in the workbook.

The demand for money diagram

We have established that the demand for money is a positive function of the level of output and income and a negative function of the interest rate. It is represented by the following equation:

$$M^{d} = YL (i) + -$$

Representing the demand for money as a diagram involves the following:

- The interest rate is indicated on the vertical axis.
- The quantity of money is indicated on the horizontal axis.

The demand for money curve (M^{d1}) in the following diagram is downward sloping to indicate the negative relationship between the interest rate and the quantity of money demanded.

A downward movement along the money demand curve indicates that as the interest declines the quantity of money demanded increases. As the interest rate declines the opportunity cost of holding money declines and financial market participants are inclined to hold more money.

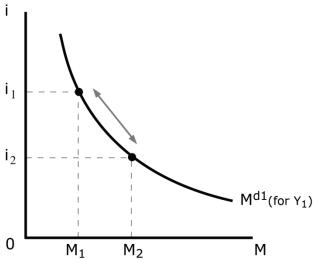


Diagram 3.1: The demand for money

An upward movement along the money demand curve indicates that, as the interest rate increases, the quantity of money demanded decreases. As the interest rate increases, the opportunity cost of holding money also increases and financial market participants are willing to hold less money. Note that this money demand curve is drawn for a given level of output and income (Y₁).

The position of the money demand curve is determined by the positive relationship between the level of output and income and the demand for money.

At an output and income level of Y₁ the money demand curve is M^{d1}, as indicated by the diagram below.

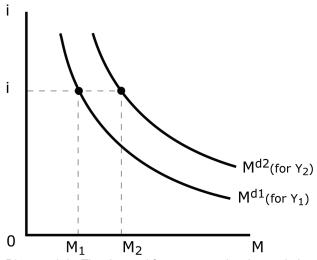


Diagram 3.2: The demand for money and a change in income

As the level of output and income increases from Y_1 to Y_2 , the demand for active balances increases as financial participants wish to do more transactions. At each interest rate the quantity of money demanded is therefore higher and a rightward shift of the money demand curve takes place.

Money demand vs. quantity of money demanded

Note that we make a distinction between a change in money demand and a change in the quantity of money demanded.

The demand for money refers to the quantity of money that will be demanded at each interest rate. It represents all the points on the demand for money curve. In terms of the demand for money curve, a change in income – which is an exogenous variable – changes the whole relationship.

At each interest rate, the quantity of money demanded is different and the money demand curve shifts.

We should refer to this as a change in the demand for money:

 $Y^{\uparrow} \Rightarrow M^{d\uparrow}$ and the M^{d} curve will shift to the right (see diagram 3.2)

The quantity of money demanded refers to one particular point on a demand for money curve corresponding with an interest rate. A change in the interest rate – which is the variable on the vertical axis – changes the quantity of money demanded. It does not, however, change the whole relationship and is represented as a movement along the money demand curve. In this instance, we should refer to it as a change in the quantity of money demanded:

i↑ \Rightarrow \downarrow in the quantity of money demanded (see diagram 3.1)

∠ Do activity 3.4 in the workbook.

3.3 THE MONEY SUPPLY

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain

- an exogenous money supply
- the supply of money equation
- the supply of money diagram

In this section we follow the traditional approach to the supply of money by assuming that it is controlled by the central bank. In South Africa, this is the South African Reserve Bank. This implies that the money supply is an exogenous variable in our model.

This differs from the approach where the money supply is seen as demand-determined. In this case it is the demand for money that determines the money supply and the money supply is an endogenous variable – it adjusts to the demand for money.

Given this exogenously determined money supply, the money supply equation can be written as:

$$M^s = M$$

The equation implies that it is the central bank that determines the money supply. We will later see how it determines the money supply.

Supply of money diagram

Since the supply of money is regarded as exogenous it is presented as a perfectly inelastic curve showing that the interest rate has no impact on the supply of money. A change, for instance, in the interest rate from i_1 to i_2 does not influence the supply of money.

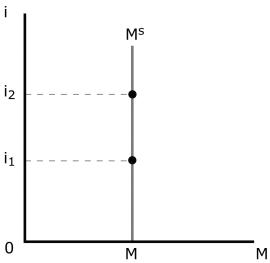


Diagram 3.3: The supply of money

An increase in the supply of money is indicated by a rightward shift of the money supply curve Ms showing that at each interest rate the money supply is higher. A decrease in the money supply is indicated as a leftward shift of the supply of money curve showing that at each interest rate the money supply is lower.

∠ Do activity 3.5 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equation and relationships in the table below.

Concepts	Equation	Relationships
 money bonds treasury bills income financial wealth demand for money quantity of money demanded exogenous money supply 	M ^d = YL(i) + - M ^s = M	$\begin{array}{ccc} Y \downarrow & \Rightarrow & M^d \downarrow \\ Y \uparrow & \Rightarrow & M^d \uparrow \\ i \downarrow & \Rightarrow & M^d \uparrow \\ i \uparrow & \Rightarrow & M^d \downarrow \end{array}$

3.4 EQUILIBRIUM IN THE FINANCIAL MARKET

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain

- equilibrium in the financial market (in words)
- equilibrium in the financial market (with the aid of equations)
- equilibrium in the financial market (with the aid of diagrams)
- equilibrium forces in the financial market
- the impact of a change in income in the financial market (with the aid of diagrams)
- the impact of a change in the money supply in the financial market (with the aid of diagrams)

The equilibrium position in the financial market indicates that portfolio equilibrium exists in the market. Financial market participants are holding the amount of money and bonds they wish to hold, given the level of output and income and the interest rate. Disequilibrium in the market implies that financial market participants are either holding too much money and too few bonds, or too little money and too many bonds, and this will cause them to change their behaviour.

In terms of the demand for and supply of money, equilibrium in the financial market indicates that the quantity of money demanded is equal to the quantity of money supplied. If there is disequilibrium in the market, that is when the quantity of money demanded differs from the quantity of money supplied, the interest rate will change to re-establish equilibrium.

The equilibrium condition in the financial market is therefore written as:

$$M = M^d$$

Substituting M^d with YL(i), it can be written as:

$$M = YL(i)$$

The above is explained in more detail in the following sections.

∠ Do activity 3.6 in the workbook.

Equilibrium in the financial market diagrams

Our equilibrium condition in the financial market is where the quantity of money demanded is equal to the quantity of money supplied and is given as:

$$M = YL(i)$$

Given the demand for money and supply of money, equilibrium in the financial market is established at the point where the demand curve for money intersects with the supply curve of money (that is where the quantity of money demanded is equal to the quantity of money supplied).

In the following diagram this equilibrium position is indicated as point a. At this equilibrium position, there is portfolio equilibrium in the sense that at the equilibrium interest rate of i, people are holding the amount of money and bonds they want and will change their holdings of money and bonds only if the level of output and income and/or the money supply changes.

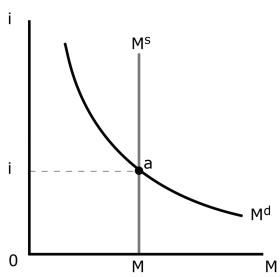


Diagram 3.4: Equilibrium in the financial market

Equilibrium forces in the financial market

In the diagram below at an interest rate of 8%, an excess supply of money of R20 billion exists. Financial market participants are holding more money than they wish to at this interest rate. At an interest rate of 2%, there is an excess demand of money of R40 billion indicating that financial market participants are holding less money than they wish to.

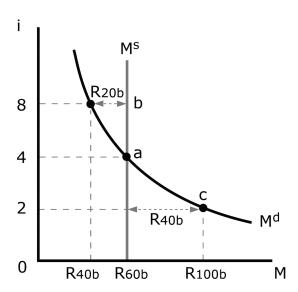


Diagram 3.5: Excess demand and excess supply of money

In the event of an excess supply of money, such as at point b, the interest rate will decline. As the interest rate declines, the quantity of money demanded increases and a downward movement along the money demand curve occurs. This process continues until equilibrium is reached at point a.

In the event of an excess demand for money, such as at point c, the interest rate will increase. As the interest increases the quantity of money demanded decreases and an upward movement along the money demand curve occurs. This process continues until equilibrium is reached at point a.

Do activity 3.7 in the workbook.

The impact of a change in income

An increase in the level of output and income increases the demand for money. The money demand curve shifts from M^{d1} to M^{d2} indicating that, at each interest rate, the demand for money is higher. At the initial interest rate of i_1 an excess demand for money occurs, as represented by the distance between point a and point b. This excess demand for money causes an increase in the interest rate and an upward movement along the money demand curve occurs until a new equilibrium is reached at point c with a higher interest rate i_2 .

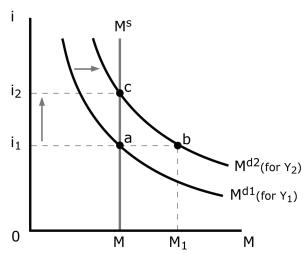


Diagram 3.6: A change in income and the interest rate

Do activity 3.8 in the workbook.

An increase in the money supply

In this financial market a change in the money supply is brought about by the central bank. An increase in the money supply shifts the money supply curve from Ms to Ms1 and the equilibrium interest rate declines.

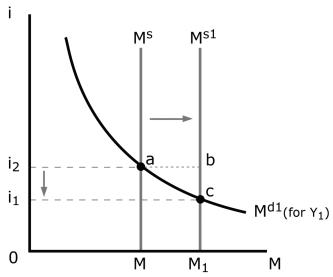


Diagram 3.7: An increase in the supply of money

At the initial interest rate of i_2 an excess supply of money occurs as represented by the distance between point a and point b.

This excess supply of money causes a decrease in the interest rate and a downward movement along the money demand curve occurs until a new equilibrium is reached at point c with a lower interest rate i₁.

∠ Do activity 3.9 in the workbook.

3.5 ADJUSTMENT PROCESS IN THE FINANCIAL MARKET

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following

- the relationship between the price of bonds and the interest rate
- the adjustment in the financial market if the demand for money changes
- the adjustment in the financial market if the supply of money changes

Price of bonds (treasury bills) and the interest rate

To explain the adjustment process in the financial market if the demand for money and/or the supply of money changes we must first understand the relationship between the price of bonds and the interest rate.

In our bonds market, 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" simply means that the holder of a treasury bill with a face or nominal value of R100 000 is entitled to R100 000 on the date of maturity. "Traded at a discount" means they are issued on the primary market (the market on which new treasury bills are issued) or traded on the secondary market (the market in which existing treasury bills are traded) at a discount on their face value. In other words, a treasury bill with a face value of R100 000 will be traded for less than R100 000. By how much less will depend on the conditions in the bond market.

While a treasury bill does not promise to pay interest, the price paid for treasury bills determines its rate of return – which is the interest rate in our model.

The rate of return on treasury bills serves as a benchmark indicator of financial market conditions and acts as a reference rate for the calculation of interest rates on many financial market assets.

To calculate the rate of return (the interest rate) on a treasury bill, you need the following information:

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

For example the life cycle of a one year treasury bill with a face value of R100 000 which was bought in the primary market for R95 000 will be:

Issue date: 1 March 2016 R95 000 **paid** by the bond buyer



Maturity date: 28 February 2017 R100 000 **received** by the bond buyer

Therefore after holding the treasury bill for one year, the buyer will receive R5 000 return in addition to the original R95 000 he invested. Therefore R5 000 is the buyers compensation for investing R95 000 for a year. Using this information we can calculate the rate of return received by the buyer, i.e. the interest rate.

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

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

Where

= interest rate

 RPb_{t+1} = price received at the end of the period (face value of the treasury bill)

RPb_t = price paid for the treasury bill at the beginning of the period.

Assuming that the face value of a treasury bill is R100 000, that the price paid for it is R95 000, and that the date to maturity is one year, you can calculate your rate of return as follows:

$$\frac{R100\ 000-R95\ 000}{R95\ 000} \times \frac{100}{1}$$
$$= 5.26\%$$

Increase in the price paid: What if the price paid for the treasury bill is R98 000? The rate of return will be:

$$\frac{R100\ 000-R98\ 000}{R98\ 000} \times \frac{100}{1}$$
$$= 2.04\%$$

Decrease in the price paid: What if the price paid for the treasury bill is R90 000?

The rate of return will be:

$$\frac{R100\ 000-R90\ 000}{R90\ 000} \times \frac{100}{1}$$
= 11.11%

As the price of treasury bills (bonds) increases, the rate of return (the interest rate) on them decreases.	As the price of treasury bills (bonds) decreases, the rate of return (the interest rate) on them increases.
$P_{B} \uparrow \Rightarrow i \downarrow$	$P_B \downarrow \Rightarrow i \uparrow$

■ Do activity 3.10 in the workbook.

Adjustment process: Change in income and the equilibrium interest rate

In the previous section we indicated that an increase in the level of output and income increases the equilibrium interest rate. With the section on the relationship between the interest rate and the price of treasury bills behind us we can now explain why this is the case.

The reason is as follows: We start from an equilibrium position in the financial market as represented by point a in the diagram below. At this equilibrium position, financial market participants are not only holding money in order to do transactions (active balances), but some people are also holding money as an asset (passive or speculative balances). An increase in income increases the demand for money for transaction purposes. At the existing equilibrium interest rate (i_1) , an excess demand for money develops in the economy because people wish to hold more money for transaction purposes than before.

To acquire this money for transaction purposes, bonds (for example treasury bills) are sold and the supply of treasury bills increases on the market. An increase in the supply of treasury bills reduces the price of treasury bills and increases the interest rate.

At this higher interest rate, there is a decrease in the amount of money demanded because people wish to hold bonds as an asset (movement from point b to point c).

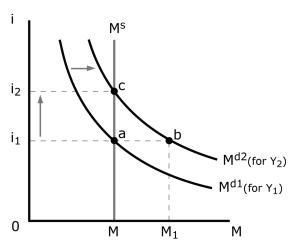


Diagram 3.8: Adjustment to equilibrium

The following numerical example illustrates this:

Assume the money supply is R50 billion as indicated in the following diagram. People are holding this R50 billion in order to do transactions to the value of R35 billion (active balances) and the rest, R15 billion (passive balances), as an asset.

An increase in income from Y_1 to Y_2 increases the demand for transaction purposes to, say, R40 billion (illustrated by an upward shift of the money demand curve from M^{d1} to M^{d2}). In response to this increased demand for money some people will sell some of their bonds (e.g. treasury bills) in order to acquire the extra R5 billion.

As a result the supply of bonds will increase, the price of bonds will decrease and the interest rate will increase. This increase in interest rates will increase the opportunity cost of holding money as a store of value and convince some people who were holding money as an asset to buy bonds instead. In other words, the money supply is fixed at R50 billion so the additional R5 billion for transaction purposes must come from the R15 billion kept as passive balances.

The price of bonds and the interest rate adjust to a level that ensures that the R5 billion needed for transactions is made available to the economy. At this new equilibrium position, the money supply is still R50 billion, but the amount that is held as an asset is now equal to only R10 billion, while the rest, the R40 billion, is kept for transaction purposes.

The composition of active balance and passive balances has changed. An increase in the interest rate is therefore needed to reduce the amount of money that people wish to hold as an asset by making it more attractive to hold bonds.

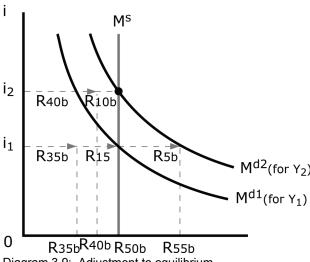


Diagram 3.9: Adjustment to equilibrium

Chain of events

In terms of a chain of events, the impact of an increase in income on the financial market can be represented as follows:

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

On the financial market: An increase in the level of output and income (Y^{\uparrow}) increases the demand for money $(M^{d\uparrow})$ for transaction purposes. On the bonds market, the supply of bonds increases and the price of bonds falls $(P_B\downarrow)$, and the interest rate thus rises $(i\uparrow)$.

Impact in the bond market of a change in the level of output and income

Increase in income

An increase in the level of output and income will increase the demand for money (for transaction purposes). In order to increase their money holdings people will sell some of their bonds. As the supply of bonds increases, the price of bonds will decrease and the interest rate will increase.

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

Decrease in income

A decrease in the level of output and income will decrease the demand for money (for transaction purposes). In order to decrease their money holdings people will buy more bonds. As the demand for bonds increases, the price of bonds will increase and the interest rate will decrease.

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

Do activity 3.11 in the workbook.

Impact of an increase in the supply of money

From the previous sections we have seen that an increase in the supply of money decreases the interest rate. The reasoning for this as follows:

At the equilibrium position point a, the quantity of money demanded equals the quantity of money supplied and there is portfolio equilibrium. In the diagram below an increase the supply of money from M^s to M^{s1} indicates that, at the current interest rate i_2 , the supply of money exceeds the demand for money. The excess supply is equal to the distance between point a and point b.

A portfolio disequilibrium exists since financial market participants are holding more money than they wish at an interest rate of i₂. They will get rid of this money by buying bonds and, as their demand for bonds increases, the price of bonds also rises and the interest rate falls. As the interest rate falls they are willing to hold more money and a downward movement along the money demand curve occurs. This process continues until equilibrium is reached at point c with a lower equilibrium interest rate.

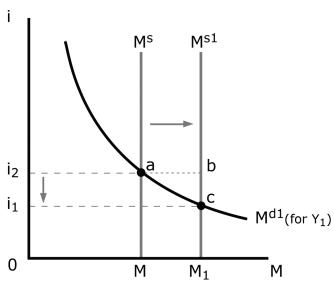


Diagram 3.10: Increase in the supply of money

Impact in the bond market of a change in money supply

Increase in the money supply (Expansionary monetary policy)

In order to increase the money supply, the central bank will **buy** bonds on the open market. This increase in the demand for bonds will increase the price of bonds and results in a lower interest rate.

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

Decrease in the money supply

(Contractionary monetary policy)

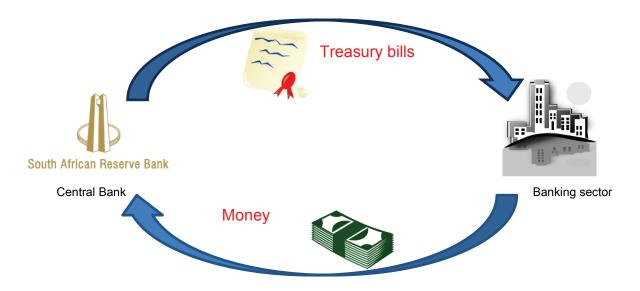
In order to decrease the money supply, the central bank will **sell** bonds on the open market. This increase in the supply of bonds will decrease the price of bonds and results in a higher interest rate.

 $M^{s}\downarrow: S_{B}\uparrow \Rightarrow P_{B}\downarrow \Rightarrow i\uparrow$

Central Bank control over the money supply

Remember that money held by the central bank does not contribute to the money supply, therefore the central bank can manipulate the size of the money supply by buying and selling bonds (like Treasury bills).

The below flow diagram illustrates the result of the **central bank selling** Treasury bills on the open market. Treasury bills will flow to the banking sector and money will flow to the central bank. This money has now been removed from the money supply and thus the **money supply decreases**. This decrease in the money supply leads to an increase in the market interest rate. Therefore when the central bank sells treasury bills it is employing a **contractionary monetary policy**.



Do activity 3.12 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts and relationships in the following table:

Concepts	Relationships
 equilibrium interest rate equilibrium condition price of bonds and interest rate increase in money supply decrease in money supply increase in money demand decrease in money demand 	$\begin{split} P_{B} &\uparrow \Rightarrow i \downarrow \\ P_{B} \downarrow \Rightarrow i \uparrow \\ Y &\uparrow \Rightarrow M^{d} \uparrow \Rightarrow P_{B} \downarrow \Rightarrow i \uparrow \\ Y \downarrow \Rightarrow M^{d} \downarrow \Rightarrow P_{B} \uparrow \Rightarrow i \downarrow \end{split}$

3.6 MONETARY POLICY IN THE FINANCIAL MARKET

Section outcomes

Once you have worked through this section of the learning unit, you should be able to do the following:

- describe monetary policy
- explain with the aid of an events chain and diagram the impact of monetary policy on the financial market
- explain the liquidity trap

Monetary policy can be defined as measures taken by the monetary authorities to influence the quantity of money or the rate of interest with a view to achieving stable prices, full employment and economic growth. In South Africa, the monetary authorities are the South African Reserve Bank (SARB) and the National Treasury, with the Governor of the SARB and Minister of Finance as the principal decision makers.

In this learning unit, we consider the use of **open-market operations** only. Open-market operations consist of 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 money supply and the interest rate.

The central bank holds both money and bonds. Bear in mind that the money in the hands of the central bank is not part of the money supply.

With the money supply under the control of the central bank, the question now arises as to how the central bank changes the money supply in the economy through open-market operations.

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

If the central bank wishes to increase the money supply, it **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.

Since portfolio equilibrium exists in the financial market – at the equilibrium interest rate financial market participants are satisfied with the amount of money and treasury bills they hold – the central bank needs to convince financial market participants to sell their treasury bills to the central bank. They do this by offering 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.

In the bonds market, this action by the central bank is reflected as an increase in the demand for bonds. This increase in the demand for bonds increases the price of bonds and results in a decline in the interest rate.

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

$$M^{s}\uparrow: D_{R}\uparrow \Rightarrow P_{R}\uparrow \Rightarrow i\downarrow$$

To increase the money supply $(M^s\uparrow)$, the central bank increases the demand for bonds $(D_B\uparrow)$, which causes an increase in the price of bonds $(P_B\uparrow)$. The interest rate therefore declines $(i\downarrow)$.

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

If the central bank wishes to decrease the money supply, it **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 since the money in the hand of the central bank is not part of the money supply. This is represented by a leftward shift in the money supply curve.

Since portfolio equilibrium exists in the financial market – at the equilibrium interest rate financial market participants are satisfied with the amount of money and treasury bills they hold – the central bank needs to 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.

In the bonds market, this action by the central bank is reflected as an increase in the supply of bonds. This increase in the supply of bonds decreases the price of bonds and the interest rate thus increases.

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

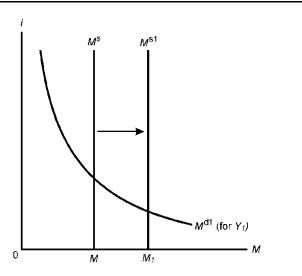
$$M^s\downarrow: S_B\uparrow \Rightarrow P_B\downarrow \Rightarrow i\uparrow$$

To reduce the money supply $(M^s\downarrow)$, the central bank increases the supply of bonds $(S_B\uparrow)$, which causes a decrease in the price of bonds $(P_B\downarrow)$. The interest rate therefore increases (i↑).

An increase in the money supply

If the central bank wishes to increase the money supply, it **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.

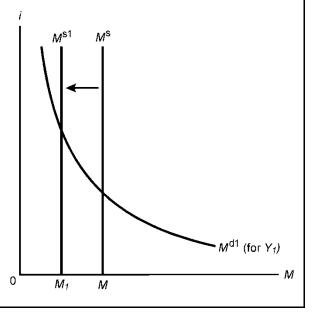
 $M^s \uparrow: D_B \uparrow \Rightarrow P_B \uparrow \Rightarrow i \downarrow$



A decrease in the money supply

If the central bank wishes to decrease the money supply, it **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.

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



Do activity 3.13 in the workbook.

The liquidity trap

According to our financial market model a change in the money supply causes a change in the interest rate. In the next unit we will show how this change in the interest rate impacts the goods market.

But does a change in the money supply always leads to a change in the interest rate? Not if you are in a liquidity trap as Paul Krugman explains in his blog:

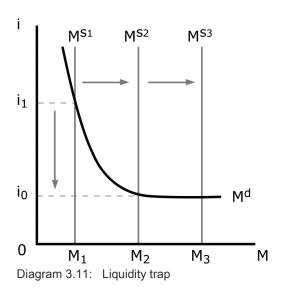
"So, at this point America and Japan (and core Europe) are all in liquidity traps: private demand is so weak that even at a zero short-term interest rate spending falls far short of what would be needed for full employment. And interest rates can't go below zero (except trivially for very short periods), because investors always have the option of simply holding cash.

Under these circumstances, normal monetary policy, which takes the form of open-market operations in which the central bank buys short-term debt with money it creates out of thin air, have no effect. Why?

Well, the reason open-market operations usually work is that people are making a trade-off between yield and liquidity – they hold money, which offers no interest, for the liquidity but limit their holdings because they pay a price in lost earnings. So if the central bank puts more money out there, people are holding more than they want, try to offload it, and drive rates down in the process.

But if rates are zero, there is no cost to liquidity, and people are basically saturated with it; at the margin, they're holding money simply as a store of value, essentially equivalent to short-term debt. And a central bank operation that swaps money for debt basically changes nothing. Ordinary monetary policy is ineffective.

Krugman, P. 2013. Monetary policy in a liquidity trap. The Conscience of a Liberal. [web log]. April, 2014, from http://krugman.blogs.nytimes.com/2013/04/11/monetary-policy-in-a-liquidity-trap/? php=true& type=blogs& r=0



At a very low or nearly zero interest rate the demand for money curve is completely elastic. In this region an increase in the money supply has now impact on the interest rate.

∠ Do activity 3.14 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts and relationships in the following table:

Concepts	Relationships
 monetary policy increase in money supply decrease in money supply liquidity trap 	$\begin{array}{c} M^s \uparrow \colon D_B \uparrow \Rightarrow P_B \uparrow \Rightarrow i \downarrow \\ M^s \downarrow \colon S_B \uparrow \Rightarrow P_B \downarrow \Rightarrow i \uparrow \end{array}$

3.6 SIMULTANEOUS CHANGES IN THE DEMAND FOR AND SUPPLY OF MONEY

Section outcomes

Once you have worked through this section of the learning unit, you should be able to do the following

• compare, using diagrams, the impact on the interest rate of a simultaneous change in the money supply and in the demand for money

In the previous sections we considered individually how a change in the demand for money affects the interest rate and how a change in supply of money affects the interest rate. In this section, we will see what happens when both demand and supply of money change.

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

Let us assume that, owing to an increase in economic growth (economic growth implies an increase in output and income Y), the demand for money for transaction purposes increases. According to our above analysis, the increase in the demand for money will cause an increase in the interest rate. If this increase in the interest rate is unacceptable, the central bank can implement an expansionary monetary policy to offset the increase in the interest rate. In terms of our financial market diagram, both the demand for money curve and the supply of money curve shift to the right. Whether the new equilibrium interest rate is higher, lower or the same will depend on the relative shifts. If the rightward shift of the supply curve is greater than the rightward shift of the demand curve, then the interest rate will be lower. However, if the rightward shift of the demand curve is greater than the rightward shift of the supply curve, then the interest rate will be higher.

Increase in demand for money and decrease in supply of money

Let us now see what happens when the demand for money increases and the supply of money decreases. Here, the interest rate is definitely higher. You can confirm this by using the financial market diagram in which you shift the demand curve to the right and the supply curve to the left.

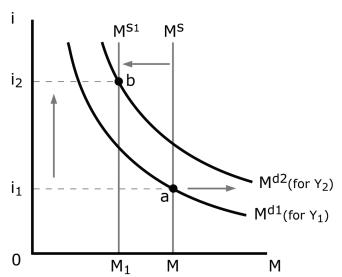


Diagram 3.12: An increase in the demand for money and a decrease in the supply of money

Decrease in both demand for and supply of money

And what happens if both the demand for and supply of money decrease? Here the change in the interest rate will depend on the relative shifts.

If the leftward shift of the demand curve is greater than the leftward shift of the supply curve, then the interest rate will be lower. If the leftward shift of the demand curve is smaller than the leftward shift of the supply curve, then the interest rate will be higher.

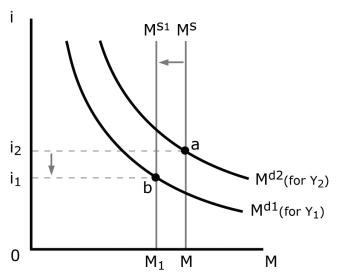


Diagram 3.13: If the relative shift of the demand for money is greater than the shift of the supply of money the interest rate declines

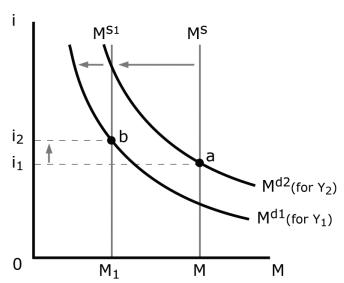


Diagram 3.14: If the relative shift of the demand for money is smaller than the shift of the supply of money the interest rate increases

Decrease in demand for money and increase in the money supply

In the event of decrease in the demand for money and an increase in the money supply the interest rate will decrease. The money demand curve shifts to the left and the money supply curve to the right.

✗ Do activity 3.15 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the following relationships:

Relationships

impact of a simultaneous change in demand for and supply of money on the interest rate

3.7 EXOGENOUS AND ENDOGENOUS VARIABLES IN THE FINANCIAL MARKET

Section outcomes

Once you have worked through this section of the learning unit, you should be able to do the following:

Identify the exogenous and endogenous variables in the financial market

The purpose of this financial market model is to give us an explanation of how the interest rate is determined. The interest rate is therefore our endogenous variable – the thing we wish to explain.

Our exogenous variables are:

- The nominal money supply which we assume is not influenced by the interest rate but is determined by the central bank. A change in the nominal money supply shifts the Ms curve.
- The part of the demand for money that is not influenced by the interest rate. This is the part of the demand for money that is influenced by the output and income and other liquidity preference considerations. These factors will shift the money demand curve.

The part of the demand for money that depends on the interest rate is **endogenous**. A change in the interest rate impacts on this part of the demand for money and is represented by a movement along the money demand curve.

Do activity 3.16 in the workbook.

3.8 THE CONDUCT OF MONETARY POLICY IN SOUTH AFRICA

Section outcomes

Once you have worked through this section of the learning unit, you should be able to briefly explain

the conduct of monetary policy in South Africa

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

The first assumption that must go is that money consists of currency only and the second assumption that the money supply is an exogenous variable under the control of the central bank.

Money consists of both currency (C) and demand deposits (D). A demand deposit is a bank deposit that can be withdrawn without notice ("on demand"). A demand deposit is created when a person deposits a sum of money with a bank, which then creates a demand deposit in favour of that person.

Examples of demand deposits are current accounts, transaction deposits, debit cards, and so on. Demand deposits (D) constitute the main share of the quantity of money. It is due to demand deposits that banks are able to create money. To explain how banks create money we first need to look at the balance sheet of a bank.

Balance sheet of a Bank			
Lia	abilities	Ass	ets
Deposits	R100 million	Cash SARB reserves Loans	R2.5 million R5.5 million R92 million
	R100 million		R100 million

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

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

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

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

The South African Reserve Bank therefore influences the money supply indirectly by influencing the demand for money through changing the repo rate. If it wishes to decrease the money supply it increases the repo rate, and if it wishes to increase the money supply it decreases the repo rate.

In this module we follow the traditional approach to money supply, which means that we assume the money supply is controlled by the central bank. A decrease in the money supply (resulting from the central bank selling bonds on the open market) will decrease the real money supply which results in an increase in the interest rate (because the supply of bonds increases on the bonds market, and so the price of bonds decreases and the return on holding bonds, or interest rate, increases): $M^s\downarrow:S_B\uparrow \Rightarrow P_B\downarrow \Rightarrow i\uparrow$. In this module the **central bank does not control the repo rate** or any other

 $M^s\downarrow: S_B\uparrow \Rightarrow P_B\downarrow \Rightarrow i\uparrow$. In this module the **central bank does not control the repo rate** or any other interest rate directly (as the SARB does in practice in South Africa).

The central bank influences the interest rate through the money supply. Therefore when describing monetary policy the chain of events cannot start with i - it starts with a change in M^s .

∠ Do activity 3.17 in the workbook.

The IS-LM Model

4

Study instruction

Read

The introductory part of chapter 5 of the prescribed book to orient yourself

Study:

Prescribed book: chapter 5

Subsections: 5.1, 5.2, 5.3 and 5.4 Study guide: learning unit 4

Learning unit outcomes

In this leaning unit we look at how output and income (Y) and the interest rate (i) are determined in the short run by combining the goods market (learning unit 2) with the financial market (learning unit 3).

Once you have worked through this study unit, you should be able to

- use the IS-LM model to explain in words and by means of a chain of events and diagrams how the level of output and income is determined by the interaction between the goods market and the financial market
- use the IS-LM model to explain in words and by means of a chain of events and diagrams the impact of fiscal and monetary policy on the level of output and income
- apply the IS-LM model to explain changes in the level of output and income in South Africa

To achieve these objectives we will proceed as follows:

Firstly, we create a new investment relationship that indicates investing to be a function of the interest rate and the level of income and output.

We then incorporate this investment relationship into the goods market that we developed in Learning Unit 2 – and we then indicate how the output and income equilibrium level is determined using the new investment function.

Next, we illustrate what happens to that goods market if the interest rate changes and, in addition, we derive the IS curve and demonstrate what the slope and shift of the IS curve implies.

This is followed by an analysis of what happens on the financial market should the level of output and income change. We then derive the LM curve and indicate what the slope and shift of the LM curve implies.

With both the IS and LM curves as background, we then introduce the IS-LM model and draw attention to the fact that equilibrium here shows that both the goods market and the financial market are in equilibrium – but that this equilibrium is not necessarily at the level of full employment.

Thereafter, we use the model to analyse the impact of fiscal and monetary policy on the economy.

Prior knowledge

Before you attempt this unit, make sure you understand the following:

investment	learning unit 2
aggregate demand relation	learning unit 2
determining the equilibrium level of output and income in the goods market	learning unit 2
the impact of a change in investment on aggregate demand and the level of output and income	learning unit 2
the multiplier	learning unit 2
the impact of fiscal policy on the level of output and income	learning unit 2

■ Do prior knowledge activity 4.1 in the workbook.

Contents

4.1 THE INVESTMENT RELATION

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams

- the investment equation
- the impact of the level of output and income on investment spending
- the impact of the interest rate on investment spending

In this model we change the assumption that investment is only an autonomous variable to one where investment is a function of the level of output and income as well as of the interest rate.

Our first challenge is therefore to rewrite the investment equation.

Investment equation

In the goods market model covered in learning unit 2, investment was regarded as an exogenous variable and written as:

By arguing that investment spending is a positive function of the level of output and income and a negative function of the interest rate, this becomes:

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

An increase in the level of output and income increases investment spending while an increase in the interest rate decreases investment spending and vice versa.

Let's turn our attention to why there is a positive relationship between investment spending and the level of output and income and a negative relationship between investment spending and the interest rate.

Investment and the level of output

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 – hence a positive relationship between the level of output and the level of investment.

In terms of a chain of events this is represented as:

$$\begin{array}{c} Y \uparrow \Rightarrow I \uparrow \\ Y \downarrow \Rightarrow I \downarrow \end{array}$$

Investment and the interest rate

The aim of investment (building a new factory or buying a machine) is to make a profit in the future. Building a new factory or buying a machine requires funds. Funding for investment can either be borrowed or financed from own funds. When using borrowed funds, the interest rate paid for these borrowed funds will have an important impact on the decision to invest or not. Using own funds, the opportunity cost of these funds must be considered. The interest rate as the opportunity cost of own funds refers to the fact that, if you put your own funds into bonds (or some other financial assets), or lend these funds to someone else, you will be able to earn interest on them. When considering using your own funds, you need take this opportunity cost into account.

The higher the interest rate, the higher the cost of borrowing will be and the higher the opportunity cost of own funds will be. At the same time, the higher the interest rate, the lower the level of investment spending in the economy will be.

One way to determine whether an investment project is worth undertaking is to compare the internal rate of return of the project (i.e. the rate of return earned from the investment) with the market interest rate (which is the interest cost of borrowed funds or the opportunity cost of own funds). If the internal rate of return is higher than the market interest rate, it would be profitable to undertake the investment. If, however, the internal rate of return is lower than the market interest rate, it would not be worthwhile undertaking the project. (In other words, the cost of financing the project would be more than its return.)

The higher the interest rate, the higher the cost of borrowing and the fewer the profitable investment opportunities will be. This is illustrated by the following example:

Numerical example

The first column shows different potential investment projects. The expected rate of return for each project is indicated in the second column, while the funding required for each project is indicated in the third column.

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

At a market interest rate of 20%, none of the projects is profitable since the cost of funding exceeds the internal rate of return for each project.

At a market interest rate of 13%, only project B is feasible since the cost of funding is lower than the expected return from the project. At an interest rate of 13%, the level of investment spending is therefore equal to R200 000.

At a market interest rate of 9%, projects A and B are feasible and the level of planned investment spending at an interest rate of 9% is equal to R200 000 + R100 000 = R300 000.

At 5%, projects A, B and C are feasible and the level of planned investment is R350 000. At 2%, all the projects are feasible and the level of planned investment is R500 000.

As the interest rate declines, planned investment spending in the economy increases.

Chain of events

Depicting the above by means of a chain of events gives us

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

Graphically

Graphically, the relationship between the interest rate and investment can be represented as follows:

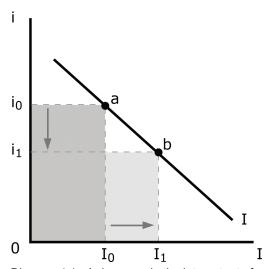


Diagram 4.1: A decrease in the interest rate from i_0 to i_1 increases investment from I_0 to I_1 and a downward movement along the investment curve from point a to point b takes place.

There is a negative relationship between the interest rate and investment. If the interest rate declines, planned investment spending increases, and if the interest rate increases, planned investment spending decreases.

There is therefore a movement along the investment curve.

A shift of the investment curve takes place if any of the other factors, except the interest rate, that influence investment spending changes. For instance, a decline in business confidence and negative expectations will cause a leftward shift of the investment curve indicating that, at every interest rate, investment is lower.

∠ Do activity 4.1 in the workbook.

4.2 EQUILIBRIUM OUTPUT AND INCOME IN THE IS-LM MODEL

Section outcomes

In this section we incorporate the new investment function in our goods market model and show how the equilibrium level of output and income is determined given this new investment function.

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of equations and diagrams:

- the demand equation
- the equilibrium level of output and income

Equilibrium output and income

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

$$Z = C + I + G$$

Given that:

$$C = c_0 + c(Y - T)$$

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

$$G = G$$

The demand equation can now be written as:

$$Z = [c_0 + c(Y - T)] + I(Y, i) + G$$

The equilibrium condition in the goods market is still:

$$Y = Z$$

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

$$Y = [c_0 + c(Y - T)] + I(Y, i) + G$$

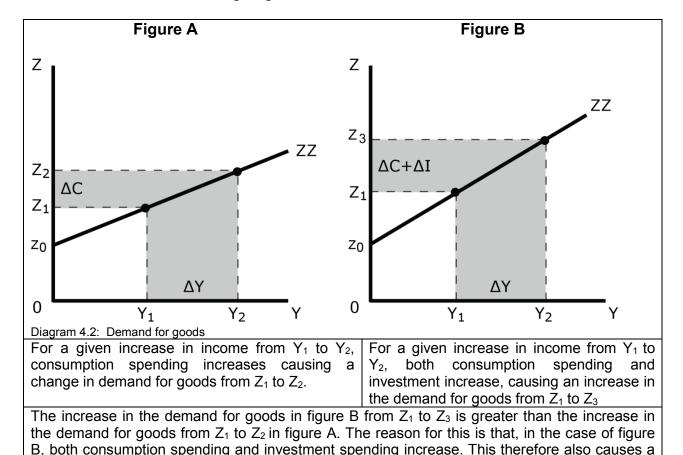
From this equation we can see that a change in C, I or G will change the equilibrium level of output and income and that the multiplier is still in operation. The difference between the multiplier in the goods market model and the multiplier in this model is that, since investment is regarded as a positive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

Equilibrium in the goods market diagram

Once investment is regarded as a positive function of output and income, a change in income not only causes a change in consumption spending, but also a change in investment spending.

Our demand for goods curve therefore changes.

This is illustrated in the following diagram:



higher multiplier effect. The ZZ curve in figure B is therefore steeper than the ZZ curve in figure A.

In our goods market diagram, equilibrium in the goods market is still represented by the point where the

∠ Do activity 4.2 in the workbook.

demand for goods cuts the 45-degree line.

4.3 THE IS RELATION

Section outcomes

Once you have worked through this section of the learning unit, you should be able to:

- provide a description of the IS relation
- describe the IS relation as an events chain
- provide a graphical derivation of the IS curve
- describe a movement along an IS curve
- describe the factors that determine the slope of the IS curve
- describe a shift of the IS curve

Description (definition) of the IS curve

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

Deriving the IS curve

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

Events chain

To derive the IS relation we need to trace the impact of a change in the interest rate on the level of output and income.

Let's consider the impact of an increase in the interest rate using an events chain.

An increase in the interest rate decreases investment spending since investment spending is a negative function of the interest rate. A decrease in investment leads to a decrease in the demand for goods, and through the multiplier effect, the level of output and income decreases. As the demand for goods and output decreases, both consumption spending and investment spending also decrease, and the multiplier process is in operation.

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

What is not shown in the above chain of events is that, when the level of output and income decreases, investment declines further since investment is a positive function of the level of output and income. In terms of a chain of events this is indicated as:

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

Note that investment spending decreases initially because the interest rate rises, and then because output declines.

During this process there is also a decrease in consumption spending since consumption spending is a positive function of the level of output and income:

$$Y \downarrow \Rightarrow C \downarrow$$

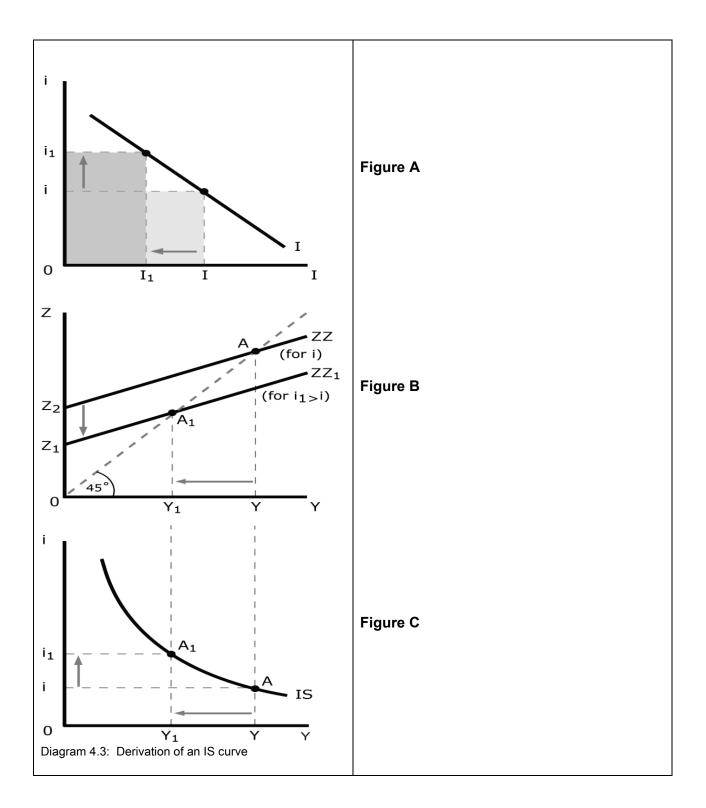
Do activity 4.3 in the workbook.

Graphical derivation of the IS curve

It is now time to derive the IS curve with the aid of diagrams:

The IS curve is derived, by assuming that the interest rate increases, and with the aid of the following three figures in diagram 4.3:

- Figure A represents the investment function.
- Figure B represents the goods market, where I = I(Y, i).
- Figure C depicts the IS curve.
- Note that the starting point for the derivation of the IS curve is a change in the interest rate.



In figure A, the interest rate (i) is measured on the vertical axis and investment spending (I) on the horizontal axis.

In figure B, the demand for goods (Z) is measured on the vertical axis and the level of output and income (Y) on the horizontal axis.

In figure C, the interest rate (i) is measured on the vertical axis and the level of output and income (Y) on the horizontal axis.

Note that the level of output and income is measured on the horizontal axis for both the goods market (figure B) and the IS curve (figure C).

To plot the first point A:

- Step 1: Assuming that the interest rate is i, the corresponding level of investment spending, according to the given investment schedule in figure A, is I.
- Step 2: Given an interest rate of i with a level of investment spending I, the corresponding demand for goods in figure B is ZZ. Given this demand for goods, goods market equilibrium is reached at point A, where Z = Y.
- Step 3: At this goods market equilibrium position A in figure B, the corresponding equilibrium level of output and income is Y.
- Step 4: By extending this equilibrium level of income Y with a dotted line to figure C, we can plot the first point on our IS curve.
- Step 5: The first point on our IS curve in figure C is plotted at the intersection of the dotted Y line with the dotted i line.
- Step 6: The first point on our IS curve is also indicated as point A, because it corresponds to point A in figure B, thus indicating a goods market equilibrium position. At this point, the goods market is in equilibrium at an interest rate of i and an income level of Y.

Plotting the second point A₁:

- Step 7: To derive the second point, we **assume that there is an increase in the interest rate** from i to i₁. According to our investment curve, the level of investment decreases to I₁ in figure A.
- Step 8: In the goods market (figure B), the decline in investment spending decreases the demand for goods. The demand for goods curve shifts downwards to ZZ₁. The shift in the demand for goods is equal to the decrease in investment (which is the result of an increase in the interest rate). At the initial level of equilibrium income Y, supply exceeds demand, and there is an adjustment to a lower level of output and income. The decline in output and income is a multiple of the decrease in investment spending owing to the multiplier effect.
- Step 9: Goods market equilibrium is ultimately reached at point A_1 in figure B.
- Step 10: At this new goods market equilibrium at point A_1 , the corresponding level of equilibrium income is Y_1 . The decrease in the equilibrium level of income from Y to Y_1 is equal to the multiplier times the change in investment.
- Step 11: By extending this equilibrium level of income Y₁ in figure B with a dotted line to figure C, we can now plot the second point on our IS curve.
- Step 12: The second point on our IS curve in figure C is plotted at the intersection of the dotted Y_1 line with the dotted I_1 line.
- Step 13: The second point on our IS curve is also labelled as point A_1 because it corresponds to point A_1 in figure B, which indicates a goods market equilibrium position Y_1 at an interest rate of i_1 .

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

We will take a shortcut and draw a downward-sloping curve through points A and A₁ in figure C, and label it IS.

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

Note that the I in IS stands for investment and the S for savings.

Do activity 4.4 in the workbook.

Comparing points on an IS curve

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

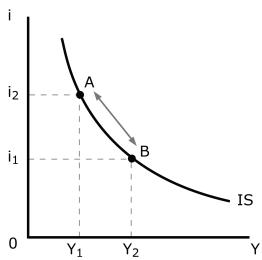


Diagram 4.4: As the interest rate changes a movement along the IS curve takes place

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

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

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

The slope of the IS curve

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

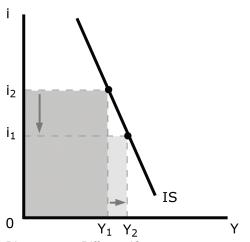
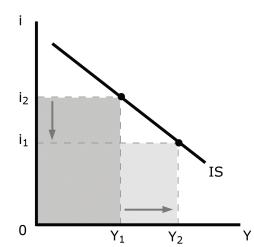


Diagram 4.5: Different IS curves



The steepness of the IS curve depends on the following variables:

Interest sensitivity of investment spending

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

Output and income sensitivity of investment spending

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

The following investment equation includes these sensitivities:

$$I = b_0 + b_1 Y - b_2 i$$

Where

b₀ is autonomous investment

b₁ is output sensitivity of investment spending

b₂ is interest rate sensitivity of investment spending

Note that a decrease in the interest rate has a negative value and, therefore, the $-b_{2i}$ will be positive if the interest rate decreases and negative if the interest rate increases.

The higher the value of b_1 the greater the impact of a change in output on the investment spending and the higher the value of b_2 the greater the impact of a change in the interest rate on investment spending.

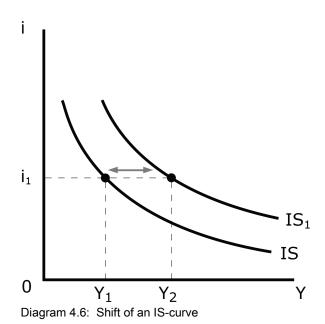
Do activity 4.5 in the workbook.

Shifts of the IS curve

It is necessary to distinguish between a movement along a given IS curve and a shift of this IS curve. There is a movement along an IS curve if the interest rate changes. A shift of the IS curve, however, is caused by a change in any of the autonomous factors that changes the demand for goods and the equilibrium level of output and income, at each and every interest rate. These autonomous factors are factors such as government spending, taxation, consumer and investor confidence.

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

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



An important variable that influences the shift of the IS curve is the size of the multiplier. The greater the multiplier, the greater the impact of a change in the autonomous variable and the greater the rightward shift of the IS-curve.

The following table provides a summary of movements and shifts of an IS-curve.

Movement	Rightward shift	Leftward shift
upward:	increase in autonomous	decrease in autonomous
interest rate increases	consumption spending	consumption spending because
	because of, say, an increase	of, say, a decrease in consumer
	in consumer confidence (c ₀)	confidence (c ₀)
downward:	increase in autonomous	decrease in autonomous
interest rate decreases	investment spending (Ī)	investment spending (Ī)
	because of, say, an increase	because of, say, a decrease in
	in investor confidence	investor confidence
	increase in autonomous	decrease in autonomous
	government spending (G)	government spending (G)
	decrease in autonomous	increase in autonomous
	taxation (T)	taxation (T)

B Do activity 4.6 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equations and relationships in the following table:

Concepts	Equations	Relationships
 investment relation IS relation IS curve movement along an IS curve shift of an IS curve 	I = I(Y,i) +,- Y = C(Y-T) + I(Y,i) + G	$\begin{array}{l} Y \uparrow \Rightarrow I \uparrow \\ Y \downarrow \Rightarrow I \downarrow \\ \\ i \uparrow \Rightarrow I \downarrow \\ i \downarrow \Rightarrow I \uparrow \end{array}$ $i \uparrow \Rightarrow I \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow \\ i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \end{array}$

4.4 THE LM RELATION

Prior knowledge

Before attempting this section, make sure you understand the following:

the demand for money	learning unit 3
how the equilibrium interest rate is determined	learning unit 3
the impact of a change in income on the equilibrium interest rate	learning unit 3

Do prior knowledge activity 4.2 in the workbook.

The financial market in real terms

Section outcomes

Once you have worked through this section of the learning unit, you should, in words and by means of an equation, be able to explain the following

• the financial market in real terms

We are now in the process of constructing a model that shows how the levels of output and income are determined by the interaction between the goods market and the financial market. This requires us to model the financial market in real terms as well. You will recall that, in learning unit 3, we modelled the financial market in nominal terms, while in learning unit 2 we modelled the goods market in real terms.

The equilibrium condition in the financial market in nominal terms is:

$$M = RYL(i)$$

Since the nominal income RY = PY, which is the price level times real production (income), we divide it by the price level (P) to get the real income.

Our equilibrium in the financial market therefore changes from:

$$\begin{aligned} M &= \mathsf{PYL}(\mathsf{i}) \\ \mathsf{to} \\ M/\mathsf{P} &= \mathsf{YL}(\mathsf{i}) \end{aligned}$$

Where

M/P – real money supply Y – real income i – interest rate

The real money supply is the money supply (M/P) expressed in terms of its purchasing power (in terms of goods).

For a given nominal money supply, an increase in the general price level results in a decline in the real money supply. With the same nominal amount of money, fewer goods and services can be bought. Conversely, a decline in the general price level results in an increase in the real money supply (more goods and services can be bought).

This is illustrated by the following example in which it is indicated how the real money supply changes if the price level changes:

Nominal money s	upply (M ^s)	Real mo	oney supply (M/P)
Money amount		Amount	of goods
E.g.: M =	R100 million	M/P =	R100 m/R10
Price level (P) =	R10	=	10 million
E.g.: M =	R100 million	M/P =	R100 m/R20
<i>P</i> ↑ =	R20	=	5 million
E.g.: M =	R100 million	M/P =	R100/R5
<i>P</i> ↓ =	R5	=	20 million

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

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

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

∠ Do activity 4.7 in the workbook.

The LM relation

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- describe the LM relation
- describe the LM relation as an events chain
- describe the graphical derivation of the LM curve
- describe a movement along the LM curve
- describe the factors that determine the slope of the LM curve
- describe a shift of the LM curve

Description (definition) of the LM curve

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

The chain of events for the LM relation

To derive the LM curve we need to trace the impact on the financial market of a change in the level of output and income.

Using a chain of events, the impact of an increase in the level of output on the equilibrium interest rate can be written as:

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

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

Do activity 4.8 in the workbook.

Graphical derivation of the LM curve

The key to the derivation of the LM curve is the events that take place in the financial market when the **level of output and income changes**. Revise the section "Change in income and the equilibrium interest rate" in learning unit 3 and section 3.2 in the prescribed book.

Equilibrium in the financial market implies that the quantity of money demanded is equal to the quantity of money supplied. The financial market is represented in figure A, and the LM curve in figure B in diagram 4.7. The vertical axes in both figures are the same (that is they are placed next to each other) and measure the interest rate. However, the horizontal axes differ. In figure A, the real money supply (M/P) is measured, while in figure B, the level of output and income (Y) is measured.

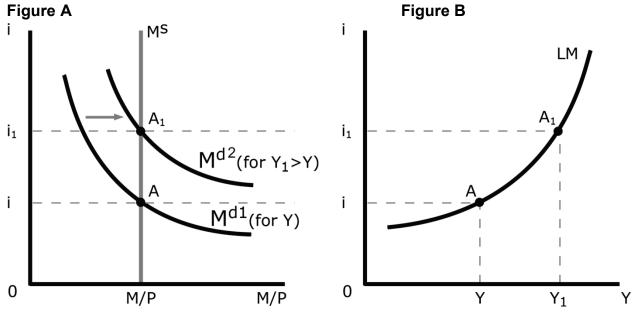


Diagram 4.7: Derivation of an LM curve

The following steps are used to graphically derive the LM curve:

To plot the first point A:

- Step 1: Given an income level of Y in figure B, we have a corresponding demand for money curve M^{d1} in figure A.
- Step 2: Given this demand for money curve M^{d1} and the real supply of money curve M^s, equilibrium in the financial market (i.e. where the quantity of money demanded = the quantity of money supplied) occurs at point A in figure A.
- Step 3: At this financial market equilibrium position A in figure A, the corresponding equilibrium interest rate is i.
- Step 4: By extending this equilibrium interest rate i in figure A with a dotted line to figure B, we can plot the first point on our LM curve.
- Step 5: The first point on our LM curve in figure B is plotted at the intersection of the extended dotted line i with the vertical dotted line Y.
- Step 6: This first point on the LM curve is also indicated as point A since it corresponds to point A in figure A and shows the financial market equilibrium position at an output level of Y.

To plot the second point A_1 :

- Step 7: Assume an increase in the level of output and income from Y to Y_1 in figure A.
- Step 8: Given this higher level of output Y₁, the demand for money increases when people decide to do more transactions. This is indicated by a rightward shift in the demand for money curve from M^{d1} to M^{d2} in figure A.
- Step 9: Given this new demand for money curve M^{d2} , we have a new financial market equilibrium position at point A_1 in figure A.
- Step 10: At this new financial market equilibrium position A₁ in figure A, the corresponding equilibrium interest rate is i₁. An increase in the demand for money causes an increase in the equilibrium interest rate.
- Step 11: By extending this equilibrium interest rate i₁ in figure A with a horizontal dotted line to figure B, we can plot the second point on our LM curve.
- Step 12: The second point on our LM curve in figure B is plotted at the intersection of the extended dotted line i₁ with the vertical dotted line Y₁.
- Step 13: This second point on the LM curve is also indicated as point A_1 since it corresponds to point A_1 in figure A and shows the financial market equilibrium position at a level of output and income of Y_1 .

By repeating the same exercise for different levels of output, a series of financial market equilibrium points can be plotted in figure B, which ultimately gives us the LM curve. We will take a short cut and draw an upward-sloping curve through points A and A_1 in figure B, and label it LM.

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.

Note that the L in LM stands for demand for money and the M for the supply of money.

Do activity 4.9 in the workbook.

Movements along an LM curve

When comparing points on an LM curve, you need to take into account what happens to the variables in the model when the level of output and income changes.

Ø

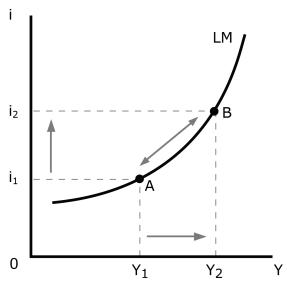


Diagram 4.8: Movement along an LM curve

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

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

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

∠ Do activity 4.10 in the workbook.

The slope of the LM curve

Two variables that have an impact on the slope of the LM curve are the income sensitivity of the demand for money and the interest sensitivity of the demand for money.

The **income sensitivity of the demand for money** measures by how much the demand for money changes if there is a change in the level of output and income.

For instance, the greater the income sensitivity of the demand for money, the more the demand for money curve shifts for a given change in income – and the greater the shift of the demand for money curve, the greater the increase in the interest rate. This then gives us a steeper LM curve.

The above can be explained by comparing the following two LM curves as demonstrated below:

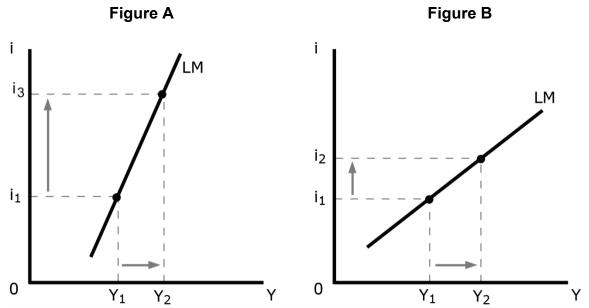


Diagram 4.9: Impact of a change in income on the interest rate

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

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

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

∠ Do activity 4.11 in the workbook.

Shift of an LM curve

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

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

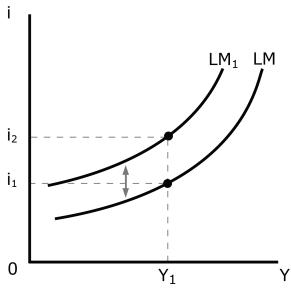


Diagram 4.10: Shift of an LM curve

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

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

∠ Do activity 4.12 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equations and relationships in the following table:

Concepts	Equations	Relationships
 LM relation LM curve movement along an LM curve shift of an LM curve 	$M^d = YL(i)$ $M/P = YL(i)$	$\begin{array}{c} Y \! \uparrow \Rightarrow M^d \! \uparrow \Rightarrow i \! \uparrow \\ Y \! \downarrow \Rightarrow M^d \! \downarrow \Rightarrow i \! \downarrow \end{array}$

4.5 PUTTING THE IS AND THE LM RELATIONS TOGETHER (Section 5.3 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- describe in words, and with the aid of diagrams, simultaneous equilibrium in the goods and financial market
- describe the adjustment to equilibrium
- distinguish between exogenous and endogenous variables in the IS-LM model
- show graphically the impact of a change in exogenous variables in the IS-LM model

With the IS and LM relations behind us we can now construct the IS-LM model by combining the IS relation and the LM relation.

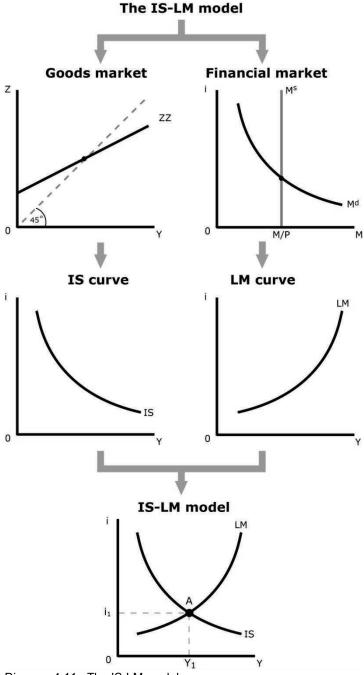


Diagram 4.11: The IS-LM model

The IS relation indicates goods market equilibrium positions while the LM curve indicates financial market equilibrium positions.

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

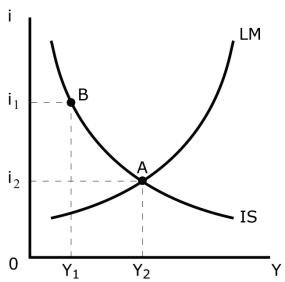


Diagram 4.12: Disequilibrium in the IS-LM model

A point such as point B in the above diagram indicates that the goods market is in equilibrium (it is on the IS curve) but that the financial market is not (it is a point off the LM curve). Since the financial market is in disequilibrium, changes will take place in this market. In this particular case there is an excess supply of money at an interest rate of i₁ and, consequently, the interest will start to fall. As the interest rate falls, investment spending increases in the goods market and a movement to point A along the IS curve occurs.

Exogenous and endogenous variables in the IS-LM model

In the IS-LM model the most important variables that we wish to explain are the level of output and income (Y) and the interest rate (i). These variables are our endogenous or dependent variables. Any variable that is influenced by these endogenous variables is, by implication, also an endogenous variable. However, a variable can contain both an exogenous (autonomous) and an endogenous component. For instance, consumption spending (C) has an exogenous (autonomous) component (c_0) as well as an endogenous component (c_0). The same applies to investment spending and the demand for money.

An exogenous variable has an effect on the endogenous variables, but is in turn not influenced by the endogenous variables.

In the IS-LM model the values of the exogenous variables are determined by the model builder, while the values of the endogenous variables are determined by the exogenous variables and the specifications of the model.

Endogenous variables	Exogenous variables
$C = C_0 + cY_D$	$C = c_o + cY_D$
The \mathbf{Y}_{D} part of the consumption function is the endogenous component.	The autonomous or exogenous variables in the consumption function are \mathbf{c}_{\circ} and \mathbf{c} (the marginal propensity to consume). The \mathbf{c}_{\circ} part is known as autonomous or exogenous consumption.
The parts of investment that are dependent on income and the interest rate are the endogenous components.	The part of investment that is influenced by expectations, business confidence, and political and social factors is the exogenous component of investment. This is known as autonomous or exogenous investment.
Government spending (G) does not contain an endogenous component.	Government spending is an exogenous variable because its value is not determined by the endogenous variables in the model.
In this specific version of the IS-LM model, taxation (T) does not contain an endogenous component. If it is assumed that taxation is a function of the level of output and income, then it would be an endogenous variable.	Taxation is an exogenous component because its value is not determined by the endogenous variables.
The supply of money does not contain an endogenous component.	The supply of money is entirely exogenous and the quantity of money is determined by the central bank.
The endogenous component of the demand for money is the part of the demand for money that is determined by the interest rate and the level of output and income.	The exogenous component of the demand for money is the part that is influenced by expectations, business confidence, and political and social factors.

Impact of exogenous changes on the equilibrium level of income

In the previous section we indicated that, in this model, the economy can reach an equilibrium position that is not necessarily the level of full employment. The question then arises as to what can be done to ensure that, in this model, the economy moves to the level of full employment.

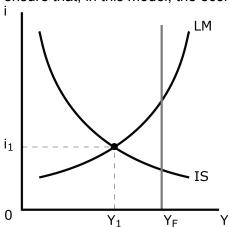


Diagram 4.13: Equilibrium and full employment in the IS-LM model

The answer to this issue lies in changes in the exogenous factors. In the sections that follow, this model is therefore used to analyse the impact of a number exogenous factors on the economy. An exogenous factor or variable is a variable that we take as given and that is thus unexplained in the model.

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

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

In terms of our IS-LM model, a change in exogenous variables in the goods market shifts the IS curve, while a change in exogenous variables in the financial market shifts the LM curve. Revise the sections on shifts of the IS curve and shifts of the LM curve if you are unsure of the meaning of these shifts.

Using our IS-LM model we can illustrate how fiscal and monetary policy can be used to reach full employment.

An increase in government spending, which is a fiscal policy measure, shifts the IS curve rightwards and full employment can be reached. An increase in the money supply, which is a monetary policy measure, shifts the LM curve downwards and full employment can be reached.

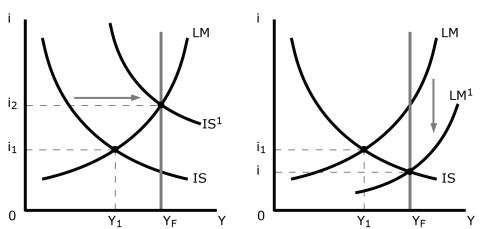


Diagram 4.14: Exogenous changes in the IS-LM model

In the following sections we explain these measures in more detail. When dealing with the impact of these exogenous variables on the economy, the first decision you must make is on which market the initial impact is felt. Your starting point is the events in this initial market which will eventually spill over into the other market. For instance, the first impact of a change in taxation or government spending is on the goods market, where it influences a number of variables which eventually impact on the financial market. However, the first impact of a change in the money supply is on the financial market, after which it influences events in the goods market.

Do activity 4.14 in the workbook.

4.6 IMPACT OF FISCAL POLICY

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events and diagrams

- the impact of fiscal policy on the IS-LM model
- the factors that influence the impact of fiscal policy
- the crowding out effect

Work through the section in the prescribed book and make sure you can describe the impact of fiscal policy on the IS-LM model.

An expansionary policy is used to stimulate economic activity by increasing the demand for goods (aggregate demand). An **expansionary fiscal policy** means that government spending has to be increased and/or taxes have to be decreased.

A contractionary policy is used to "cool down" economic activity by decreasing the demand for goods (aggregate demand). **A contractionary fiscal policy** means that government spending has to be reduced and/or taxes have to be increased.

The impact of a contractionary fiscal policy: increase in taxation

Using the diagram for the IS-LM model, the end result of an increase in taxation can be represented as follows:

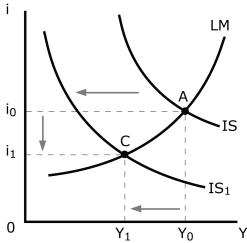


Diagram 4.15: Impact of a contractionary fiscal policy

An increase in taxation causes a leftward shift of the IS curve and a new equilibrium is formed at point C. From this diagram it is clear that an increase in taxation causes a decline in the interest rate and a decrease in output and income.

The challenge for you is to describe why the interest rate and the level of output decrease if taxation is increased, as well as what happens to the other variables in the model – such as investment, the demand for money, consumption spending, the money supply and government spending.

Note that the first decision you have to make is in which market the initial impact is felt. In the case of taxation, the initial impact is in the goods market. Once you have described the initial impact in the goods market, you need to explain how the events in the goods market are now going to influence the financial market and how changes in the financial market again impact on the goods market. You therefore have to move from the goods market to the financial market and then back to the goods market.

■ Do activity 4.15 in the workbook.

An events chain

Using words and a chain of events, the impact of an increase in taxation on output and income and the interest rate can be described as follows:

The initial effect is on the **goods market**. The increase in the tax rate reduces disposable income. The reduction in disposable income causes a decrease in consumption spending because consumption spending is a positive function of disposable income.

A decline in consumption spending causes a decline in the demand for goods since Z = C + I + G. The decline in demand reduces the level of output and income because the demand for goods determines the level of output and income.

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

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

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

On the **financial market** the decline in the level of output reduces the demand for money because there is a lower level of transactions. The decrease in the demand for money leads to a decline in the interest rate in the financial market.

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

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

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

An important fact to notice here is that the decrease in output decreases investment spending $(\Rightarrow Y \downarrow \Rightarrow I \downarrow)$, while a decrease in the interest rate increases investment spending ($i \downarrow \Rightarrow I \uparrow$). We therefore have two opposing forces in operation and the end result will be determined by which of these forces dominates.

The end result is a decrease in the equilibrium level of output and income and a lower interest rate. This is the result of the decline in the demand for goods. Bear in mind that it is the demand for goods that determines the level of output and income.

Looking at the demand for goods,

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

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. If, however, the impact of the decline in output is less than the impact of the decline in the interest rate, investment spending increases. Assuming that these two forces cancel each other out, the decrease in investment spending matches the increase in investment spending and investment spending remains unchanged. It is therefore clear that the decline in consumption spending reduces the demand for goods which causes the equilibrium level of output and income to decrease.

Note that all other exogenous variables (government spending and money supply), except taxation, remain unchanged.

Do activity 4.16 in the workbook.

Graphical analysis

In our IS-LM diagram the above can be described as follows:

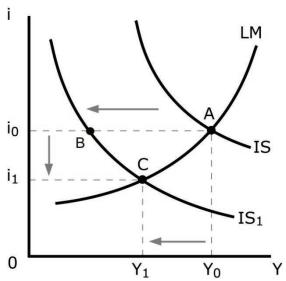


Diagram 4.16: Impact of a contractionary fiscal policy

We start with an equilibrium position at point A. The increase in taxation shifts the IS curve to the left from IS to IS_1 . On the goods market the level of output and income initially decreases due to the decrease in consumption spending and investment spending from Y_0 to Y_1 and a disequilibrium position is reached at point B.

At point B the financial market is in disequilibrium. The decrease in the level of output and income has decreased the demand for money. An excess supply of money develops and, consequently, the interest rate declines in the financial market.

As the interest rate declines investment spending rises in the goods market. A downward movement along the IS curve occurs from point B and continues until point C is reached.

Do activity 4.17 in the workbook.

Determinants of the impact of fiscal policy

The effectiveness of fiscal policy is dependent on the magnitude of the impact of a given change in government spending and/or taxes on the level of output and income. To explain the determinants of the impact of fiscal policy we will make use of an increase in government spending.

The factors that influence the impact of an increase in government spending are:

- the multiplier
- the income sensitivity of the demand for money
- the interest sensitivity of investment spending
- output and income sensitivity of investment spending

The multiplier

$$G^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow}$$

In this part of the events chain the increase in the level of output and income (Y) for a given increase in government spending (G) depends on the multiplier. The bigger the multiplier, the greater the impact of a given change in G on Y.

Therefore the greater the multiplier, the **more effective** an increase in government spending will be in increasing the level of output and income.

Output and income sensitivity of demand for money

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

The more sensitive the demand for money is to a change in income, the greater the increase in the interest rate for a given increase in income will be – and the more the interest rate rises, the greater the decline in investment spending.

Therefore the greater the output and income sensitivity of demand for money, the **less effective** an increase in government spending will be in increasing the level of output and income.

Interest sensitivity of investment spending

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

The more sensitive investment spending is to a change in the interest rate, the greater the change in investment spending for a given change in the interest rate. Since an increase in government spending will lead to an increase in the interest rate (because $G^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow} \Rightarrow M^{d\uparrow} \Rightarrow i^{\uparrow}$), then the interest sensitivity of investment spending will determine by how much investment spending will decrease due to an increase in the interest rate resulting from an increase in government spending.

Therefore the greater the interest sensitivity of investment spending, the **less effective** an increase in government spending will be in increasing the level of output and income.

Output and income sensitivity of investment spending

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

The more sensitive investment spending is to a change in income, the greater the increase in investment spending for a given increase in income will be.

Therefore the greater the output and income sensitivity of investment spending, the **more effective** an increase in government spending will be in increasing the level of output and income.

Crowding out

Crowding out occurs if an increase in government spending leads to an overall decrease in investment spending, i.e. government spending replaces investment spending. Conversely, crowding in occurs if an increase in government spending leads to an overall increase in investment spending.

The effect of an increase in government spending on investment spending is **indeterminate** because:

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

And
$$G^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow} \Rightarrow I^{\uparrow}$$

Therefore I

Thus, whether an increase in government spending will eventually lead to crowding out or crowding in of investment spending depends on the relative strengths of the interest sensitivity of investment spending and the output and income sensitivity of investment spending, i.e. which effect overwhelms the other.

Crowding out will occur if the interest sensitivity of investment spending is high and the output sensitivity of investment spending is low.

Without information about the relative strengths of the interest sensitivity of investment spending and the output and income sensitivity of investment spending we cannot predict which effect will dominate.

∠ Do activity 4.18 in the workbook.

4.7 IMPACT OF MONETARY POLICY

Section outcomes

Once you have worked through this section of the study unit, you should be able to explain the following in words and by means of a chain of events and diagrams:

- the impact of monetary policy on the IS-LM model
- factors that influence the impact of monetary policy
- the liquidity trap

Work through this section in the prescribed book and make sure you can describe the impact of monetary policy on the IS-LM model.

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.

Using the diagram for the IS-LM model, the end result of an increase in nominal money supply can be represented as follows:

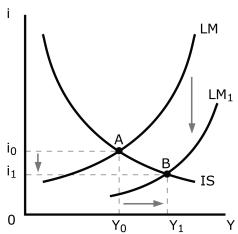


Diagram 4.17: Impact of an expansionary monetary policy

An increase in the money supply shifts the LM curve downwards and a new equilibrium is reached at point B. From this diagram it is clear that an increase in nominal money supply causes a decrease in the interest rate and an increase in output and income.

The challenge for you is to describe why the interest rate declines and the level of output rises if the nominal money supply is increased, as well as what happens to the other variables in the model – such as investment spending, consumption spending, government spending and taxation.

Events chain

Using words and a chain of events, the impact of an increase in the money supply on output and income and the interest rate can be described as follows:

The initial impact of an increase in the money supply is on the **financial market**.

(Once you have described the initial impact in the financial market, you need to explain how the events in the financial market are going to influence the goods market – hence moving from the financial market to the goods market.)

On the **financial market** an increase in the nominal money supply increases the real money supply and an excess supply of money develops. This excess supply of money causes the interest rate to decline.

$$\mathsf{M}^{\uparrow} \Rightarrow \mathsf{M}/\mathsf{P}^{\uparrow} \Rightarrow \mathsf{i}^{\downarrow}$$

On the **goods marke**t the decrease in the interest rate increases investment spending, the demand for goods and the level of output and income. The rise in the level of output and income further increases investment as well as consumption spending.

The multiplier process is thus in operation.

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

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

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

Do activity 4.19 in the workbook.

Graphical analysis

In our IS-LM model the above can be described as follows:

An increase in the nominal money supply causes a downward shift of the LM curve from LM to L M_1 . At point A an excess supply of money is created on the financial market and consequently the interest rate starts to decreases. As the interest rate decreases, a downward movement along the IS curve occurs. The decline in the interest rate increases investment spending, the demand for goods and output and income. On the horizontal axis, output and income increase and this process continues until an equilibrium position – where both the goods and the financial market are in equilibrium – is reached at point B. At this equilibrium position the interest rate is i_1 and the level of output and income Y_1 .

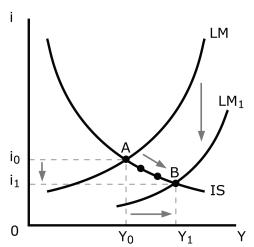


Diagram 4.18: Impact of an expansionary monetary policy

∠ Do activity 4.20 in the workbook.

Determinants of the impact of monetary policy

The effectiveness of monetary policy is dependent on the magnitude of the impact of a given change in money supply on the level of output and income. In this section we take a closer look at the variables that determine the impact that an expansionary monetary policy will have in the IS-LM model. We consider two variables, namely the interest sensitivity of investment spending and the interest sensitivity of the demand for money.

Interest sensitivity of investment spending

An important variable that determines the impact of monetary policy is how sensitive investment is to a change in the interest rate. Looking back at the events chain for monetary policy you will note that the link between investment and the interest rate is an important one, as illustrated by the following events chain:

$$\mathsf{M}^{\uparrow} \Rightarrow \mathsf{M}/\mathsf{P}^{\uparrow} \Rightarrow \mathsf{I}^{\downarrow} \Rightarrow \mathsf{I}^{\uparrow} \Rightarrow \mathsf{Z}^{\uparrow} \Rightarrow \mathsf{Y}^{\uparrow}$$

If investment is not very sensitive to a change in the interest rate, then a given change in the interest rate will have little impact on investment spending and, consequently, change in the level of output will be small. Therefore the greater the interest sensitivity of investment spending, the **more effective** an increase in the money supply will be in increasing the level of income and output.

Note that this relationship is also important in determining the effectiveness of fiscal policy (see section 4.6) but this effect works in the opposite direction. I.e. a greater interest sensitivity of investment spending will mean that monetary policy is more effective, and fiscal policy is less effective.

The interest sensitivity of the demand for money

The interest sensitivity of the demand for money determines by how much the interest rate changes if there is a change in the money supply. For monetary policy to have an impact on the level of output and income it needs to cause a change in the interest rate.

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

The more sensitive the demand for money is to a change in interest rate, the greater the change in the interest rate for a given change in the money supply, and the greater the impact of monetary policy.

If an increase in the money supply has no impact on the interest rate, then monetary policy is completely ineffective to change the level of output. This is what happens in the case of the **liquidity trap**.

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

It is clear from the discussion above on the "determinates of the impact of monetary policy" and the discussion of the "determinates of the impact of fiscal policy" under section 4.6, that there are certain conditions under which fiscal policy is more effective than monetary policy and under which monetary policy is more effective than fiscal policy. This discussion should have given you a small insight into the debate that often rages between economists as to whether fiscal policy or monetary policy is more effective.

∠ Do activity 4.21 in the workbook.

Once you have finished studying this section you should have a clear understanding of the concepts, equations and relationships in the following table:

Concepts	Equations	Relationships
 fiscal policy monetary policy LM relation LM curve shift of the LM curve IS relation IS curve shift of the IS curve 	M/P = YL(i) $Y = C(Y-T) + I(Y,i) + G$	$\begin{array}{l} Y \!\!\uparrow \Rightarrow M^d \!\!\uparrow \Rightarrow i \!\!\uparrow \\ Y \!\!\downarrow \Rightarrow M^d \!\!\downarrow \Rightarrow i \!\!\downarrow \\ i \!\!\uparrow \Rightarrow I \!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ i \!\!\downarrow \Rightarrow I \!\!\uparrow \Rightarrow Z \!\!\uparrow \Rightarrow Y \!\!\uparrow \\ \end{array}$ $\begin{array}{l} T \!\!\uparrow \Rightarrow Y_D \!\!\downarrow \Rightarrow C \!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ Y \!\!\downarrow \Rightarrow C \!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ Y \!\!\downarrow \Rightarrow I \!\!\downarrow \\ Z \!\!\downarrow = C \!\!\downarrow + I \!\!\downarrow \!\!\uparrow + G \\ M \!\!\uparrow \Rightarrow M \!\!/ \!\!P \!\!\uparrow \Rightarrow i \!\!\downarrow \\ Z \!\!\uparrow = C \!\!\uparrow + I \!\!\uparrow + G \end{array}$

4.8 COMPARING FISCAL POLICY WITH MONETARY POLICY

Section outcomes

Once you have worked through this section of the learning unit, you should, with aid of the IS-LM model, be able to:

compare the impact of fiscal policy with monetary policy

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

The following diagram depicts the impact of an expansionary monetary policy and of an expansionary fiscal policy:

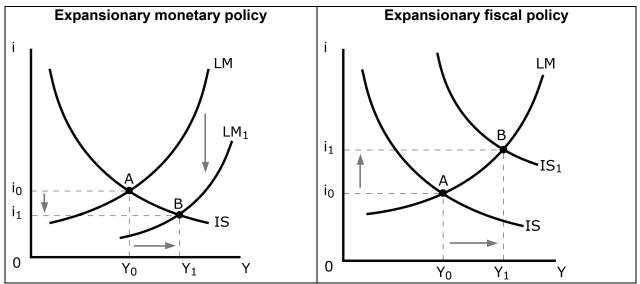


Diagram 4.19: Comparing monetary and fiscal policy

Comparing the results

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.

Let us now see what happens to some of the other variables.

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

∠ Do activity 4.22 in the workbook.

4.9 POLICY MIX IN THE IS-LM MODEL

Section outcomes

Once you have worked through this section of the learning unit you should, with aid of the IS-LM model, be able to explain:

the use of a policy mix in the IS-LM model to achieve a certain objective

In the previous sections we dealt with monetary policy and fiscal policy separately. It is also possible to use a combination of fiscal and monetary policies in this model to achieve certain objectives.

Dealing with a budget deficit and unemployment.

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

Let's take the case of a decrease in government spending.

In terms of the IS-LM model a decrease in government spending causes a decrease in the demand for goods. The level of output then declines and unemployment rises. This is represented by a leftward shift of the IS curve and a new equilibrium is reached at point B where both the interest rate and the level of output are lower. Note that, on its own, a contractionary fiscal policy causes a decline in the budget deficit, but at the expense of an increase in unemployment.

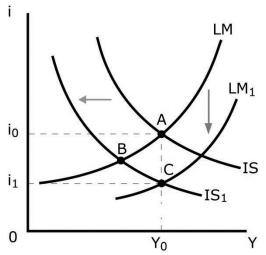


Diagram 4.20: The use of a policy mix in the IS-LM model

By implementing, at the same time, an expansionary monetary policy the negative impact of a contractionary fiscal policy on the level of output is softened. An increase in the money supply decreases the interest rate and, as the interest rate is decreased, investment spending, the demand for goods and the level of output rise. In terms of our IS-LM model model this is represented as downward shift of the LM curve.

An equilibrium position such as point C can be reached where the budget deficit is lower without a corresponding decline in output.

However, if the economy is in a liquidity trap an expansionary monetary policy will not have the desired results since, in this case, monetary policy is ineffective to bring about a change in the interest rate.

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

If the objective is to increase the level of output without an increase in the interest rate the appropriate policies are an expansionary fiscal policy with an expansionary monetary policy.

Let's see how it works in the IS-LM model.

An expansionary fiscal policy implies an increase in government spending and/or a decrease in taxation.

Let's take the case of a decrease in taxation.

In terms of the IS-LM model a decrease in taxation causes an increase in disposable income while the demand for goods and the level of output rises in the goods market. This is represented by a rightward shift of the IS curve. The increase in output causes an increase in the demand for money and a rise in the interest rate in the financial market. In our IS-LM model a new equilibrium is reached at point B with a higher level of output and a higher interest rate. Note, however, that this policy will cause an increase in the budget deficit since government revenue (T1) has declined.

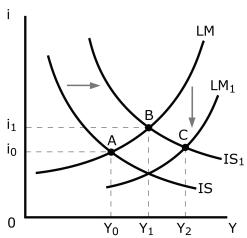


Diagram 4.21: Using a policy mix to keep the interest rate the same

By implementing, at the same time, an expansionary monetary policy it is possible to stop the interest rate from rising. In terms of our IS-LM model the LM curve shifts downwards and equilibrium is reached at point C where the level of output is higher and the interest rate is the same as at point A.

Do activity 4.23 in the workbook.

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

Section outcomes

Once you have worked through this section of the learning unit, you should be able to:

compare the impact of fiscal policy in the goods market with its impact in the IS-LM model

In both the goods market model of learning unit 2 and in the IS-LM model of this learning unit fiscal policy has an impact on the level of output and income. The impact however differs since the IS-LM model has more variables than the goods market model.

Using the example of an increase in government spending this difference can be demonstrated as follows:

In the **goods market model** an increase in government spending increases output and income equal to the multiplier times the change in government spending. The chain of events is:

$$G^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow}$$

In terms of the demand for goods, consumption spending and government spending are higher:

$$C\uparrow + I + G\uparrow$$

Investment spending, which is an exogenous variable, is unchanged.

In the **IS-LM model** an increase in government spending not only leads to an increase in output and income, but also to a change in the interest rate and investment spending.

The chain of events for the IS-LM model is:

$$\begin{array}{l} G \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \\ Y \uparrow \Rightarrow M^{d} \uparrow \Rightarrow i \uparrow \\ i \uparrow \Rightarrow i \downarrow \\ Y \uparrow \Rightarrow i \uparrow \end{array}$$

The impact on the level of output and income is therefore not only determined by the increase in government spending, but also by the change in the interest rate, how sensitive investment spending is to a change in the interest rate, and how sensitive investment is to a change in income.

The similarity between the two models is that, in both instances, an expansionary fiscal policy increases the level of output and income. The difference is that in the IS-LM model there are more variables that influence the impact of an expansionary fiscal policy.

∠ Do activity 4.24 in the workbook.

Openness in goods and financial markets

5

In this unit we continue to investigate the determination of output and income in the economy. Up to now we have considered the determination of output and income for a closed economy. It is now time to add the foreign sector in order to study the determination of output and income for an open economy. In this unit we will lay the foundation for studying an open economy.

Study instruction

Study

Prescribed book: chapter 18

Subsections: introduction, parts 18.1 and 18.2

Study guide: learning unit 5

Learning unit outcomes

In this learning unit, we deal mainly with the different concepts used in the economic debate on an open economy, as well as the measurement of these concepts. You must understand this terminology in order to avoid confusion when dealing with the subsequent learning units.

Once you have worked through this learning unit, you should be able to

- describe openness in the goods, financial and factors markets
- define the nominal exchange rate
- define the real exchange rate
- describe the components of the South African balance of payments
- describe the interest parity condition
- use the interest parity condition to choose between domestic and foreign bonds

Contents

5.1 OPENNESS IN THE GOODS MARKETS

(Introduction and section 18.1 in the prescribed book)

Study

Prescribed book: chapter 18

Subsections: 18.1

Study guide: Openness in the goods market

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- explain the concept of openness in the goods, financial and factor markets
- identify and explain the factors that influence economic participants' choice between domestic and foreign goods
- define the nominal exchange rate and distinguish between the different ways in which the nominal exchange rate can be expressed
- distinguish between an appreciation and a depreciation of the nominal exchange rate
- define the real exchange rate
- explain the factors that will cause a change in the real exchange rate
- distinguish between an appreciation and a depreciation of the real exchange rate
- explain movements in the real exchange rate of South Africa
- explain the concept multilateral exchange rate

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

∠ ■ Do activity 5.1 in the workbook.

The choice between domestic goods and foreign goods

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

Nominal exchange rate (E)

Note that there are two ways in which the nominal exchange rate can be defined.

Price of foreign currency in terms of the domestic currency (\$1 = R) - Direct method

One way is to express the price of foreign currency in terms of the domestic currency (e.g. \$1 = R), and this is the common practice in South Africa – for instance, \$1 = R8.6734. This is the rate you see on the television news, hear on the radio and read about in the newspapers. The convention of four decimal places is adopted because of the massive size of many transactions on the foreign exchange markets, which means that even small changes in exchange rates can give rise to substantial absolute changes in the value of such transactions.

Price of the domestic currency in terms of foreign currency (R1 = \$) - Indirect method

The other way is to express it as **the price of the domestic currency in terms of foreign currency (e.g. R1 = \$)**. In the case of South Africa, this means that the price of the rand (the domestic currency) is expressed in terms of dollars, pounds, euros, and so forth. For instance, R1 = \$0.20 means that the price of a rand in terms of dollars is 0.20 dollars. With R1, South Africans can buy 20 US cents and Americans

can buy R1 with 20 US cents.(If the nominal exchange rate is defined as **the price of foreign currency** (dollars) in terms of the domestic currency (rand), the exchange rate is \$1 = R5.)

In this module, we follow the international convention of defining the nominal exchange rate (E) as the **price of the domestic currency in terms of foreign currency** (R1 = \$). Make sure that you are familiar with expressing the nominal exchange rate according to this convention.

Do activity 5.2 in the workbook.

An appreciation

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

In other words, if the exchange rate, expressed as R1=\$, increases (E \uparrow), then the domestic currency appreciates.

Depreciation

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

In other words, if the exchange rate expressed as R1 = \$, decreases (E \downarrow), then the domestic currency depreciates.

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).

B Do activity 5.3 in the workbook.

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

While the nominal exchange rate between the rand and the dollar tells us how much a dollar will cost us, the real exchange rate tells us what happens to the relative price of domestic goods in terms of foreign goods. It gives us some indication of the affordability of domestic goods compared with foreign goods and it is this relative price that influences economic participants' choice between domestic and foreign goods.

Make sure you can describe the real exchange rate in terms of formula 18.1 in the prescribed book.

$$\epsilon = \frac{EP}{P*}$$

Bear in mind that the following three factors impact on the real exchange rate:

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

The impact of the nominal exchange rate (E)

The following example demonstrates the impact of a change in the nominal exchange rate on the real 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

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

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

Year 2

GDP deflator for South Africa: 110 GDP deflator for the USA: 110

The nominal exchange rate: R1 = \$0.10

Given this information, the real exchange rate is

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

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

The impact of the price level

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

Year 1

GDP deflator for South Africa: 110 GDP deflator for the USA: 110

The nominal exchange rate: R1 = \$0.10

Given this information, the real exchange rate is

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

Year 2

GDP deflator for South Africa: 120 GDP deflator for the USA: 110

The nominal exchange rate: R1 = \$0.10

Given this information, the real exchange rate is

$$\varepsilon = 0.10 \times 120/110 = 0.1 \times 1.1 = 0.11$$

Comparing the real exchange rate for year 2 (ϵ = 0.11) with the real exchange rate for 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, this was caused by the increase in the domestic price level relative to the foreign price level.

A significant implication of the above is that 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 the foreign price level tends to erode the impact of the depreciation.

From time to time, interest groups in the South African economy call on the government to reduce the nominal exchange rate in order to decrease the price of exports and increase the price of imports. Apart from the question of how this is to be done, one also needs to consider the impact this depreciation of the domestic currency would have on the domestic price level. In all likelihood, it would increase our domestic price level by fuelling inflation, thereby eroding the gains from a depreciation of the domestic currency.

To summarise:

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

$$\mathsf{EP}^{\uparrow} > \mathsf{P}^{\star} \Rightarrow \epsilon^{\uparrow} \Rightarrow \mathsf{real} \; \mathsf{appreciation}$$

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

$$EP \downarrow < P^* \Rightarrow \epsilon \downarrow \Rightarrow$$
 real depreciation

From bilateral to multilateral exchange rates

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

■ Do activity 5.4 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equation and relationships in the following table:

Concepts	Equation	Relationships
 openness in the goods market nominal exchange rate appreciation of the domestic currency depreciation of the domestic currency real exchange rate real appreciation real depreciation bilateral exchange rate 	E = price of domestic currency in terms of the foreign currency, R = \$ $ \epsilon = \frac{EP}{P*} $	$E \downarrow \Rightarrow \text{depreciation of} \\ \text{the domestic currency} \\ E \uparrow \Rightarrow \text{appreciation of} \\ \text{the domestic currency} \\ \epsilon \downarrow \Rightarrow \text{real depreciation} \\ \epsilon \uparrow \Rightarrow \text{real appreciation} \\ \end{cases}$

5.2 OPENNESS IN THE FINANCIAL MARKETS

(Section 18.2 in prescribed book)

Openness in financial markets

Section outcomes

Once you have worked through this section of the learning unit, you should be able to:

- explain the meaning of openness in the financial market
- explain why openness in the financial market allows a country to have a trade deficit or trade surplus

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

∠ Do activity 5.5 in the workbook.

Balance of payments

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- identify and describe the different elements of the balance of payments
- distinguish between a trade balance and balance on the current account
- distinguish between a positive and negative balance on the financial account
- comment on the relationship between the balance on the current account and the balance on the financial account for South Africa
- explain what is reflected by any change in the net gold and other foreign reserves

See the textbook for a condensed version and a description of the different elements of the balance of payments for South Africa.

Take note of the following aspects:

Trade balance and balance on current account

The trade balance is the difference between trade exports and imports. It is, however, not always clear whether services are included or excluded in this figure. To indicate that it excludes services, one could make use of the concept merchandise trade balance. This will then be the difference between merchandise exports (including net gold exports) and merchandise imports.

The balance on the current account is the difference between all the sales of goods and services to the rest of the world and all the primary income receipt minus all the purchases of goods and services from the rest of the world and primary payments.

Do activity 5.6 in the workbook.

The choice between domestic and foreign assets

Section outcomes

This is an important section as it lays the foundation for learning units 6 and 7.

Once you have worked through this section of the learning unit, you should be able to

- explain the role of the interest rate and exchange rate in deciding between domestic and foreign financial assets
- describe the interest parity condition
- use the interest parity condition to decide whether to buy South African bonds or USA bonds

Impact of interest rate and exchange rate

In assessing whether to invest in foreign or domestic bonds, the interest rate, exchange rate and expectations about the future exchange rate play an important role. Thus the following two formulae from figure 18.7 in the textbook can be used to compare the return on domestic and foreign assets.

a. Formula for the expected return on South African bonds held for one year, in South African rands:

 $R(1 + i_t)$

where

R = the amount of rands to be invested

 i_t = the domestic interest rate

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

 $RE_t(1+i_t^*)(1/E_{t+1}^e)$

where

R = the amount of rands to be invested

 i_t = the domestic interest rate i_t^* = the foreign interest rate E_t = the nominal exchange rate

 E_{t+1}^{e} = the expected nominal exchange rate

Use the above formulae to answer the following question:

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

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

Return on South African bond:

 $R(1 + i_t)$

 $= R100\ 000\ (1 + 0.04)$

= R104000

Return on USA bond:

 $RE_t(1+i_t^*)(1/E_{t+1}^e)$

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

Or perhaps you find the following method for calculating the return on foreign bonds more intuitive:

Today, you decide to invest your R100 000 into one year USA bonds. At the current nominal exchange rate of R1 = \$0.10, your R100 000 is worth \$10 000 (R100 000 x \$0.10 = \$10 000). After one year, your investment in dollars will be worth \$10 380 [\$10 000 (1 + 0.038) = \$10 380].

Converting your \$10 380 back into rands at the expected exchange rate of R1 = \$0.11 gives you \$10 380/0.11 = R94 363.64

From the calculations it is clear that you should be buying South African bonds.

But what if the expected exchange rate turned out to be R1 = \$0.09.

Was it still the best decision? The answer is "no" since, at an exchange rate of R1 = \$0.09, you would get back \$10 380/0.09 = R115 333.30. You should rather buy USA bonds.

Can you see how the interest rate differential and the expected exchange rate both impact on your decision?

Interest parity condition

If financial investors' only concern is the expected rate of return, they will hold only the assets with the highest expected rate of return. Combining this behaviour with the free flow of financial capital, the arbitrage process will ensure that the expected rate of return between financial assets in the world will ultimately be the same.

One way to look at the arbitrage process is to assume that the expected exchange rate will be the same as the current exchange rate. If country A offers a higher return than country B, then capital will flow to country A where the demand for financial assets will increase.

This will lead to an increase in the price of these assets and therefore a decline in the return on these assets. This process of arbitrage continues until the rate of return is the same in both countries.

Using the example of the decision between holding a one year South African bond or a one year USA bond, arbitrage implies that, eventually, the expected rate of return between these two bonds will be the same.

This is what is represented by equation 18.2 in the textbook.

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

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

It looks as follows:

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

 $1.04 = 0.943636$

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

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

This then gives us:

```
(1 + 0.04) = (1.039)(0.11/0.11)
1.04 = 1.039 and a position closer to equality is reached.
```

What we have established now is a relationship between the domestic interest rate, the foreign interest rate and the expected rate of appreciation of the currency. This is what is represented by equation 18.3 in the textbook whereas equation 18.4 is an approximation of equation 18.3.

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

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

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

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

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

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

The choice between SA bonds and USA bonds

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

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

Should you hold SA bonds or USA bonds?

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

∠ Do activity 5.8 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equation and relationship in the following table:

Concepts	Equations	Relationships
 openness in the financial markets balance of payments choice between domestic and foreign bonds interest parity condition interest rates and exchange rates 	$i_{t} \approx i_{t}^{*} - \frac{E_{t+1}^{e} - E_{t}}{E_{t}}$	If $E_{t+1}^e = E_t$, then the interest parity condition implies that $i_t = i_t^*$

The goods market in an open economy

6

In learning units 2 and 4 we analysed the impact of fiscal policy for a closed economy. We also indicated that a possible constraint of using fiscal policy is that it might lead to an unsustainable trade balance deficit. In this unit we will build a model to explain why this is the case. We will also use this model to explore different policy options that can be used in an open economy.

Study instruction

Study

Prescribed book: chapter 19

Subsections: 19.1, 19.2, 19.3 and 19.4

Study guide: learning unit 6

Learning unit outcomes

The model in this learning unit is an extension of the goods market model you encountered in learning units 2 and 4. This model, however, is specified in terms of real variables. For instance, reference is made to the real exchange rate (ϵ) and not the nominal exchange rate (ϵ) and the real interest rate (ϵ) and not the nominal interest rate (i). (The real interest rate is the nominal interest rate minus the inflation rate.)

The main outcomes for this unit are that you should be able to use the model to

- explain in words, and by means of a chain of events, equations and diagrams, the impact of a change in domestic demand on the level of output and income and the trade balance
- explain in words, and by means of a chain of events, equations and diagrams, the impact of a change in foreign demand on the level of output and income and the trade balance
- explain in words, and by means of a chain of events, equations and diagrams, the impact of a depreciation on the level of output and income and the trade balance

To achieve this we will proceed as follows:

We use the demand for goods equation discussed in learning unit 4 as our basis. We then extend it to include a foreign sector by adding exports and imports to the equation. Next, we indicate that, in an open model, it is the **demand for domestic goods** that determines the level of output and income.

We then identify the main factors that impact on imports and exports and add this information to our demand for domestic goods equation. Next, we indicate graphically how the demand for domestic goods determines the level of output and income in the goods market. We then derive the NX curve to show the relationship between the level of output and income and the trade balance.

With our model in place, we then proceed to analyse the impact that a change in domestic demand, a change in foreign demand and a depreciation of the exchange rate have on the level of output and income and the trade balance. Using this model we also show how an expansionary fiscal policy increases not only the budget deficit, but also the trade deficit.

Contents

6.1 THE IS RELATION IN AN OPEN ECONOMY (Section 19.1 in the prescribed book)

Section outcomes

Once you have worked through this section in the learning unit you should be able to

- explain in words, and by means of equations, the difference between domestic demand and the demand for domestic goods
- explain in words, and by means of a chain of events and diagrams, the determinants of imports
- explain in words, and by means of a chain of events and diagrams, the determinants of exports
- explain in words, and by means of diagrams, the difference between the DD curve (domestic demand for goods) and the ZZ curve (demand for domestic goods)
- explain the trade balance in words and distinguish between a trade deficit and a trade surplus
- derive, with the aid of diagrams, the NX curve (net exports)

Prior knowledge

Before you attempt this section, make sure you understand the following:

domestic demand for goods	Learning unit 2
determination of equilibrium output and income	Learning unit 2
the IS relation	Learning unit 4
real exchange rates	Learning unit 5

∠ ■ Do prior knowledge activity 6.1 in the workbook.

The demand for domestic goods

In this section, you should be able to distinguish clearly between the **demand for domestic goods** and the **domestic demand for goods**, using equation 19.1. Related to this are the concepts **gross domestic expenditure** and **expenditure on domestic goods and services**.

The difference is between the *demand for domestic goods* and the *domestic demand for goods* is that the demand for domestic goods (demand for goods produced in South Africa) excludes imports and includes exports while the domestic demand for goods (goods consumed in South Africa – they can be produced in South Africa or in any other country) includes imports and excludes exports.

Note that the model is specified in real terms and, therefore, in the equation for the demand for domestic goods, imports are expressed in terms of the price of domestic goods (IM/ϵ) and are subtracted.

The determinants of the demand for domestic goods

This section discusses the important variables that influence imports and exports. It also discusses the derivation of a NX-curve.

The determinants of C, I and G

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

The determinants of imports

There are two factors that influence the level of imports, namely the domestic level of output (Y) and the real exchange rate (ε) .

Domestic level of output (Y)

This is an important relationship. When domestic output in the economy rises, it leads to an increase in imports. A rise in output and income causes an increase in imports by both households and firms. Households buy final goods and services and firms buy mainly intermediate and capital goods.

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

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

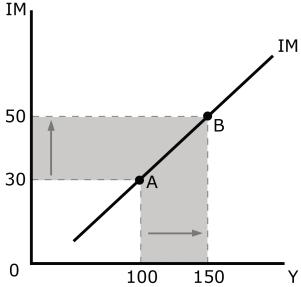


Diagram 6.1: Output and imports

The import curve is upward sloping to reflect the positive relationship between output and imports and the slope is determined by the marginal propensity to import.

Make a point of remembering this relationship because it plays a vital role in the rest of our analysis and has a significant impact on the balance of payments constraint facing South Africa.

Real exchange rate (ε)

An increase in the real exchange rate reduces the cost of imports and, consequently, more is imported. There is thus a positive relationship between the real exchange rate and imports.

$$\epsilon \uparrow \Rightarrow IM \uparrow$$

X = X

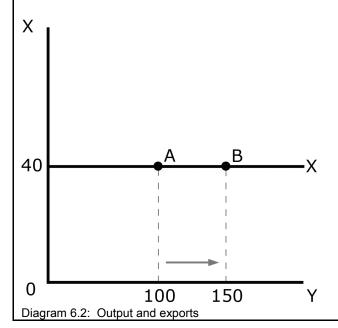
The determinants of exports

Unlike imports, the level of exports is not determined by the domestic level of output (Y) but by the level of output of a country's trading partners (Y*). The other factor that influences exports is the real exchange rate (ε) .

Domestic level of output (Y)

A change in the domestic level of output does not influence the level of exports. Exports can thus be regarded as exogenous.

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



Level of foreign output (Y*)

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

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

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

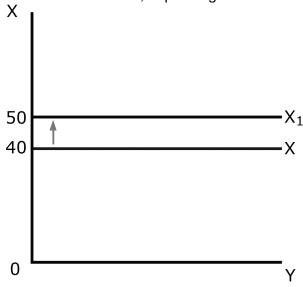


Diagram 6.3: Increase in exports

Real exchange rate (ε)

An increase in the real exchange rate implies that our goods are relatively more expensive than the goods produced in the rest of the world. A more expensive price for our exports will usually result in a decrease in exports and there is thus a negative relationship between the real exchange rate and exports.

$$\epsilon \! \uparrow \Rightarrow X \! \downarrow$$

B Do activity 6.3 in the workbook.

Putting the components together

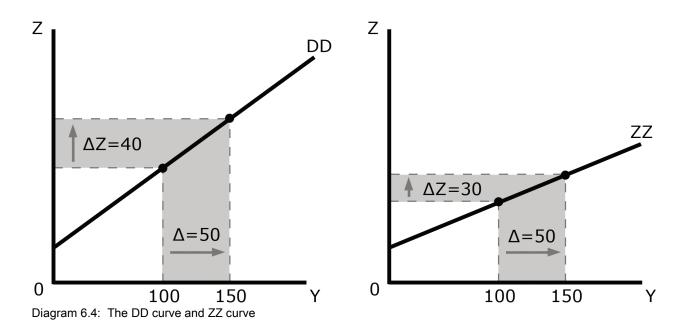
The DD curve and ZZ curve

A significant difference between the DD curve (domestic demand curve) and the ZZ curve (demand for domestic goods curve), shown in figure 19-1 in the prescribed book, is that the slope of the ZZ curve is smaller than the slope of the DD curve. This is because imports are a positive function of the domestic level of output and income. As output and income increase in the economy, some of the increase in demand falls on imports instead of domestic goods. This also leads to a smaller multiplier effect.

The small downward shift in figure 19-1(b) in the text book is caused by the autonomous imports – those imports that are not a function of the level of output and income.

It is the slope effect that is of greater significance. Consider the following two curves: DD represents the domestic demand for goods in a closed economy, while ZZ represents the demand for domestic goods in an open economy.

As you can see, the slopes of these curves differ: DD is steeper than ZZ. DD is steeper because the increase in output and income is spent on domestic goods, while for the ZZ curve, part of the increase in output and income is now spent on imported goods. Consequently the demand for domestic goods increases less for an open economy.



Constructing the NX curve

The NX curve shows what happens to the trade balance (i.e. the difference between exports and imports) as the domestic level of output and income increases in the economy.

When studying this section, remember the positive relationship between the domestic level of output and imports. As the domestic level of output and income rises, imports increase.

There are two ways to construct the NX curve. In the prescribed book, the NX curve is constructed in figure 19-1(c).

An alternative way of constructing the NX curve is to use the import and export curves shown above.

Given the real exchange rate the level of exports is R40 million in the diagram below, regardless of the level of domestic output. According to our import function, at an output and income level of R100 million, the level of imports is R30 million, at an income level of R120 million the level of imports is R40 million, and at an income level of R150 million the level of imports is R50 million.

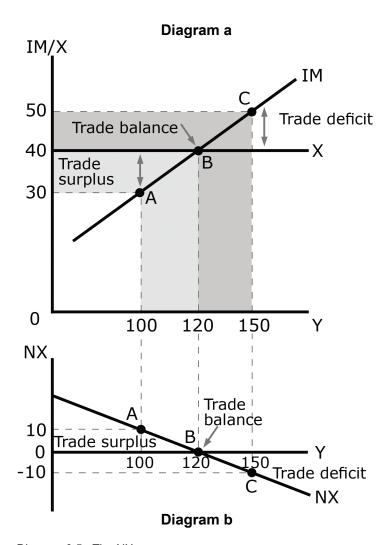


Diagram 6.5: The NX curve

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

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

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

Do activity 6.4 in the workbook.

The following table contains the important concepts, equations and relationships for this section:

Concepts	Equations	Relationships
 demand for domestic goods determinants of imports determinants of exports trade balance NX curve 	$Z = C + I + G - IM/\epsilon + X$ $IM = IM(Y,\epsilon) + +$ $X = X(Y^*,\epsilon) + -$	$\begin{array}{l} Y \uparrow \Rightarrow IM \uparrow \\ Y \downarrow \Rightarrow IM \downarrow \\ \epsilon \uparrow \Rightarrow IM \uparrow \\ \epsilon \downarrow \Rightarrow IM \downarrow \\ Y^* \uparrow \Rightarrow X \uparrow \\ Y^* \downarrow \Rightarrow X \downarrow \\ \epsilon \uparrow \Rightarrow X \downarrow \\ \epsilon \uparrow \Rightarrow X \uparrow \\ \epsilon \downarrow \Rightarrow X \uparrow \end{array}$

6.2 EQUILIBRIUM OUTPUT AND THE TRADE BALANCE (Section 19.2 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- explain in words and diagrams the determination of the equilibrium output and income in an open economy
- explain in words and by means of a chain of events and diagrams the relationship between the equilibrium level of output and income and the trade balance

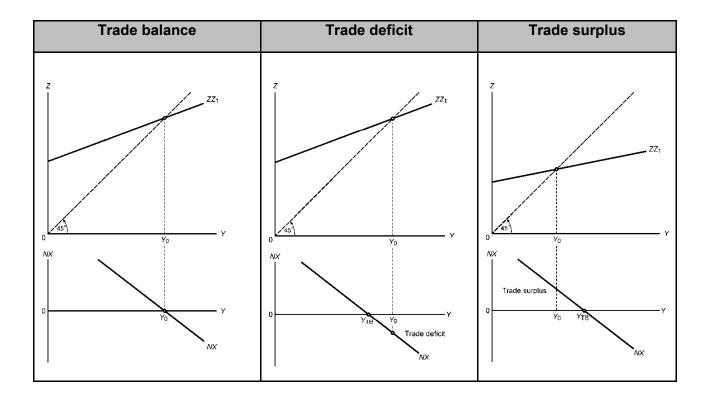
Prior knowledge

Before you attempt this section, make sure you understand the following:

demand for domestic goods	Learning unit 6, section 6.1
goods market equilibrium	Learning unit 2, section 2.3
determinants of imports	Learning unit 6, section 6.1
determinants of exports	Learning unit 6, section 6.1
the NX curve	Learning unit 6, section 6.1

∠ Do prior knowledge activity 6.2 in the workbook.

Equation 19.4 in the prescribed book contains the important variables that influence the demand for goods in an open economy. For a given demand for goods, equilibrium in the goods market is reached where the level of output and income is equal to the demand for goods. 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 determine the demand for goods changes the equilibrium level of output and income. A change in the equilibrium level of output and income, in turn, leads to a change in the trade balance.

It is this relationship between a change in the equilibrium level of output and income and the trade balance that is the topic of the next section.

∠ Do activity 6.5 in the workbook.

The following table contains the important concepts, equations and relationships for this section:

Concepts	Equations	Relationships
equilibrium output and incometrade balanceNX curve	Y = Z $Z = C + I + G - IM/\epsilon + X$ $IM = IM(Y,\epsilon)$ $X = X(Y^*,\epsilon)$	$\begin{array}{c} Y \uparrow \Rightarrow NX \downarrow \\ Y \downarrow \Rightarrow NX \uparrow \end{array}$

6.3 INCREASES IN DEMAND, DOMESTIC OR FOREIGN (Section 19.3 in prescribed book)

With our model in place we can now analyse the impact of a change in a number of important variables on the level of output and income and the trade balance.

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events, and diagrams

- the impact of a change in domestic demand on the level of output and income and the trade balance
- the impact of an expansionary fiscal policy on the trade deficit and budget deficit
- the impact of a change in exports on the NX curve
- the impact of a change in foreign demand on the level of output and income and the trade balance
- comparing the impact of a change in domestic demand with that of a change in foreign demand

Prior knowledge

Before you attempt this section, make sure you understand the following:

demand for domestic goods	Learning unit 6, section 6.1
determinants of the demand for domestic goods	Learning unit 6, section 6.1
equilibrium output and income and the trade balance	Learning unit 6, section 6.2

∠ ■ Do prior knowledge activity 6.3 in the workbook.

Increases in domestic demand

A rise in domestic demand, say, through an increase in government spending, increases the demand for goods and the equilibrium level of output and income increases. Since part of the increase in demand falls on imported goods, the level of imports increases and the trade balance decreases. In figure 19-3 in the prescribed book, the original equilibrium position Y corresponds with a trade balance equilibrium position (NX = 0). The increase in government spending here leads to a trade deficit (NX < 0). In other words, the trade balance worsens or decreases. Not only does the increase in government spending increase the trade deficit, but it also increases the budget deficit. In an open economy one must therefore consider not only the impact of an expansionary fiscal policy on the budget deficit but also the impact on the trade deficit.

Chain of events

In terms of a chain of events, the above is represented as follows:

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

Since part of an increase in government spending and the resultant increase in the demand for goods is on imported goods, the multiplier effect of an increase in government spending on the equilibrium level of output and income is smaller in an open economy than in a closed economy.

Note that an increase in domestic demand can also be due to an increase in, for instance, autonomous consumption or investment spending.

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

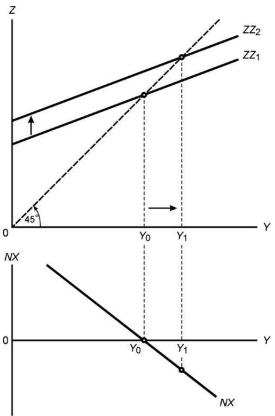
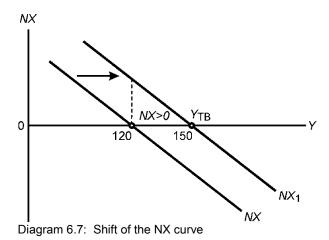


Diagram 6.6: Impact of an increase in government spending

Do activity 6.6 in the workbook.

Increase in foreign demand

To understand the impact of an increase in exports (foreign demand) you must first understand what happens to the NX curve if exports increase. When we derived the NX curve in learning unit 6.1, a certain level of exports was assumed. In the example used, it was assumed that exports were R40 million. If the same exercise had been done with the assumption that the level of exports was R50 million, a new NX curve to the right of the initial NX curve would be obtained. According to this new NX curve, at an income level of Y (which was R120 million in our example), a trade surplus occurs, and the level of income (Y_{TB}) at which a trade balance occurs is now at a higher level (R150 million).



The second point to understand is that, while a rise in exports increases the demand for goods, which in turn increases the equilibrium level of output and income, the increase in output also in turn causes a rise in imports.

Chain of events

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

We assume that the positive effect of an increase in exports on the trade balance, outstrips the negative effect of an increase in imports. The trade balance thus improves (NX^{\uparrow}) .

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 (Ī)	

The following diagram demonstrates the impact of an increase in exports on the level of output and income and the trade balance.

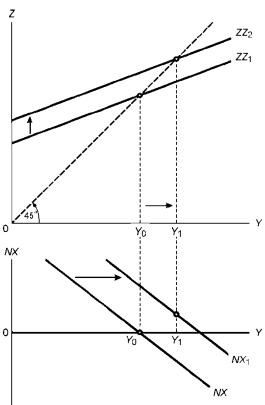


Diagram 6.8: Increase in exports

Do activity 6.7 in the workbook.

The following table contains the important concepts, equations, relationships and diagrams for this section:

Concepts	Equations	Relationships
 increase in domestic demand increase in foreign demand trade balance 	$Y = Z$ $Z = C + I + G - IM/\epsilon + X$ $IM = IM(Y,\epsilon)$ $X = X(Y^*,\epsilon)$	$\begin{array}{l} Y \uparrow \Rightarrow NX \downarrow \\ Y \downarrow \Rightarrow NX \uparrow \end{array}$ $G \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \Rightarrow IM \uparrow \Rightarrow NX \downarrow $ $X \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \Rightarrow IM \uparrow $ $X \uparrow \Rightarrow NX \uparrow $

6.4 DEPRECIATION, THE TRADE BALANCE AND OUTPUT (Section 19.4 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events and diagrams:

- the impact of a depreciation on the real exchange rate
- the Marshall-Lerner condition
- the impact of a depreciation on the level of output and income and trade balance

Prior knowledge

Before you attempt this section, make sure you understand the following:

real exchange rate	Learning unit 5, section 5.1
depreciation of the real exchange rate	Learning unit 5, section 5.1
determinants of exports	Learning unit 6, section 6.1
determinants of imports	Learning unit 6, section 6.1
net exports	Learning unit 6, section 6.1

∠ ■ Do prior knowledge activity 6.4 in the workbook.

Impact of a depreciation on the real exchange rate

Note that a depreciation, given that the relative price level stays the same, leads to a lower real exchange rate. Thus the real exchange rate (ϵ) equals the nominal exchange rate (ϵ) in all models where the price level is fixed. Prices are assumed to be fixed in the IS-LM model therefore a nominal depreciation of the domestic currency will lead to a real depreciation of the domestic currency.

Depreciation and the trade balance: the Marshall-Lerner condition

The depreciation of the real exchange rate impacts the demand for domestic goods through a change in exports and imports – and it increases the import bill.

For the Marshall-Lerner condition to hold, a real depreciation must eventually lead to an increase in net exports (an improvement in the trade balance). A depreciation of the domestic currency decreases the price of exports and increases the price of imports and has therefore both a positive and a negative effect on the trade balance. *Positive effect*: the decrease in the price of exports results in an increase in exports and a decrease in imports and the trade balance improves. *Negative effect*: the increase in the price of imports increases the import bill which impacts negatively on the trade balance. For the Marshall-Lerner condition to hold, the positive effect on the trade balance must outstrip the negative effect (in other words, exports must increase enough and imports must decrease enough to compensate for the increase in the price of imports).

Thus, a depreciation has both a positive and a negative effect on the trade balance.

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

The effects of a depreciation

We assume that the Marshall-Lerner condition holds, therefore a depreciation results in an improvement in the trade balance as well as an increase in the level of output and income. The level of output and income increases because the demand for domestic goods increases.

The increase in the demand for domestic goods is the result of two things: the rise in exports and expenditure switching. Expenditure switching takes place when the increase in the relative price of imports cause economic participants to switch their expenditure from imported goods to domestic goods.

Chain of events

The chain of events for the *positive effect* will be as follows:

The lower price of exports causes an increase in exports which, in turn, increases the demand for domestic goods as well as the level of output and income.

$$\mathsf{P}_{\mathsf{exports}} \!\! \downarrow \Rightarrow \mathsf{X} \!\! \uparrow \Rightarrow \mathsf{Z} \!\! \uparrow \Rightarrow \mathsf{Y} \!\! \uparrow$$

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

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

The chain of events for the *negative effect* will be as follows:

$$P_{imports} \uparrow \Rightarrow Imports Bill \uparrow$$

Thus, for the Marshall-Lerner condition to hold, depreciation must eventually lead to an increase in net exports and as a result, an increase in the level of output and income.

For this to happen, the positive effect on the trade balance (increase in exports and decrease in imports due to the relative price changes) must outstrip the negative effect (increase in the imports bill).

Therefore, the ZZ_1 curve will shift upwards, the domestic level of output will increase, the NX curve will shift to the right and a trade surplus occurs.

Graphically this can be indicated as follows:

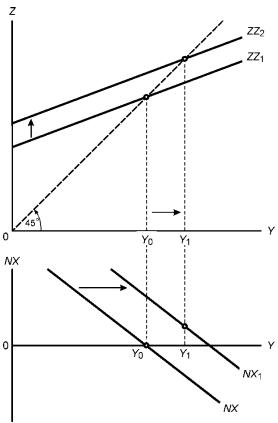


Diagram 6.9: Impact of a depreciation

A depreciation causes an upward shift of the ZZ_1 curve to ZZ_2 . This increase is due to the increase in exports and to expenditure switching from imports to domestic goods. The higher demand for domestic goods increases the level of output and income and it increases from Y_0 to Y_1 .

Since exports are higher, the NX curve shifts to the right to NX_1 . According to the new NX_1 curve at the equilibrium income of Y_1 there is now a trade surplus. The depreciation has resulted in an increase in the equilibrium level of output and income and an improvement in the trade balance.

There is a secondary effect on the trade balance. The increase in the level of output and income will result in an increase in imports:

$$\mathsf{E}\!\downarrow \Rightarrow \mathsf{X}\!\uparrow \Rightarrow \mathsf{Z}\!\uparrow \Rightarrow \mathsf{Y}\!\uparrow \Rightarrow \mathsf{IM}\!\uparrow \Rightarrow \mathsf{NX}\!\downarrow$$

However we assume that the increase in imports induced by the increase in the level of output and income is smaller than the direct improvement in the trade balance as a result of the increase in exports and expenditure switching, thus the trade balance improves overall.

To summarise: We assume in this module that the Marshall-Lerner condition holds. Thus a real **depreciation** leads to an increase in exports and a decrease in imports thus increasing net exports resulting in an improvement in the trade balance:

$$E \downarrow \Rightarrow X \uparrow \Rightarrow NX \uparrow$$
$$E \downarrow \Rightarrow IM \downarrow \Rightarrow NX \uparrow$$

And the level of output and income will increase due to the increase in exports and expenditure switching:

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

Impact of an appreciation on the trade balance and the level of output and income

The opposite is therefore true and a real **appreciation** leads to a decrease in exports and an increase in imports thus decreasing net exports resulting in a deterioration in the trade balance:

$$\begin{array}{c} \mathsf{E}^{\uparrow} \Rightarrow \mathsf{X} \downarrow \Rightarrow \mathsf{NX} \downarrow \\ \mathsf{E}^{\uparrow} \Rightarrow \mathsf{IM}^{\uparrow} \Rightarrow \mathsf{NX} \downarrow \end{array}$$

And the level of output and income will increase due to the increase in exports and expenditure switching:

$$E^{\uparrow} \Rightarrow X^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow}$$
$$E^{\uparrow} \Rightarrow IM^{\uparrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow}$$

∠ Do activity 6.8 in the workbook.

The following table contains the important concepts, equations and relationships for this section:

Concepts	Equations	Relationships
 real depreciation Marshall-Lerner condition trade balance depreciation and trade balance depreciation and level of output and income 	$Y = Z$ $Z = C + I + G - IM/\epsilon + X$ $IM = IM(Y,\epsilon)$ $X = X(Y^*,\epsilon)$	$\begin{array}{c} \epsilon \downarrow \Rightarrow X \uparrow \\ \epsilon \downarrow \Rightarrow IM \downarrow \\ Y \uparrow \Rightarrow IM \uparrow \\ E \downarrow \Rightarrow X \uparrow \Rightarrow NX \uparrow \\ E \downarrow \Rightarrow IM \downarrow \Rightarrow NX \uparrow \\ E \downarrow \Rightarrow X \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \\ E \downarrow \Rightarrow IM \downarrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \end{array}$

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

7

The model in this learning unit is an extension of the IS-LM model you encountered in learning unit 4. This extended IS-LM model takes into account that we are dealing with an open economy in which the exchange rate is an endogenous variable. You might recall that, in learning unit 6, we discussed the impact of the exchange rate on the demand for goods by assuming that it either increases or decreases, and that we then analysed the impact of a change in the exchange rate on the level of output and income and the trade balance. In this model you will see how the exchange rate is influenced by the domestic interest rate which in return is determined by the interaction between the goods market and the financial market.

Study instruction

Read:

The introductory part of chapter 20 in the prescribed book, to orient yourself.

Study:

Prescribed book: chapter 20

Subsections: 20.1, 20.2, 20.3 and 20.4

Study guide: learning unit 7

Learning unit outcomes

Once you have worked through this learning unit, you should be able to use the IS-LM model to explain the following in words and by means of a chain of events, equations and diagrams:

- equilibrium in the goods market in an open economy
- equilibrium in the financial market in an open economy
- the relationship between the domestic interest rate and the nominal exchange rate
- equilibrium in the goods and financial market in an open economy
- the impact of fiscal policy in an open economy
- the impact of monetary policy in an open economy
- comparing the impact of fiscal policy with monetary policy for an open economy

To achieve these outcomes we will proceed as follows:

First, we look at the goods market by using the demand for goods equation (our IS curve for an open economy) that we derived in learning unit 6 and we rewrite it in terms of the nominal interest rate and exchange rate. We then show how a change in the interest rate and a change in the exchange rate impact on the demand for goods and the level of output and income.

We then turn our attention to the financial market and use the tools we developed in learning units 3, 4 and 5. You might recall that in learning unit 3 we showed how the equilibrium interest rate is determined by the quantity of money demanded and the quantity of money supplied in the financial market. In learning unit 4 we derived the LM curve to indicate the impact a change in output and income has on the equilibrium interest rate. In learning unit 5 we derived the interest parity condition which implies that, through the process of arbitrage, the domestic interest rate (i) must be (approximately) equal to the foreign interest rate (i*) minus the expected appreciation of the domestic currency (Ee).

We then use this interest parity condition to derive the interest parity relation which indicates the relationship between the domestic interest rate and the exchange rate, given that the expected exchange rate and the foreign interest rate are unchanged.

We then combine the IS-LM model with this interest parity relation and the stage is set to analyse the impact of fiscal and monetary policy on the level of output and income, the exchange rate and the trade balance.

Contents

7.1 EQUILIBRIUM IN THE GOODS MARKET (Section 20.1 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to

- explain in words, and by means of an equation, the demand for goods relationship for an open economy
- explain in words, and by means of a chain of events, the impact of a change in the interest rate on the demand for goods and the level of output and income
- explain in words, and by means of a chain of events, the impact of a change in the nominal exchange rate on the demand for goods and the level of output and income

Prior knowledge

Before you attempt this section of the work, make sure you understand the following:

the demand for goods in an open economy	Learning unit 6
the relationship between the interest rate and investment	Learning unit 4
net exports	Learning unit 6
the relationship between the exchange rate and net exports	Learning unit 6
appreciation and depreciation of the domestic currency	Learning unit 5

∠ ■ Do prior knowledge activity 7.1 in the workbook.

Equilibrium condition in the goods market

One of the assumptions of the IS-LM model is that the price level is constant. In an open model, this means that the domestic price level (P) as well as the foreign price level remain unchanged (P*). We can therefore analyse the economy using nominal variables such as the nominal interest rate (i) and the nominal exchange rate (E).

This is why the equilibrium condition given by equation 19.4 in the prescribed book is rewritten by replacing the term $IM(Y,\epsilon)/\epsilon + X(Y^*,\epsilon)$ with $NX(Y,Y^*,E)$. Two important variables that we deal with in this section are the nominal exchange rate (E) and the nominal interest rate (i).

To simplify matters we also group exports and imports together and refer to them as net exports (NX).

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

An increase in the interest rate leads to a decrease in investment spending, the demand for goods and the level of output and income.

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

The decrease in output and income is a multiple of the decrease in investment spending. This is due to the multiplier effect.

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

A depreciation of the exchange rate results in an increase in exports and a decrease in imports due to expenditure switching, thus the trade balance improves. The increase in exports and expenditure switching increases the demand for goods and the level of output and income.

$$\begin{array}{l} \mathsf{E}\!\!\downarrow \Rightarrow \mathsf{X}\!\!\uparrow \Rightarrow \mathsf{NX}\!\!\uparrow \Rightarrow \mathsf{Z}\!\!\uparrow \Rightarrow \mathsf{Y}\!\!\uparrow \\ \mathsf{E}\!\!\downarrow \Rightarrow \mathsf{IM}\!\!\downarrow \Rightarrow \mathsf{NX}\!\!\uparrow \Rightarrow \mathsf{Z}\!\!\uparrow \Rightarrow \mathsf{Y}\!\!\uparrow \end{array}$$

The following are the important equation and relationships for this section:

Equation	Relationships
$Y = C(Y-T) + I(Y,i) + G + NX(Y,Y^*,E)$	$i \uparrow \Rightarrow I \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$
	$\begin{array}{c} E\!\!\downarrow \Rightarrow X\!\!\uparrow \Rightarrow NX\!\!\uparrow \Rightarrow Z\!\!\uparrow \Rightarrow Y\!\!\uparrow \\ E\!\!\downarrow \Rightarrow IM\!\!\downarrow \Rightarrow NX\!\!\uparrow \Rightarrow Z\!\!\uparrow \Rightarrow Y\!\!\uparrow \end{array}$
	$\begin{array}{c} E\!\!\uparrow \Rightarrow X\!\!\downarrow \Rightarrow NX\!\!\downarrow \Rightarrow Z\!\!\downarrow \Rightarrow Y\!\!\downarrow \\ E\!\!\uparrow \Rightarrow IM\!\!\uparrow \Rightarrow NX\!\!\downarrow \Rightarrow Z\!\!\downarrow \Rightarrow Y\!\!\downarrow \end{array}$

∠ Do activity 7.1 in the workbook.

7.2 EQUILIBRIUM IN FINANCIAL MARKETS (Section 20.2 in the prescribed book)

Section outcomes

Once you have worked through this section of the study unit, you should be able to:

- explain in words, and by means of an equation, the equilibrium in the financial market for an open economy
- explain in words, and by means of an equation, the interest parity condition
- explain in words, and by means of a diagram, the relationship between the domestic interest rate and the nominal exchange rate

Prior knowledge

Before you attempt this section of the work, make sure you understand the following:

equilibrium in financial markets	Learning unit 3
the LM curve	Learning unit 4
openness in financial markets	Learning unit 5
the interest rate parity condition	Learning unit 5

Do prior knowledge activity 7.2 in the workbook.

The domestic interest rate and the nominal exchange rate

In this section, a relationship between the domestic interest rate and the nominal exchange rate is 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. 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 = \$0.20The expected exchange rate (at the end of the period E e) is R1 = \$0.20The 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:

$$E = \frac{1+i}{1+i*}\bar{E}^e$$

Therefore:

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

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 current 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 rands results in an appreciation of the domestic currency (in this case, the rand).

Figure 20.1 in the prescribed book 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 E^e . In terms of our example above, it is assumed that the interest rate in the rest of the world remains unchanged at 4% and that the expected exchange rate remains unchanged at R1 = \$0.20.

The following diagrams give a summary of the impact of change in the domestic interest rate on the nominal exchange rate:

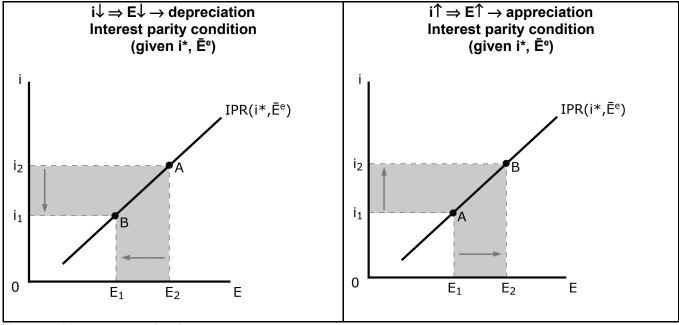


Diagram 7.1 Interest rate and exchange rate

The following table contains the important concepts, equation and relationships for this section:

Concepts	Equation	Relationships
 interest parity condition nominal exchange rate expected future exchange rate 	$E = \frac{1+i}{1+i*}\bar{E}^e$	i↑ ⇒ Capital _{inflow} ⇒ E↑ ⇒ appreciation i↓ ⇒ Capital _{outflow} ⇒ E↓ ⇒ depreciation

Do activity 7.2 in the workbook.

7.3 PUTTING GOODS AND FINANCIAL MARKETS TOGETHER (Section 20.3 in the prescribed book)

Section outcomes

Once you have worked through this section of this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- the impact of a change in the interest rate on the level of output and income in the goods market for an open economy
- the IS-LM model for an open economy
- how the equilibrium interest rate determines the equilibrium exchange rate

Prior knowledge

Before you attempt this section of the work, make sure you understand the following:

the demand for goods in an open economy	Learning unit 7
goods market equilibrium	Learning unit 7
the IS relationship	Learning unit 4, learning unit 6 and learning unit 7
financial market equilibrium	Learning unit 3 and learning unit 7
the LM relationship	Learning unit 4 and learning unit 7
the interest parity condition and exchange	Learning unit 5 and learning unit 7
rates	
the IS-LM model	Learning unit 4

∠ Do prior knowledge activity 7.3 in the workbook.

The downward slope of the IS curve

In this section, the changes in the IS curve are important – as is the link between the domestic equilibrium interest rate and the nominal exchange rate.

As you learnt in learning unit 4, the IS curve is downward sloping. In a closed economy, this is because of the negative relationship between the interest rate and the level of output and income.

Chain of events

In terms of a chain of events, this relationship is represented as follows:

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

A decline in the interest rate increases investment spending, the demand for goods and the level of output and income.

In an open economy, there is an additional channel through which interest rates impact on the level of output and income.

Chain of events

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

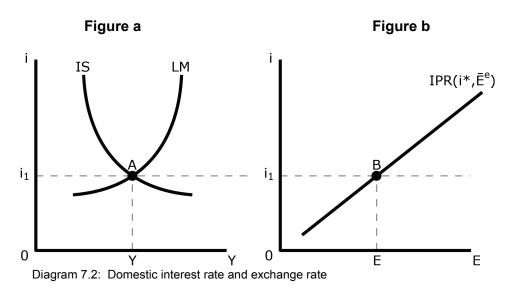
$$i\downarrow \Rightarrow E\downarrow \Rightarrow X\uparrow \Rightarrow Z\uparrow \Rightarrow Y\uparrow$$

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. This 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, in turn, increases the demand for goods and the level of output and income.

From domestic interest rates to the exchange rate

In terms of the IS-LM model, the domestic equilibrium interest rate is determined by the interaction between the goods market and the financial market. The goods market is represented by the IS curve and the financial market by the LM curve. Also refer to figures 20.2(a) and (b) and the explanation of this in the prescribed book.

In terms of figure a in diagram 7.2, below, equilibrium in both the goods and financial markets occurs at point A. At point A, the equilibrium interest rate is i_1 . 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.



The following table contains the important concepts, equations and relationships for this section:

	Concepts	Equations	Relationships
•	the IS curve for an open economy the LM curve for an open economy the IS-LM model for an open economy the interest parity relation exchange rate	IS: $Y = C(Y-T) + I(Y,i) + G + NX(Y,Y^*,E)$ $E = \frac{1+i}{1+i*}\bar{E}^e$ LM: M/P = YL(i)	$\begin{split} i \!\!\! \downarrow \Rightarrow I \!\!\! \uparrow \Rightarrow Z \!\!\! \uparrow \Rightarrow Y \!\!\! \uparrow \\ i \!\!\! \uparrow \Rightarrow I \!\!\! \downarrow \Rightarrow Z \!\!\! \downarrow \Rightarrow Y \!\!\! \downarrow \\ i \!\!\! \downarrow \Rightarrow Capital_{outflow} \Rightarrow E \!\!\! \downarrow \\ i \!\!\! \uparrow \Rightarrow Capital_{inflow} \Rightarrow E \!\!\! \uparrow \\ E \!\!\!\! \downarrow \Rightarrow X \!\!\!\! \uparrow \Rightarrow NX \!\!\! \uparrow \Rightarrow Z \!\!\!\! \uparrow \Rightarrow Y \!\!\!\! \uparrow \\ E \!\!\!\! \downarrow \Rightarrow IM \!\!\!\! \downarrow \Rightarrow NX \!\!\!\! \uparrow \Rightarrow Z \!\!\!\! \uparrow \Rightarrow Y \!\!\!\! \uparrow \\ E \!\!\!\! \uparrow \Rightarrow IM \!\!\!\! \downarrow \Rightarrow NX \!\!\!\! \downarrow \Rightarrow Z \!\!\!\! \downarrow \Rightarrow Y \!\!\!\! \downarrow \\ E \!\!\!\! \uparrow \Rightarrow IM \!\!\!\! \uparrow \Rightarrow NX \!\!\!\! \downarrow \Rightarrow Z \!\!\!\! \downarrow \Rightarrow Y \!\!\!\! \downarrow \\ E \!\!\!\! \uparrow \Rightarrow IM \!\!\!\! \uparrow \Rightarrow NX \!\!\!\! \downarrow \Rightarrow Z \!\!\!\! \downarrow \Rightarrow Y \!\!\!\! \downarrow \\ Y \!\!\!\! \uparrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\! \uparrow \Rightarrow i \!\!\!\! \uparrow \\ Y \!\!\!\! \downarrow \Rightarrow M \!\!\!\!\!\! \downarrow \Rightarrow i \!\!\!\! \downarrow \\ \end{split}$

∠ Do activity 7.3 in the workbook.

7.4 THE EFFECTS OF POLICY IN AN OPEN ECONOMY (Section 20.4 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events and diagrams:

- the impact of fiscal policy in an open economy
- the impact of monetary policy in an open economy
- a comparison of the impact of monetary policy with the impact of fiscal policy for an open economy

To understand the impact of fiscal and monetary policy in an open economy you need to be fully conversant with the material covered in the previous learning units. Do not be misled by the fact that this topic is covered by only two pages in the prescribed book. This brief description covers most of the relationships you have dealt with in previous learning units and you must now combine all these different relationships to make sense of this section.

The effects of fiscal policy in an open economy

Prior knowledge

Before you attempt this section of the work, make sure you understand the following:

the IS-LM model	Learning unit 4
the IS relation	Learning unit 4, learning unit 6 and learning unit 7
shift of the IS curve	Learning unit 4
the LM relationship	Learning unit 4
the impact of a change in output and income on the interest rate	Learning unit 3 and learning unit 4
fiscal policy, output and interest rate	Learning unit 4
the interest parity condition and exchange rates	Learning unit 7

∠ Do prior knowledge activity 7.4 in the workbook.

From an increase in the budget deficit to deterioration of the trade balance

Given the level of taxation, an increase in government spending (expansionary fiscal policy) causes an increase in the budget deficit and affects the trade balance.

Impact on the goods market

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. In terms of figure 7.3(a) below, this is indicated by a rightward shift in the IS curve.

$$\begin{array}{l} \mathsf{G}^{\uparrow} \Rightarrow \mathsf{Z}^{\uparrow} \Rightarrow \mathsf{Y}^{\uparrow} \\ \mathsf{Y}^{\uparrow} \Rightarrow \mathsf{C}^{\uparrow} \\ \mathsf{Y}^{\uparrow} \Rightarrow \mathsf{I}^{\uparrow} \end{array}$$

Impact on the financial market

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

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

Back to the goods market

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

$$\begin{array}{l} i {\uparrow} \Rightarrow I {\downarrow} \\ Y {\uparrow} \Rightarrow I {\uparrow} \end{array}$$

Impact on the exchange rate and trade balance

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

The increase in the interest rate causes an increase in capital inflows; the nominal exchange rate increases and the domestic currency appreciates. This is represented by an upward movement along the interest parity relation in figure 7.3(b) below. (Note: prices are assumed to be fixed in the IS-LM model therefore a nominal appreciation of the domestic currency will lead to a real appreciation of the domestic currency).

$$i \!\!\uparrow \Rightarrow Capital_{inflow} \!\!\Rightarrow E \!\!\uparrow$$

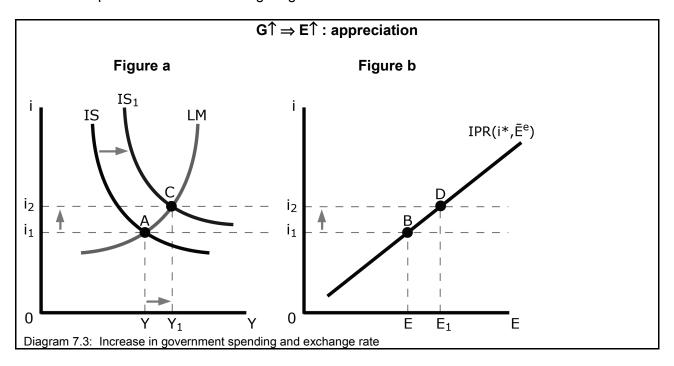
As the domestic currency appreciates, exports decrease and the trade balance deteriorates. The appreciation of the currency also causes imports to be cheaper, and imports thus increase, which contributes to a further worsening of the trade balance.

$$\begin{array}{l} \mathsf{E}\!\uparrow \Rightarrow \mathsf{X}\!\!\downarrow \Rightarrow \mathsf{NX}\!\!\downarrow \\ \mathsf{E}\!\uparrow \Rightarrow \mathsf{IM}\!\uparrow \Rightarrow \mathsf{NX}\!\!\downarrow \end{array}$$

We assume that the initial impact on the level of output and income of an increase in government spending will dominate the impact of an appreciation, and thus the level of output and income increases overall.

$$\begin{array}{l} \mathsf{E}^{\uparrow} \Rightarrow \mathsf{X}^{\downarrow} \Rightarrow \mathsf{Z}^{\downarrow} \Rightarrow \mathsf{Y}^{\downarrow} \\ \mathsf{E}^{\uparrow} \Rightarrow \mathsf{IM}^{\uparrow} \Rightarrow \mathsf{Z}^{\downarrow} \Rightarrow \mathsf{Y}^{\downarrow} \end{array}$$

The above is represented in the following diagram:



The following table contains the important concepts, equations and relationships for this section:

Concepts	Equations	Relationships
 the IS-LM model for an open economy fiscal policy the interest parity relation and exchange rates 	$Y = C(Y-T) + I(Y,i) + G +$ $NX(Y,Y^*,E)$ $E = \frac{1+i}{1+i*}\bar{E}^e$ $LM: M/P = YL(i)$	$\begin{array}{c} G \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow \\ Y \uparrow \Rightarrow C \uparrow \\ Y \uparrow \Rightarrow M^{d} \uparrow \Rightarrow i \uparrow \\ i \uparrow \Rightarrow I \downarrow \\ Y \uparrow \Rightarrow I \uparrow \\ i \uparrow \Rightarrow Capital_{inflow} \Rightarrow E \uparrow \end{array}$
		$ \begin{bmatrix} E^{\uparrow} \Rightarrow X \downarrow \Rightarrow NX \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow \\ E^{\uparrow} \Rightarrow IM^{\uparrow} \Rightarrow NX \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow \end{bmatrix} $

∠ Do activity 7.4 in the workbook.

The effect of monetary policy in an open economy

Prior knowledge

Before you attempt this section of the work, make sure you understand the following:

monetary policy and open-market operations	Learning unit 3
the LM relationship	Learning unit 4
shift of the LM curve	Learning unit 4
the IS relationship	Learning unit 4, learning units 6 and 7
monetary policy, output and interest rate	Learning unit 4
the interest parity condition and exchange rates	Learning unit 7

∠ Do prior knowledge activity 7.5 in the workbook.

From a monetary contraction (contractionary monetary policy) to an appreciation of the domestic currency

Impact on the financial market

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 (M^s) to the left (see learning unit 4).

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

Impact on the goods market

In the goods market, an increase in the interest rate causes a decline in investment spending, which decreases the demand for goods and the level of output and, in turn, a decline in income. As the level of output and income declines, there is a further decrease in investment spending.

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

Impact on the exchange rate and trade balance

The increase in the interest rate causes an increase in capital inflows; the nominal exchange rate increases and the domestic currency appreciates (prices are assumed to be fixed in the IS-LM model therefore a nominal appreciation of the domestic currency will lead to a real appreciation of the domestic currency).

$$i \uparrow \Rightarrow Capital_{inflow} \Rightarrow E \uparrow$$

An appreciation of the domestic currency increases the price of exports and the net exports position worsens. Simultaneously an appreciation decreases the price of imports and the net exports position worsens.

$$\begin{array}{c} \mathsf{E}^{\uparrow} \Rightarrow \mathsf{X} \downarrow \Rightarrow \mathsf{NX} \downarrow \\ \mathsf{E}^{\uparrow} \Rightarrow \mathsf{IM}^{\uparrow} \Rightarrow \mathsf{NX} \downarrow \end{array}$$

The impact of a decrease in money supply on the level of output and income is strengthened by the impact of an appreciation, thus overall the level of output and income decreases.

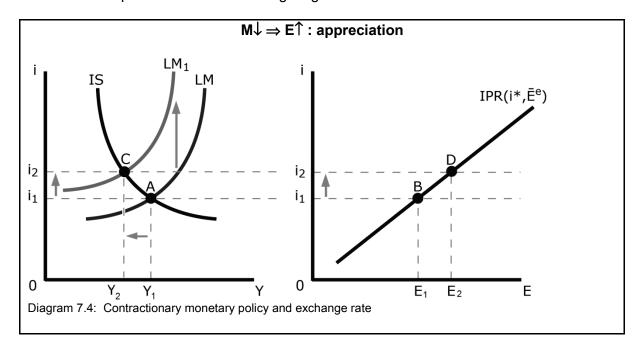
$$\begin{array}{l} E \! \uparrow \Rightarrow X \! \downarrow \Rightarrow Z \! \downarrow \Rightarrow Y \! \downarrow \\ E \! \uparrow \Rightarrow IM \! \uparrow \Rightarrow Z \! \downarrow \Rightarrow Y \! \downarrow \end{array}$$

The IS-LM model

In terms of the IS-LM model, the above is represented in diagram 7.4 by an upward shift of the LM curve. A movement from point A to point C 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 then appreciates. This is represented by an upward movement along the interest parity relation in diagram 7.4 below.

The above is represented in the following diagram:



The following table contains the important concepts, equations and relationships for this section:

Concepts	Equations	Relationships
 the IS-LM model for an open economy monetary policy the interest parity relation and the exchange rate 	IS: $Y = C(Y-T) + I(Y,i) + G + NX(Y,Y^*,E)$ $E = \frac{1+i}{1+i*}\bar{E}^e$ LM: M/P = YL(i)	$\begin{split} M \!\!\downarrow &\Rightarrow M/P \!\!\downarrow \Rightarrow i \!\!\uparrow \\ i \!\!\uparrow \Rightarrow I \!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ Y \!\!\downarrow \Rightarrow I \!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ i \!\!\uparrow \Rightarrow Capital_{inflow} \Rightarrow E \!\!\uparrow \\ E \!\!\uparrow \Rightarrow X \!\!\downarrow \Rightarrow N \!\!\!\downarrow \Rightarrow Z \!\!\downarrow \Rightarrow Y \!\!\downarrow \\ E \!\!\uparrow \Rightarrow I \!\!\!\!M \!\!\uparrow \Rightarrow N \!$

∠ Do activity 7.5 in the workbook.

7.5 COMPARING THE IMPACT OF FISCAL AND MONETARY POLICY

You will not find this section in the prescribed book, but bear in mind that it is extremely important and prescribed for the examination.

To compare the impact of fiscal policy with that of monetary policy a good starting point is the diagrams. You need to draw the diagrams yourself.

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 has 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 has depreciated.

Comparison

In both cases the level of output and income is higher. The reason why it is higher differs, however. 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 an expansionary monetary policy the increase in the money supply causes a decrease in the interest rate.

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

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

The impact on the trade balance therefore differs. In the case of an expansionary fiscal policy (where the exchange rate appreciates), the trade balance worsens 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 policy and an 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	Government spending higher	Unchanged
taxes	and/or taxes lower	
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

∠ Do activity 7.6 in the workbook.

The labour market

In the previous learning units we looked at how the interaction between the goods market and financial market determines the output level and income in a closed economy and in an open economy. In our arguments we have concentrated on the role the demand for goods plays and have ignored the supply side by assuming that the supply adjust to changes in demand.

It is now time to incorporate the supply side. We will do that by developing a labour market in this unit. In the next unit we will then construct a model (called the AS-AD model) that shows how the level of output and income is determined by the interaction between the goods market, the financial market and the labour market for a closed economy.

Study instruction

Read

The introductory part of the medium run, as well as chapter 6 in the prescribed book, to orient yourself.

Study

Prescribed book: chapter 6

Subsections: 6.1, 6.2, 6.3, 6.4 and 6.5

Study guide: learning unit 8

Learning unit outcomes

In this labour market model, the natural rate of unemployment – which is the unemployment rate that the economy tends to return to in the medium run – is the result of the behaviour of labour and firms in the economy. The behaviour of labour is captured by the wage setting relationship while the behaviour of firms is captured by the price setting relationship and it is the interaction between wage setting behaviour and price setting behaviour that determines the natural rate of unemployment.

Once you have worked through this learning unit, you should be able to

- explain how wage setting and price setting determine the natural rate of unemployment
- explain, by using the labour market model, what causes a change in the natural rate of unemployment
- explain the link between the natural rate of unemployment and the natural level of output

To achieve these outcomes we first look at some of the features of the South African labour market and define some important labour market concepts.

We then capture the behaviour of labour by constructing a wage setting relationship.

This is followed by the construction of a price setting relationship that captures the behaviour of firms.

By combining the wage setting relation and the price setting relation we then show how the natural rate of unemployment is determined and what the factors are that change the natural rate of unemployment.

We end the section by showing what the relationship between the natural rate of unemployment and the natural level of output for a macro economy is.

As you work through this learning unit, also consider the question of whether the natural unemployment rate for South Africa has been increasing or decreasing and what the factors that contributed to this change in the natural rate of unemployment might have been.

Contents

8.1 A TOUR OF THE LABOUR MARKET (Sections 6.1 and 6.2 in the prescribed book)

Section outcomes

Once you have worked through this section, you should be able to explain the following:

- the non-institutional civilian population
- the labour force
- being out of the labour force
- employed
- unemployed (according to the strict and expanded definitions)
- the measurement of unemployment
- the employment rate
- movements in unemployment and the position of workers

Make sure you can distinguish between the concepts labour force, out of the labour force, employed and unemployment.

Estimating the numbers of the employed and unemployed in South Africa is extremely difficult and different measures of employment and unemployment are calculated from time to time.

Another problem of estimating unemployment in South Africa is the issue of employment in the informal sector. If the informal sector is to be regarded as a last resort for those who are unable to find jobs in the formal sector, the employment rate (labour absorption capacity) of the formal sector can be used to gauge the extent of unemployment in South Africa. The low labour force absorption capacity of the formal sector, coupled with the fact that between 400 000 and 500 000 new people enter the labour market every year, indicates high and increasing unemployment in South Africa.

What you need to understand in the section on the movement in unemployment is that, when the labour market is slack – that is, when the demand for labour slows down or declines – workers are more likely to lose their jobs and the probability of finding a job is lower. Make sure you have a clear understanding of the relationship between changes in the unemployment rate and the bargaining position of a worker.

In the next section, you will see that a higher unemployment rate erodes the bargaining position of workers, which in turn has implications for wage-setting behaviour in the economy and the natural rate of unemployment.

Do activity 8.1 in the workbook.

8.2 WAGE DETERMINATION (Section 6.3 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events and equations

- the factors that influence the bargaining position of workers
- the wage determination relation
- the impact of the expected price level, the unemployment rate and other variables on the determination of nominal wages demands

Wages are set in many ways: by collective bargaining (bargaining between firms and unions), by employers and by bargaining between the employer and individual employees. Although institutional differences influence wage determination, there are common forces at work in all countries, namely that workers are typically paid a wage that exceeds their reservation wage (this means that most workers are paid a high enough wage that they prefer being employed to being unemployed) and that wages depend on labour market conditions such as the unemployment rate, the demand for labour, the supply of labour and labour laws and regulations.

Bargaining

The bargaining power of a worker depends on two factors, namely the nature of the job (e.g. non-skilled/semiskilled versus highly skilled workers) and labour market conditions. Labour market conditions that influence the bargaining position are factors such as the unemployment rate, probability of finding suitable replacement workers, probability of finding a job and labour market laws and regulations. Make sure you know what the impact of these factors on the bargaining position is.

Efficiency wages

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. The theory that links productivity or the efficiency of workers to the wage they are paid is called the "efficiency wage theory".

WAGES, PRICES AND UNEMPLOYMENT

Wage determination equation

In this section we capture the important variables that influence nominal wages as an equation.

Imagine the following: It is the end of the year and the season for wage bargaining for next years' wages has started. You will be representing the workers in your firm at the bargaining table.

Think of the following issues:

Will you be expressing your wage demands in nominal or real terms?

Will you care about the real wage?

Will you know the current rate of inflation on the day that bargaining takes place?

Do you think the inflation rate for the next year is important?

Will you know what the rate of inflation will be during the next year?

If the sales of the firm are decreasing due to an economic recession, will it strengthen or weaken your bargaining position?

If a new law is implemented that makes it more difficult for firms to fire workers, will this influence your bargaining position?

If you were to find yourself involved in a wage bargaining process, surely you would express your wage demand in nominal terms.

In other words, you would ask for a specific nominal amount such as R10 000 per month and not specify it in terms of goods and services – for example, as 100 loaves of bread, 20 fried chickens, 50 litres of petrol, and so on. However, your objective is to obtain a real wage since it is the real wage that determines how many goods and services you can buy. This real wage that you wish to obtain is also known as the targeted or desired real wage.

How will the price level influence your targeted real wage? A higher price level implies that goods and services are more expensive and, if your nominal wage is unchanged, you will have to be content with affording fewer goods and services. In other words, your real wage declines as the price level increases. Your problem during the bargaining process is that you do not know what the current price level is or what the price level will be at the end of next year. The best you can do is to form some expectation of what it is and what it will be – and it is this expected inflation rate you will use when you formulate your wage demands. If you expect the inflation rate to increase by 5% you will increase your wage demand by at least 5%. And if you expect the inflation rate to be 10%, your wage demand will increase by at least 10%. Can you see that the higher your expected rate of inflation, the higher your wage demand will be? A positive relationship therefore exists between the expected price level (Pe) and nominal wage demands.

In terms of a chain of events this positive relationship can be written as:

$$\begin{array}{c} \mathsf{P}^{\mathsf{e}} \uparrow \Rightarrow \mathsf{W} \uparrow \\ \mathsf{P}^{\mathsf{e}} \downarrow \Rightarrow \mathsf{W} \downarrow \end{array}$$

If the economy is in a recession your firm will probably be experiencing a decline in its sales and might be considering laying off (or might have already have laid off) some of its workers. The firm would also not be looking to hire new workers. The probability of losing your job therefore increases and, since other firms in the economy are not hiring, the probability of finding a new job if you lose your job decreases. Your bargaining position is therefore weakened and this will have an impact on your wage demands which will have to be decreased.

Applying this principle to the whole economy one can postulate that the higher the unemployment rate (which is what happens in a recession) the lower the bargaining position of workers and the lower their wage demands. A negative relationship therefore exits between the unemployment rate and nominal wage demands. In this instance, the unemployment rate is used as a proxy for labour market conditions.

In terms of a chain of events it can be written as:

$$u^{\uparrow} \Rightarrow W^{\downarrow}$$

 $u^{\downarrow} \Rightarrow W^{\uparrow}$

An increase in the unemployment rate decreases nominal wage demands while a decrease in the unemployment rate increases nominal wage demands.

Institutional factors such as minimum wages, labour market regulations and laws also influence your bargaining position. Any institutional factor (such as a labour law) that makes it more difficult for firms to fire or retrench you might strengthen your bargaining position. On the other hand, the same law might cause firms to be less inclined to hire workers, thereby weakening your bargaining position.

Examples of such institutional factors are:

- unemployment insurance or benefits to workers who lose their jobs
- 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 strengthen the bargaining position of workers and there will be a rise in wages at a given unemployment rate)
- collective bargaining

These institutional factors are represented by the symbol z which stands for all the other factors that affect wages, except the expected price level (Pe) and the unemployment rate (u). An increase in z implies an increase in nominal wage demands.

Given the above information we can now write our wage equation for the whole economy as:

$$W = P^{e}F(u,z)$$
+ -.+

The nominal bargained wage (W) depends, therefore, on three factors:

Pe = expected price level u = unemployment rate

z = institutional factors such as labour laws and regulations, minimum wages and unemployment benefits (it includes all other variables that may affect the outcome of wage setting)

Once you have finished studying this section you should have a clear understanding of the concepts, equation and relationships in the following table:

Concepts	Equation	Relationships
 bargaining power collective bargaining reservation wage efficiency wages nominal wage real wage nominal wage demands expected price level unemployment institutional factors 	W = PeF(u,z) + -,+	$P^{e}\uparrow \Rightarrow W\uparrow$ $P^{e}\downarrow \Rightarrow W\downarrow$ $u\uparrow \Rightarrow W\downarrow$ $u\downarrow \Rightarrow W\uparrow$ $\Delta z \Rightarrow \Delta W$

Do activities 8.2 and 8.3 in the workbook.

8.3 PRICE DETERMINATION (Section 6.4 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events and equations:

the price determination process in an imperfectly competitive market

In an imperfectly competitive market, a firm has some control over the price of its product, unlike in a perfectly competitive market, where each firm is a price taker.

One way in which prices are set in an imperfectly competitive market is on a cost-plus-profit basis. The prices set by firms therefore largely depend on the costs they face and the mark-up on these costs.

These costs depend, in turn, on the nature of the production function (the relation between inputs, quantity of output and the prices of these inputs).

Imagine that you are the cost accountant for a firm and you must determine the price per unit given the following information:

Wage rate per worker is R50 Each worker produces one unit. The mark up is 20%

What would be the price per unit given the above information?

Let's see how you can calculate it. One way you can do this calculation is by using the following formula:

```
Price per unit = (1+ the mark-up) times cost of production
= (1 + 0.2)R50
= R60
```

What would the unit price be if the mark-up were to increase to 40%?

```
Price per unit = (1+ the mark-up) times cost of production
= (1 + 0.4)R50
= R70
```

The mark-up and the price per unit (P) are therefore **positively** correlated.

And what would the price per unit be if the mark-up is 20% and the wage R70?

```
Price per unit = (1+ the mark-up) times cost of production
= (1 + 0.2)R70
= R84
```

An **increase in the nominal wage** will increase the price per unit and a positive relationship exists between the nominal wage and the price per unit.

Price equation

In this section we derive a price equation for the economy based on a cost-plus-profit basis as well as the following assumptions that apply to all firms in the economy:

- (1) Labour is the only factor of production used in the production of output. The production function is therefore Y = AN (where Y represents output, A represents labour productivity and N represents employment).
- (2) This production function implies that labour productivity (the output per worker) is constant and equal to 1 (A = 1). Our production function is therefore Y = N.

This assumption that output per worker is constant implies constant returns to labour in production which means that, if firms double the number of workers they employ, they double the amount of output they produce. This also means that the marginal product of labour, that is, the additional unit produced by employing one extra labourer, is 1, and also that the marginal cost of producing the extra unit of output is the wage paid for the additional labourer.

For our price equation this has the implication that the cost per unit is equal to the wage paid to a worker and that the price per unit is determined by firms as a mark-up over labour cost per unit.

Assuming that all firms behave in this way we can then conclude that the price level will be determined by the nominal wage per unit of output and the mark-up by firms. Our price equation can therefore be expressed as follows:

$$P = (1 + m)W$$

Where

P = price level

m = the mark-up

W = nominal wage

Assuming that the mark-up is 20%, and that the nominal wage per worker is R1 000, the price level will be equal to (1 + 0.2) R1 000 = R1 200. You can verify for yourself that an increase in the wage per worker and an increase in the mark-up will increase the price level.

The mark-up (m) and the price per unit (P) are **positively** correlated and, in terms of a chain of events, can be written as follows:

$$\begin{array}{c} m \uparrow \Rightarrow P \uparrow \\ m \downarrow \Rightarrow P \downarrow \end{array}$$

The nominal wage (W) and the price per unit (P) are **positively** correlated and, in terms of a chain of events, can be written as follows:

$$W \uparrow \Rightarrow P \uparrow \\ W \downarrow \Rightarrow P \downarrow$$

Once you have finished studying this section, you should have a clear understanding of the concepts, equation and relationships in the following table:

Concepts	Equation	Relationships
 imperfectly competitive market labour productivity marginal product of labour marginal cost of labour mark-up production function labour cost per unit 	P = (1 + m)W + +	$\begin{array}{l} m^{\uparrow} \Rightarrow P^{\uparrow} \\ m^{\downarrow} \Rightarrow P^{\downarrow} \end{array}$ $\begin{array}{l} W^{\uparrow} \Rightarrow P^{\uparrow} \\ W^{\downarrow} \Rightarrow P^{\downarrow} \end{array}$

Do activity 8.4 in the workbook.

8.4 THE NATURAL RATE OF UNEMPLOYMENT

(Section 6.5 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- the wage-setting relationship
- the price-setting relationship
- equilibrium in the labour market
- the determination of the natural rate of unemployment
- changes in the natural rate of unemployment
- the natural level of output

The real wage-setting relation

In the section on wage determination we argued that the nominal wage is determined by the expected price level, the unemployment rate and institutional factors – and that the wage equation is written as:

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

We also indicated that, while the bargaining takes place in nominal terms, the objective is to achieve a real wage which we refer to as the targeted real wage. What we need to do now is to write this equation in terms of the targeted real wage. To do that, we assume that the expected price level (Pe) and the actual price level (P) are the same and that the actual price level is known. Our nominal wage equation then becomes

To change this into a real wage equation we divide both sides by P and end up with:

What the real wage-setting relation tells us is that the target real wage (W/P) is influenced by the unemployment rate and institutional factors. The higher the unemployment rate, the lower the targeted real wage that workers can bargain for. Unemployment erodes the bargaining power of labour, and the higher the unemployment rate, the less bargaining power workers have and the lower the real wage (or the targeted real wage) they can bargain for.

The real wage-setting relationship does not tell us what the actual real wage will be – that is why we call it the targeted real wage. Workers can try to achieve this targeted real wage by bargaining for a nominal wage, but whether the targeted real wage is achieved will depend on what happens to the price level (the price level being determined by the mark-up used by firms).

The real wage-setting relationship can be represented graphically as follows:

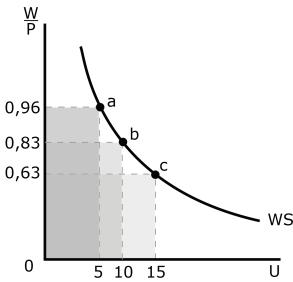


Diagram 8.1: Real wage-setting relation

For a given price level P and a given bargaining position of labour, as captured by the variable z (which includes all other factors except the unemployment rate and expected price level), the real wage-setting relationship is derived by considering the impact of a change in the unemployment rate on the targeted real wage demands of workers.

The unemployment rate is measured on the horizontal axis while the targeted real wage is measured on the vertical axis.

From the wage-setting relationship we know that the higher the unemployment rate, the weaker the bargaining position of workers and the lower the nominal wage they can bargain for. For a given price level this implies that the target real wage will be lower.

The real wage relationship is therefore downward sloping to reflect this negative relationship between the targeted real wage and the unemployment rate.

Note that, throughout this analysis, we assume that the price level is constant and that the actual price level (P) and expected price level (P^e) are the same – in other words $P = P^e$.

What we are seeing here is how labour, through their targeted real wage, is trying to get hold of the goods and services produced.

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

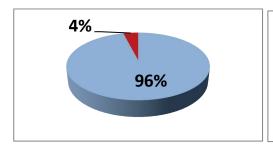
Assume the following:

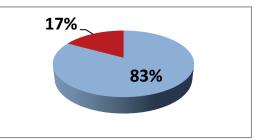
The price level is R960 per unit.

Output per worker is one unit.

Unemployment rate (u)	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

For instance, given an unemployment rate of 5% labour might target a real wage that represents 96% of the goods and services produced while at an unemployment rate of 10% they will target a real wage representing 83% of the goods and services produced.





The part that does not accrue to labour, the 4% and 17%, is the share of the firm which we will deal with under the price setting relationship. In other words, if labour and the firm produce, say, 1 000 loaves of bread, the 96% implies that the share of labour is 960 loaves and that of the owners of the firm's share is 40 loaves of bread. Remember that we are dealing here with real things.

What will cause the wage-setting relationship (WS curve) to change?

Any factor, other than the unemployment rate, that increases the bargaining power of workers will cause the wage-setting relationship to change. If labour legislation provides workers with more protection against layoffs, their bargaining position is strengthened at each unemployment rate and the WS curve will shift upwards. In other words, at each and every unemployment rate, workers will bargain for a higher targeted real wage. Whether or not they will obtain this higher real wage, however, will depend on what happens to the price level.

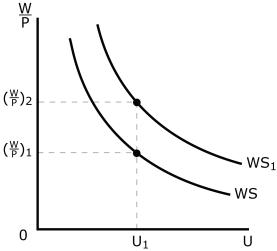


Diagram 8.2: Shift of the real wage-setting relation

Do activity 8.5 in the workbook.

The price-setting relation

In this section, the argument is that the price setting behaviour of firms is, in fact, what determines the real wage that is paid to labour. This wage is called the implied or feasible real wage.

In the section on price setting we argued that, given that labour cost is the only cost of production, the price level is equal to

$$P = (1 + m)W$$

This implies that whatever the level of nominal wages, the price level will always be a certain percentage (as determined by the mark-up) higher than the wages paid to workers.

What we now need to do is to write this equation in terms of the implied or feasible real wage. We do this by first dividing both sides by W:

$$P/W = 1 + m$$

We then invert to get W/P:

$$W/P = 1/1 + m$$

This is the real wage implied by price setting and it is drawn as a horizontal line.

Why a horizontal line? The mark-up is not influenced by the unemployment rate (u).

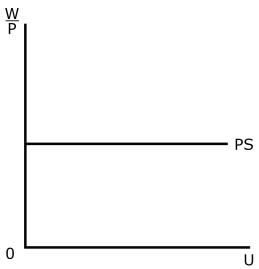


Diagram 8.3: The implied real wage

The real wage implied by price setting is also known as the price determined real wage, implied real wage or feasible real wage.

The implication of this price setting behaviour is that, while labour might target a real wage that is higher than the implied or feasible real wage, the real wage they will receive will be the implied or feasible real wage.

The following example illustrates the above:

Assume the nominal wage per unit is R10 000 and the mark-up is 20%.

Using the price equation P = (1 + m)W the price per unit is:

$$P = (1 + 0.2)R10000 = R12000$$

What is the real wage that labour receives? In order to calculate the real wage we can calculate the percentage of the price per unit which goes to labour. To do this we divide the nominal wage per unit by the price per unit, which is equal to R10 000/R12 000 x 100/1 = 83.33%. Put differently, 83.33% of the production accrues to labour, the rest goes the firms.

What happens if the nominal wage increases to R12 000. Then the price increases to:

$$P = (1 + 0.2)R12000 = R14400$$

What happens to the real wage of labour? It is unchanged at 83.33% since R12 000/R14 400 x 100/1 = 83.33%. Labour still gets only 83.33% of production.

It is the mark-up (m) that determines how much of the production goes to the firm and how much to labour.

What happens to the implied real wage if the mark-up by firms increases? Working through the following example you will see that the implied real wage to labour decreases. The firm gets more and labour less.

Assume the wage rate per unit is R10 000 and the mark-up increases from 20% to 30%. What will happen to the implied real wage?

One way of doing the calculation is to use the formula for the implied real wage 1/1+m.

At a mark-up of 20% the implied real wage is 1/1+0.2 = 0.8333 At a mark-up of 30% the implied real wage is 1/1+0.3 = 0.7692

Thus, at a mark-up of 30% labour gets only 76.92% of the production.

In terms of the diagram this is represented by a downward shift of the PS curve.

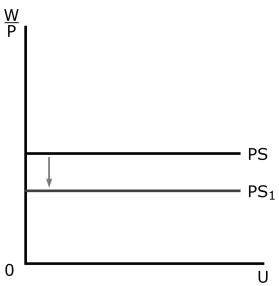


Diagram 8.4: Shift of the implied real wage

Do activity 8.6 in the workbook.

Equilibrium, real wages and unemployment

In this model, equilibrium in the labour market does not imply that the quantity demanded for labour equals the quantity of labour supplied. 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 represented by point b in the following diagram:

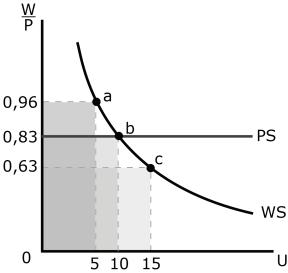


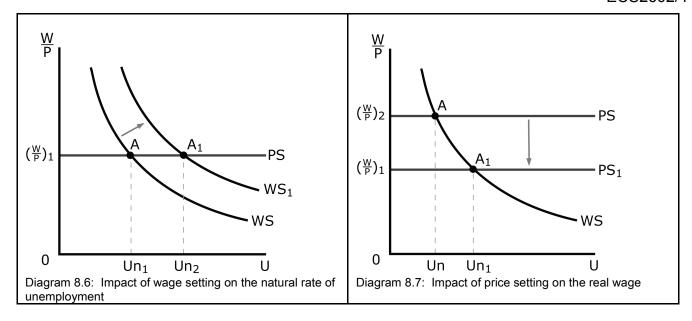
Diagram 8.5: The natural rate of unemployment

The natural rate of unemployment

It is only at an unemployment rate of u_n that the real wage implied by wage setting is equal to the real wage implied by price setting, and this unemployment rate is called the natural rate of unemployment.

At any other unemployment rate, the real wage implied by wage setting differs from the real wage implied by price setting. For instance, at an unemployment rate of u_1 in diagram 8.8 below, which is lower than the natural rate of unemployment, workers will bargain for a real wage that is higher than the implied real wage.

Factors that will cause a change in the natural rate of unemployment (or the equilibrium unemployment rate)	
, i	A change in the mark-up
An improvement in the worker's bargaining position shifts the WS curve to the right 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. Note that the implied real wage is still the same while the natural unemployment rate is higher.	An increase in the mark-up 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 that the implied real wage is lower while the natural rate of unemployment is higher.



Obtaining an increase in the real wage

What we are seeing here is the battle for the mark-ups. Labour tries to obtain a higher real wage through an increase in nominal wages. Firms respond by increasing the price level, thus leaving both the real wage and their share of total production unchanged.

Unemployment acts as a disciplining device to ensure that a point can be reached where the targeted real wage equals the implied or feasible real wage. This occurs at the natural unemployment rate. If, for instance, the unemployment rate is lower than the natural rate of unemployment (such as at point B) the targeted real wage is higher than the feasible real wage. To ensure that the targeted real wage is equal to the feasible real wage, unemployment must increase. This increase in unemployment weakens the bargaining position of labour and consequently their targeted real wage decline. Note that it is not the natural rate of unemployment that changes – it is the actual unemployment rate.

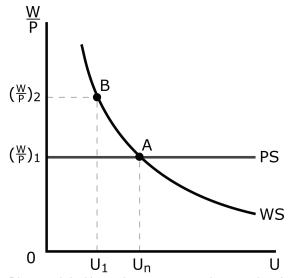


Diagram 8.8: Unemployment rate and targeted real wage

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.

Do activity 8.7 in the workbook.

8.5 FROM UNEMPLOYMENT TO EMPLOYMENT TO OUTPUT

This relationship between unemployment, employment and output is central to the aggregate supply curve that you will study in learning unit 9. Make sure you understand the relationship between these three variables.

From unemployment to employment

In this section, 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.

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 u_n
- the labour force is L
- natural level of employment N_n

```
N_n = L(1 - u<sub>n</sub>)
= 150 (1 - 5%)
= 150 (1 - 0.05)
= 150 (0.95)
= 142.5 million workers
```

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 each employed worker produces one unit (according to our production function), it follows that the natural level of output is

 Y_n = number of workers employed x output per worker

- = 142.5 workers x 1
- = 142.5 million units

Note that, as the natural unemployment rate changes, the natural level of employment and natural level of output will also change.

Do activity 8.8 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equations, relationships and diagrams in the following table:

Concepts	Equations	Relationships
wage-setting relationshipprice-setting relationship	W/P = F(u,z)	$\Delta z \Rightarrow \Delta u_n$
 natural rate of unemployment natural level of output 	$W/P = \frac{1}{1+m}$	$\begin{array}{c} m \uparrow \Rightarrow u_n \uparrow \\ m \downarrow \Rightarrow u_n \downarrow \end{array}$
	$F(u_n,z) = \frac{1}{1+m}$	
	$F\left(1-\frac{Yn}{L},z\right)=\frac{1}{1+m}$	

The AS-AD model

9

Study instruction

Read

The introductory part of chapter 7 of the prescribed book to orient yourself.

Study

Prescribed book: chapter 7

Subsections: 7.1, 7.2, 7.3, 7.4, 7.5 and 7.6

Study guide: study unit 9

Study unit outcomes

In this learning unit, we combine learning unit 4 (the IS-LM model) and learning unit 8 (the labour market) and look at the determination of output in both the short and medium run.

Once you have worked through this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- the aggregate supply relationship
- the derivation of the aggregate supply curve
- the aggregate demand curve
- the derivation of the aggregate demand curve
- equilibrium in the short run
- the adjustment from the short to the medium run
- the impact of monetary policy
- the neutrality of money
- the impact of fiscal policy

Contents

9.1 AGGREGATE SUPPLY

(Section 7.1 in the prescribed book)

Section outcomes

Once you have worked through this section of the learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- the aggregate supply relationship and aggregate supply curve
- a movement along and a shift of the aggregate supply curve

3

Prior knowledge

Before you attempt this section, make sure you understand the following:

wage-setting relationship	Learning unit 8
price-setting relationship	Learning unit 8
natural rate of unemployment	Learning unit 8
equilibrium in the labour market	Learning unit 8
the natural level of output	Learning unit 8

∠ ■ Do prior knowledge activity 9.1 in the workbook.

The AS relation

The AS relationship is represented by equation 7.2 in the prescribed book. This relationship appears more complicated than it is. It consists of all the variables that influence wage setting and price setting in the economy, which you dealt with in learning 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 = $P^eF(u,z)$) and prices (P = (1 + m)W) in the labour market (learning unit 8). In learning unit 8, we assumed that the actual price level was equal to the expected price level (P = P^e), but in this learning unit it is only true for the short run.

Properties of the aggregate supply curve

The following are the important properties of the aggregate supply curve that you must understand:

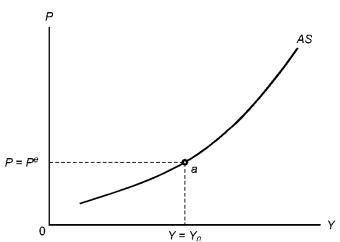


Diagram 9.1: The AS curve

The aggregate supply curve has a positive slope

The positive slope of the AS curve indicates that as the level of output and income increases, the price level rises, in other words, the causality is from a change in the level of output and income to a change in the price level.

The increase in the price level is the result of the impact of a decrease in unemployment on wages and prices and can be represented by the following chain of events:

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

As the level of output and income increases, the level of employment increases $(Y^{\uparrow} \Rightarrow N^{\uparrow})$. The increase in the level of employment causes a decrease in the unemployment rate $(N^{\uparrow} \Rightarrow u^{\downarrow})$. As the unemployment rate declines, the bargaining position of workers increases, which leads to a rise in nominal wages $(u^{\downarrow} \Rightarrow W^{\uparrow})$. This process is captured by the wage-setting relationship, $W = P^{e}(u,z)$. Since prices are determined by firms as a mark-up over labour costs, the price level rises as wages increase $(W^{\uparrow} \Rightarrow P^{\uparrow})$. This process is captured by the price-setting relationship, (P = (1 + m)W), which also determines the real wage that is paid.

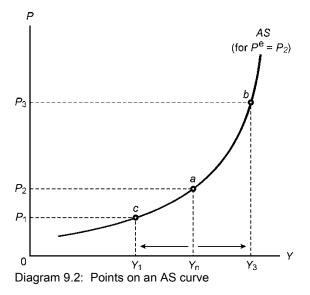
The expected price level is the same along a given aggregate supply curve

The aggregate supply curve is derived from the wage-setting and price-setting relationships dealt with in learning unit 8, where it was assumed that the expected price level is given.

A given AS curve passes through a point where the level of output is equal to the natural level of output $(Y = Y_n)$ and the actual price level = the expected price level $(P = P^e)$.

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.

At points to the right of the natural level of output, the actual price level is higher than the expected price level ($P > P^e$), and at points to the left, the actual price level is lower than the expected price level ($P < P^e$).



At an output level such as point b, which is higher than the natural level of output, the actual price level is, say, P_3 , but the expected price level is P_2 .

At an output level such as point c, which is lower than the natural level of output, the actual price level is P_1 , while the expected price level is P_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.

Workers can determine their nominal wage but not the real wage, because the real wage is the outcome of the price-setting behaviour in the economy.

Do activity 9.2 in the workbook.

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:

$$P^{e\uparrow} \Rightarrow W\uparrow \Rightarrow P\uparrow$$

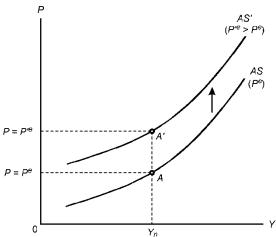


Diagram 9.3: Shift of an AS curve

- An increase in Pe shifts the AS curve upwards
- A decrease in Pe shifts the AS curve downwards

A movement along an AS curve

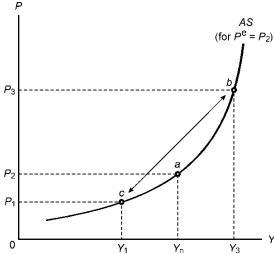


Diagram 9.4: Movement along an AS curve

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.

∠ Do activity 9.3 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equation, relationships and diagrams in the following table:

Concepts	Equation	Relationships
 AS relation AS curve movement along an AS curve shift of an AS curve 	$P = P^{e}(1+m)F (1 - {}^{Y}/_{L}, Z)$	$Y^{\uparrow} \Rightarrow N^{\uparrow} \Rightarrow u^{\downarrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow}$ $P^{e\uparrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow}$

9.2 AGGREGATE DEMAND

(Section 7.2 in the prescribed book)

Section outcomes

Once you have worked through this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- aggregate demand relation
- derivation of the aggregate demand curve
- movement along an aggregate demand curve
- shift of an aggregate demand curve

Prior knowledge

Before you attempt this section, make sure you understand the following:

IS relation	Learning unit 4
LM relation	Learning unit 4
IS-LM model	Learning unit 4

Derivation of the AD curve

The following steps are involved when deriving the AD curve:

In the prescribed book, figure 7.3(a) represents the IS-LM model, while figure 7.3(b) shows the derivation of the AD curve.

Note that when the AD curve is derived it is done by assuming a change in the price level.

Figure a

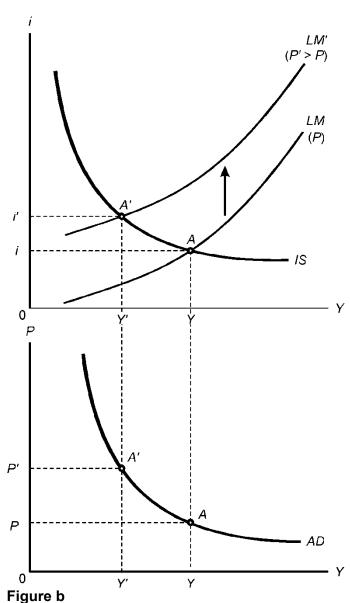


Diagram 9.5: Derivation of an AD curve

Plotting the first point A of the AD curve

- 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.
- 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.
- 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.

Plotting the second point A'.

- Step 4: Assume an increase in the price level from P to P' in figure b.
- 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 upwards 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.
- 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'.
- 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.

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.

In terms of a chain of events, the derivation of the aggregate demand curve can be represented as follows:

$$\mathsf{P}^{\uparrow} \Rightarrow \mathsf{M}/\mathsf{P}^{\downarrow} \Rightarrow \mathsf{i}^{\uparrow} \Rightarrow \mathsf{I}^{\downarrow} \Rightarrow \mathsf{Z}^{\downarrow} \Rightarrow \mathsf{Y}^{\downarrow}$$

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.

∠ Do activity 9.4 in the workbook.

Shifts of the AD curve

It is essential for you to be able to distinguish clearly between a movement along the AD curve and a shift of the AD curve. A movement along the AD curve is caused by a change in the price level, while a shift in the AD curve is caused by a change in any of the autonomous (or exogenous) variables, such as taxes, government spending or the nominal money supply.

Remember that exogenous variables include factors such as autonomous consumption and autonomous investment.

Movement along	Rightward shift	Leftward shift
a change in the price level	increase in autonomous government	decrease in autonomous
$(\Delta \text{ in P})$	spending (G)	government spending (G)
P∱: upwards	decrease in autonomous taxation (T)	increase in autonomous
		taxation (T)
P↓: downwards	increase in the nominal money	decrease in the nominal money
	supply (M)	supply (M)

∠ ✓ Do activity 9.5 in the workbook.

Once you have finished studying this section, you should have a clear understanding of the concepts, equations, relationships and diagrams in the following table:

Concepts	Equations	Relationships	
 AD relation AD curve movement along an AD curve shift of an AD curve 	Y = C(Y-T) + I(Y,i) + G $M/P = YL(i)$ $Y = Y(M/P, G, T)$	$P^{\uparrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow}$ $M^{\downarrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow}$ $G^{\uparrow}(or T^{\downarrow}) \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow} \Rightarrow M^{d\uparrow} \Rightarrow i^{\uparrow}$	

9.3 EQUILIBRIUM IN THE SHORT AND THE MEDIUM RUN (Section 7.3 in the prescribed book)

Section outcomes

Once you have worked through this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- equilibrium in the short run
- equilibrium in the medium run
- adjustment from the short to medium run

Prior knowledge

Before you attempt this section, make sure you understand the following:

AS relation	Learning unit 9
AS curve	Learning unit 9
shift of the AS curve	Learning unit 9
AD relation	Learning unit 9
AD curve	Learning unit 9
shift of the AD curve	Learning unit 9

Do prior knowledge activity 9.3 in the workbook.

In the first part of this section, the AS relation and AD relation 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.

EQUILIBRIUM IN THE SHORT RUN

A distinction is made between the short and medium run. In the short run, it is possible to be at a position away from the natural level of output and employment. In the medium run, however, the economy returns to the natural level of output and employment.

Also note that 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 output and employment implies that the actual price level and the expected price level differ. At a position such as point A in figure 7.5 in the prescribed book, the expected price level is lower than the actual price level (Pe < P). It is this upward revision of the expected price level and the impact of this on nominal wages that eventually moves the economy back to the natural level of output and employment in the medium run.

In figure 7.5, at a output and employment level of Y, which is higher than the natural level of output and employment, the unemployment rate is lower than the natural unemployment rate. In terms of the wage-setting relation, this implies that workers will try to achieve a real wage $(W/P)_1$ that is higher than the real wage (W/P) implied by price setting. When workers bargained for the real wage they assumed incorrectly that the expected price level and the actual price level would be the same $(P^e = P)$. As a result of the price-setting behaviour of firms, the actual price level at an output level of Y turns out to be higher than the price level expected by workers when they bargained for the real wage. They thought that they were going to receive a higher real wage, but owing to an increase in the price level, it turned out that their real wage was the same as before. Note that the real wage that workers receive at an output level of Y, is the same as the real wage they receive at an output level of Y_n. This is because of the fact that while workers can set the nominal wage, they cannot determine the real wage they will receive, since the price level is determined by the price-setting behaviour (P = (1 + m)W) of firms in the economy.

Eventually workers will realise that the actual price level is higher than the price level they expected, and during the next round of wage negotiations they will adjust their expected price level and nominal wage demands upwards. This now brings us to the medium run.

FROM THE SHORT TO THE MEDIUM RUN

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. This increase in the price level, however, affects the financial market, 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 and income declines.

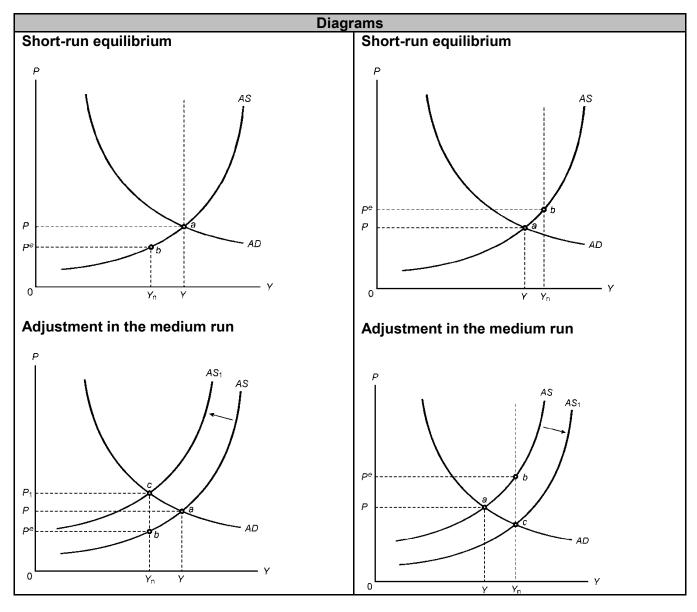
In terms of a chain of events, this can be represented as follows:

$$P^{e\uparrow} \Rightarrow W\uparrow \Rightarrow P\uparrow \Rightarrow M/P\downarrow \Rightarrow i\uparrow \Rightarrow I\downarrow \Rightarrow Z\downarrow \Rightarrow Y\downarrow$$

This process continues until the natural level of output and employment is reached, where the expected price level (P^e) = the actual price level (P). This then is the medium run position.

In terms of the AS-AD model, the increase in the expected price level is represented by a shift of the AS curve upwards. The impact on the financial and goods market is represented by an upward movement along the AD curve.

∠ ■ Do activity 9.6 in the workbook.



Once you have finished studying this section, you should have a clear understanding of the concepts, equations, relationships and diagrams in the following table:

Concepts	Equations	Relationships
 AD relation AD curve AS relation AS curve movement along an AD curve shift of an AS curve equilibrium in the short run equilibrium in the medium run 	$Y = C(Y-T) + I(Y,i) + G$ $M/P = YL(i)$ $Y = Y(M/P, G, T)$ $P = P^{e}(1+m)F(1-Y/L, Z)$	$\begin{array}{c} P^{\uparrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow} \\ \\ P^{e\uparrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow \\ Z^{\downarrow} \Rightarrow Y^{\downarrow} \end{array}$

9.4 THE EFFECTS OF A MONETARY EXPANSION

(Section 7.4 in the prescribed book)

Section outcomes

Once you have worked through this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

- the impact of monetary policy
- the neutrality of money

Prior knowledge

Before you attempt this section, make sure you understand the following:

monetary policy	Learning unit 3
AS relation	Learning unit 9
AS curve	Learning unit 9
shift of the AS curve	Learning unit 9
AD relation	Learning unit 9
AD curve	Learning unit 9
shift of the AD curve	Learning unit 9
adjustment from the short to medium run	Learning unit 9

∠ Do prior knowledge activity 9.4 in the workbook.

In this section of the work, you will combine everything you have learnt about the goods market, the financial market and the labour market. Make sure that you have a detailed understanding of the previous learning units. The following section describes the impact of an **expansionary monetary policy in the AD-AS model** and is based on figure 7.7 in the prescribed book. It might be a good idea for you to construct the diagrams step by step to enable you to follow the arguments.

In the short run

Initial events in the financial market

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.

$$\mathsf{M}^{\uparrow} \Rightarrow \mathsf{M}/\mathsf{P}^{\uparrow} \Rightarrow \mathsf{i}^{\downarrow}$$

Events in the goods market

In the goods market, 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.

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

In terms of the AS-AD model, this is represented by a rightward shift in the AD curve in figure 7.7.

Events in the labour market

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

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

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' in figure 7.7.

In the medium run

Events in the labour market

At point A' in figure 7.7, the expected price level on which workers based their real wage negotiations turned out to be lower than the actual price level. They revised their expected price level upwards and negotiated for higher wages. In reaction to the higher nominal wages, firms increased the price level.

$$P^{e} \uparrow \Rightarrow W \uparrow \Rightarrow P \uparrow$$

In figure 7.7, this effect is captured by a shift of the AS curve upwards.

Events in the financial and goods market

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.

$$\mathsf{P}^{\uparrow} \Rightarrow \mathsf{M}/\mathsf{P}^{\downarrow} \Rightarrow \mathsf{i}^{\uparrow} \Rightarrow \mathsf{I}^{\downarrow} \Rightarrow \mathsf{Z}^{\downarrow} \Rightarrow \mathsf{Y}^{\downarrow}$$

In figure 7.7, this is captured by an 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 medium run position.**

THE NEUTRALITY OF MONEY

The interesting thing about the impact of an expansionary monetary policy is that in the medium run, it is neutral, which means that it only changes nominal variables and not the real variables in the model. Comparing point A" (the medium run position) with point A (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, the following are nominal and real variables:

Nominal variables	Real variables
nominal money supply (Ms)	real money supply (M/P)
price level (P)	interest rate (i)
nominal wage (W)	investment spending (I)
	demand for goods (Z)
	level of output and income (Y)
	real wage (W/P)

What happened to these variables in the short and medium run?

Short run	Medium run
$M^{s} \uparrow \rightarrow M/P \uparrow \rightarrow i \downarrow$	$P^{e} \uparrow \rightarrow W \uparrow \rightarrow \mathbf{P} \uparrow$
$i\downarrow \rightarrow I\uparrow \rightarrow Z\uparrow \rightarrow Y\uparrow$	$\mathbf{P} \uparrow \to M/P \downarrow \to i \uparrow \to I \downarrow \to Z \downarrow \to Y \downarrow$
$Y^{\uparrow} \rightarrow N^{\uparrow} \rightarrow u^{\downarrow} \rightarrow W^{\uparrow} \rightarrow P^{\uparrow}$	

The nominal variables increase in the medium run

- M^s↑ 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).

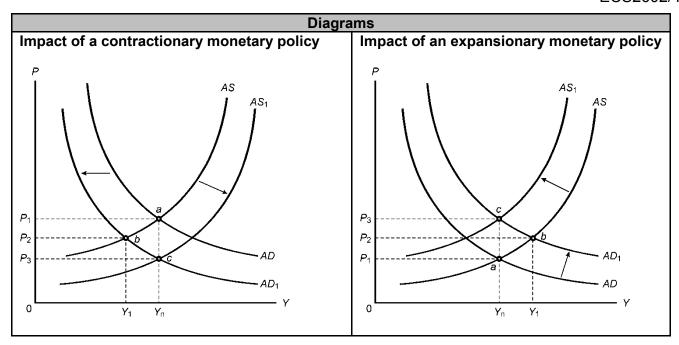
In other words, a 10% increase in money supply eventually leads to a 10% increase in the price level, which means that the real variables return to their original values as does the real wage, because the increase in nominal wage is offset by an increase in the price level.

This is referred to as the neutrality of money. An expansionary monetary policy only influences nominal variables (they are higher), while real variables remain unchanged. Neutrality of money does not mean that monetary policy cannot or should not be used to affect output.

As expansionary monetary policy can, for example, help the economy move out a recession and return more quickly to Y_n . However, this is a warning that monetary policy cannot sustain higher output forever (cannot effect real change in the economy) because it returns to the Y_n level.

Note: We refer to the neutrality of money in the medium run following the prescribed books explanation. Note that many economists refer to the neutrality of money in the long run not the medium run. The distinction between the medium run and long run in the AS-AD model falls outside the prescribed material for this module.

∠ Do activity 9.7 in the workbook.



Once you have finished studying this section, you should have a clear understanding of the concepts, equations, relationships and diagrams in the following table:

Concepts	Equations	Relationships
 monetary policy AD relation AD curve AS relation AS curve movement along an AD curve shift of an AD curve movement along an AS curve shift of an AS curve equilibrium in the short run equilibrium in the medium run neutrality of money 	Y = C(Y-T) + I(Y,i) + G M/P= YL(i) Y = Y(M/P, G, T) P = Pe(1+m)F $(1 - {}^{Y}/_{L}, Z)$	$M^{\uparrow} \Rightarrow M/P^{\uparrow} \Rightarrow i^{\downarrow}$ $i^{\downarrow} \Rightarrow I^{\uparrow} \Rightarrow Z^{\uparrow} \Rightarrow Y^{\uparrow}$ $Y^{\uparrow} \Rightarrow N^{\uparrow} \Rightarrow u^{\downarrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow}$ $P^{e\uparrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow}$ $P^{\uparrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow}$

9.5 A DECREASE IN THE BUDGET DEFICIT (Section 7.5 in the prescribed book)

Section outcomes

Once you have worked through this learning unit, you should be able to explain the following in words and by means of a chain of events, equations and diagrams:

the impact of fiscal policy

Prior knowledge

Before you attempt this section, make sure you understand the following:

fiscal policy	Learning unit 2
AS relation	Learning unit 9
AS curve	Learning unit 9
shift of the AS curve	Learning unit 9
AD relation	Learning unit 9
AD curve	Learning unit 9
shift of the AD curve	Learning unit 9
adjustment from the short to medium run	Learning unit 9

∠ Do prior knowledge activity 9.5 in the workbook.

To reduce the budget deficit (where G > T), government spending must decrease and/or taxation must increase. The following description is based on figures 7.9 and 7.10 in the prescribed book, which explains the impact of a decline in government spending. In other words, it describes the impact of a **contractionary fiscal policy in the AS-AD model**. It might be a good idea for you to construct the diagrams step by step to enable you to help follow the arguments.

In the short run

Initial events on the goods and financial markets

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.

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

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.

$$\begin{matrix} i \! \downarrow \Rightarrow I \! \uparrow \\ Y \! \downarrow \Rightarrow I \! \downarrow \end{matrix}$$

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

Events in 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 A' occurs. This is the **short run equilibrium** position.

In the medium run

Events in the labour market

At point A', 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.

$$P^{e} \downarrow \Rightarrow W \downarrow \Rightarrow P \downarrow$$

In the AS-AD model, this effect is captured by a downward shift of the AS curve to AS".

Events 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 $P \downarrow \Rightarrow M/P \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$ spending, the demand for goods and the level of output and income.

$$\mathsf{P}\!\!\downarrow \, \Rightarrow \mathsf{M}/\mathsf{P}\!\!\uparrow \, \Rightarrow \mathsf{i}\!\!\downarrow \, \Rightarrow \mathsf{I}\!\!\uparrow \, \Rightarrow \; \mathsf{Z}\!\!\uparrow \, \Rightarrow \mathsf{Y}\!\!\uparrow$$

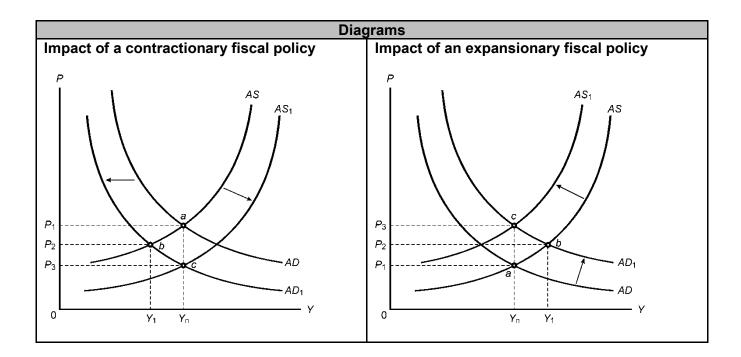
In the IS-LM model, this is represented by a downward shift of the LM curve and in the AS-AD model by a movement along the AD' curve. This process continues until point A" is reached. where the level of output is at the natural level of output and the unemployment rate by implication is equal to the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

Comparing the equilibrium point A" with the initial equilibrium position A, it is clear that the level of output and income, the level of employment and the unemployment rate are the same as before the decrease in government spending. What is different is that 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).

What has happened in the economy is that the decrease in government spending has been replaced by an increase in investment spending.

Do activity 9.8 in the workbook.

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Once you have finished studying this section, you should have a clear understanding of the concepts, equations, relationships and diagrams in the following table:

Concepts	Equations	Relationships
 fiscal policy AD relation AD curve AS relation AS curve movement along an AD curve shift of an AD curve movement along an AS curve shift of an AS curve equilibrium in the short run equilibrium in the medium run 	$Y = C(Y-T) + I(Y,i) + G$ $M/P = YL(i)$ $Y = Y(M/P, G, T)$ $P = P^{e}(1+m)F(1 - {^{Y}}/_{L}, Z)$	$G \downarrow \Rightarrow Z \downarrow \Rightarrow Y \downarrow$ $Y \downarrow \Rightarrow M^{d} \downarrow \Rightarrow i \downarrow$ $i \downarrow \Rightarrow I \uparrow$ $Y \downarrow \Rightarrow I \downarrow$ $Y \downarrow \Rightarrow N \downarrow \Rightarrow u \uparrow \Rightarrow W \downarrow \Rightarrow P \downarrow$ $P^{e} \downarrow \Rightarrow W \downarrow \Rightarrow P \downarrow$ $P \downarrow \Rightarrow M/P \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Z \uparrow \Rightarrow Y \uparrow$

SUMMARY: EXOGENOUS VS. ENDOGENOUS VARIABLES

An exogenous (autonomous) variable is independent of the endogenous variable – the variable we are trying to explain – and, while it influences the endogenous variable, it is not influenced by it. In the models that we are developing, the main endogenous variable is the level of output and income (Y).

Exogenous variable:

- Independent of the model.
- Taken as given.

Endogenous variable:

- Dependent on the model.
- If there is any change to the status quo, the endogenous variables will change to re-establish equilibrium.

For example, an increase in the money supply (which is an exogenous variable) will start a chain of events working through the various endogenous variables that has an effect in all the models we have built in this module, up to the AS-AD model:

Financial market: $M^{\uparrow} \Rightarrow M/P^{\uparrow} \Rightarrow i \downarrow$ (illustrated by a rightward shift of the Ms curve in the financial market. In the IS-LM model it is illustrated by a downward shift of the LM curve).

Goods market: The change in the interest rate will affect the goods market in the IS-LM or AS-AD

models through the negative relationship between the interest rate and investment spending.

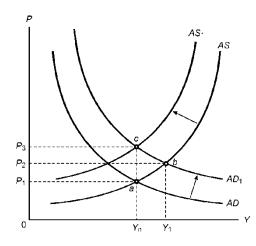
 $i\downarrow\Rightarrow I\uparrow\Rightarrow Z\uparrow\Rightarrow Y\uparrow$ (illustrated by a movement down the IS curve and these first two chain of events in the AS-AD model are illustrated by a rightward shift of the

AD curve).

Labour market:

An increase in the level of output and income increases the level of employment, decreasing the unemployment rate in the labour market and resulting in an increase in the bargaining position of workers who demand higher nominal wages leading to higher prices.

 $Y^{\uparrow} \Rightarrow N^{\uparrow} \Rightarrow u^{\downarrow} \Rightarrow W^{\uparrow} \Rightarrow P^{\uparrow}$ (Illustrated by an upward movement along the WS curve in the labour market and an upward movement along the AS curve indicated by point b in the below AS-AD model)



Up until now we have been looking at the short run (the movement from point a to point b) where prices are fixed, however an increase in nominal wages has increased the price level from P_1 to P_2 . The actual price level is now at P_2 but workers based their real wage negotiations on P_1 . Workers respond to this by revising their price expectations upwards, we are now looking at the medium run (the movement from point b to point c)

Labour market: Workers revise their expected price level upwards and negotiated for higher

nominal wages which again increased the actual price level.

 $P^{e\uparrow} \Rightarrow W\uparrow \Rightarrow P\uparrow$ (illustrated by an upwards shift of the AS curve)

AS-AD model: As the price level rises, the real money supply will decrease which has the effect

of a contractionary monetary policy on the economy.

 $P^{\uparrow} \Rightarrow M/P^{\downarrow} \Rightarrow i^{\uparrow} \Rightarrow I^{\downarrow} \Rightarrow Z^{\downarrow} \Rightarrow Y^{\downarrow} \text{ (illustrated by an upward movement along AD}_{1}$

to point c)

SUMMARY OF ASSUMPTIONS FOR THIS MODULE

Variable	Goods Market	Financial Market	IS-LM Closed economy	IS-LM Open economy	AS-AD Model
Consumption spending (C) $C = c_o + cY_D$	Exogenous AND Endogenous	Not applicable	Exogenous AND Endogenous	Exogenous AND Endogenous	Exogenous AND Endogenous

Exogenous components:

Autonomous consumption (c_o) is influenced by access to credit, wealth, expectations etc. Marginal propensity to consume (c) is influenced by access to credit, wealth, expectations etc.

Endogenous component:

Disposable income (YD): when disposable income increases, a portion is spent according to the marginal propensity to consume (c) which is itself exogenous. (\mathbf{cY}_D is called induced consumption)

Investment spending (I) Exc	ogenous Ily	Not applicable	Exogenous AND Endogenous	Exogenous AND Endogenous	Exogenous AND Endogenous
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Exogenous component:

Investment spending ($\overline{\mathbf{I}}$) is influenced by business confidence, expectations, regulations etc.

Endogenous component:

Investment spending (I) is positively related to Y and negatively related to i

Government spending and Taxes (G & T)	Not applicable	Exogenous	Exogenous	Exogenous
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Exogenous components:

Government spending (G) and Taxes (T) are both controlled by Government.

Money supply (M ^s)	Assumed to be fixed	Exogenous	Exogenous	Exogenous	Exogenous
Exogenous component: Money supply (M ^s) is controlled by the central bank					
Money	Fixed	Exogenous AND	Exogenous AND	Exogenous AND	Exogenous AND

Money		Exogenous	Exogenous	Exogenous	Exogenous
demand (M ^d)	Fixed	AND	AND	AND	AND
		Endogenous	Endogenous	Endogenous	Endogenous

Exogenous component:

Money demand (M^d) is influenced by business confidence, expectations, etc.

Endogenous components:

Money demand (M^d) is positively related to the level of output and income (Y)

Money demand (M^d) is negatively related to the interest rate (i)

Variable	Goods Market	Financial Market	IS-LM Closed economy	IS-LM Open economy	AS-AD Model
Foreign sector (X & IM)	None	None	None	Exogenous AND Endogenous	Exogenous AND Endogenous

Exogenous component:

Exports (X) are positively related to the level of income and output of our trading partners (Y*)

Endogenous components:

Exports (\mathbf{X}) are negatively related to the real exchange rate (ϵ)

Imports (IM) are positively related to the domestic level of income and output (Y)

Imports (IM) are also negatively related to the real exchange rate (ε)

Note: If prices are assumed to be fixed then the real exchange rate is equal to the nominal exchange rate. I.e. $\varepsilon = E$

Labour market (W & P)	Assumed to be fixed	Exogenous AND Endogenous			
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Exogenous components:

Nominal wages (**W**) are positively related to institutional factors (z) e.g. labour laws, minimum wages etc.

Nominal wages (W) are positively related to the expected price level (Pe)

Mark-up by firms (m) is determined by firms

The expected price level (Pe) is fixed in the short run however in the medium run workers adjust their expected price upwards if the actual price level turned out to be higher than their expected price level when wages were bargained for last, and they will adjust their expected price level downwards if the actual price level turns out to be lower than their expected price level.

Endogenous components:

Nominal wages (W) are negatively related to the unemployment rate (u)

The actual price level (P) is positively related to nominal wages (W) because an increase in nominal wages will result in an increase in the price of the product (because the mark-up by firms is exogenous). This will increase the price level.

CHAIN OF EVENTS AND DIAGRAMS Different macroeconomic models

The purpose of this summary is to show you how the various models developed in this module are connected. This is a compliment to the study plan laid out in this study guide and does not replace it.

Two stabilisation policies:

Fiscal policy	Monetary policy	
Two policy instruments: G and T	One policy instrument: Ms	
An expansionary fiscal policy is an increase in government spending and/or decrease in taxes in order to stimulate economic activity by increasing the demand for goods	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 fiscal policy is a decrease in government spending and/or increase in taxes in order to cool down economic activity by decreasing the demand for goods	A contractionary monetary policy is a decrease in the nominal money supply in order to cool down economic activity by decreasing the demand for goods	

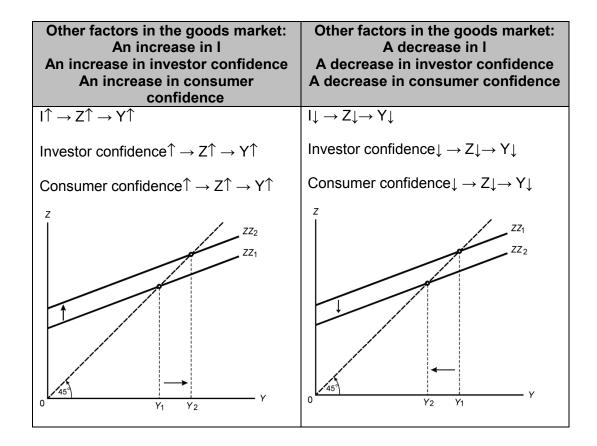
Goods market model

Only fiscal policy (G and/or T) is applicable in the goods market.

Other factors that could shift the ZZ curve are: Investment spending; investor confidence, consumer confidence.

Chain of events in the **goods market model** and diagrams:

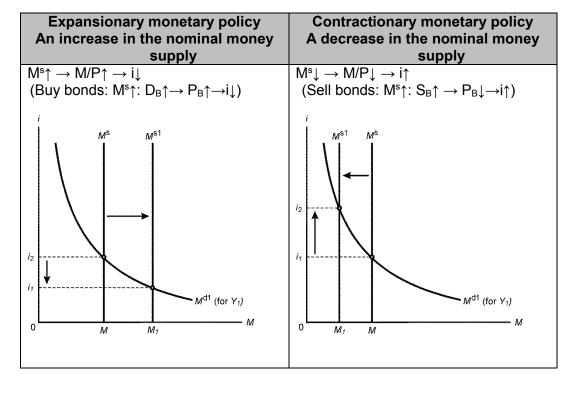
Expansionary fiscal policy An increase in G A decrease in T	Contractionary fiscal policy A decrease in G An increase in T
$\begin{array}{c} G \uparrow \to Z \uparrow \to Y \uparrow \textbf{Or} \\ T \downarrow \to Y_D \uparrow \to C \uparrow \to Z \uparrow \to Y \uparrow \end{array}$	$ \begin{array}{c} G \downarrow \to Z \downarrow \to Y \downarrow \ \textbf{Or} \\ T \uparrow \to Y_D \downarrow \to C \downarrow \to Z \downarrow \to Y \downarrow \end{array} $
Z ZZ ₂ ZZ ₁ ZZ ₁ Y Y Y ₂ Y	Z ZZ ₁ ZZ ₂ ZZ ₂ Y ₁ Y Y



Financial market model

Only the monetary policy (M^s) is applicable in the financial market.

Chain of events in the **financial market model** and diagrams:



In this module we follow the traditional approach to money supply, which means that we assume the money supply is controlled by the central bank. A decrease in the money supply (resulting from the central bank selling bonds on the open market) will decrease the real money supply which results in an increase in the interest rate (because the supply of bonds increases on the bonds market, and so the price of bonds decreases and the return on holding bonds, or interest rate, increases):

 $M^s\downarrow: S_B\uparrow \Rightarrow P_B\downarrow \Rightarrow i\uparrow$. In this module the **central bank does not control the repo rate** or any other interest rate directly (as the SARB does in practice in South Africa).

The central bank influences the interest rate through the money supply. Therefore when describing monetary policy the chain of events cannot start with i-it starts with a change in \mathbf{M}^s .

The IS-LM model (in a closed economy)

The IS curve is derived from the goods market.

The LM curve is derived from the financial market.

Therefore changes in the goods market and financial market will affect the IS-LM model. Thus, both the fiscal policy (G and/or T) and monetary policy (M^s) are applicable.

Fiscal policy will have an impact on the goods market first and then on the financial market and then back to the goods market.

Monetary policy will have an impact on the financial market first and then on the goods market.

Chain of events in the **IS-LM model** and diagrams:

Expansionary fiscal policy An increase in G A decrease in T	Expansionary monetary policy An increase in M ^s
Government spending increases	Nominal money supply increases
The impact on the goods market first $G\uparrow \to Z\uparrow \to Y\uparrow\\ \text{Impact on the financial market} \\ Y\uparrow \to M^d\uparrow \to i\uparrow\\ i\uparrow \to I\downarrow\\ Y\uparrow \to I\uparrow\\ \text{Then back to the goods market} \\ i\uparrow \to I\downarrow \to Z\downarrow \to Y\downarrow$	The impact on the financial market first $M^{s} \uparrow \to M/P \uparrow \to i \downarrow$ Impact on the goods market $i \downarrow \to I \uparrow \to Z \uparrow \to Y \uparrow$ $Y \uparrow \to I \uparrow$ $Y \uparrow \to C \uparrow$
AND/OR	

Taxes decrease

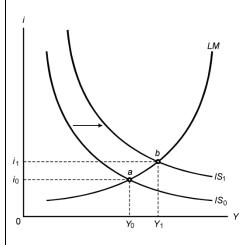
The impact on the goods market first

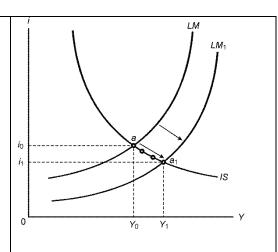
$$\begin{array}{c} T{\downarrow}{\rightarrow} \ Y_{D}{\uparrow} \rightarrow C{\uparrow} \rightarrow Z{\uparrow} \rightarrow Y{\uparrow} \\ \textit{Impact on the financial market} \\ Y{\uparrow} \rightarrow M^{d}{\uparrow} \rightarrow i{\uparrow} \end{array}$$

$$\begin{matrix} i \uparrow & \rightarrow I \downarrow \\ Y \uparrow & \rightarrow I \uparrow \end{matrix}$$

Then back to the goods market

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





Contractionary fiscal policy A decrease in G An increase in T

Government spending decreases

Impact is first on the goods market

$$G\downarrow \to Z\downarrow \to Y\downarrow \\
Y\downarrow \to C\downarrow \\
Y\downarrow \to I\downarrow$$

Then the impact on the financial market

$$Y{\downarrow} \to M^d{\downarrow} \to i{\downarrow}$$

Back to the goods market

$$\begin{array}{c} i \! \downarrow \to I \! \uparrow \\ Y \! \downarrow \to I \! \downarrow \end{array}$$

AND/OR

Taxes increase

Impact is first on the goods market $T\!\uparrow \to Y_D\!\!\downarrow \to C\!\!\downarrow \to Z\!\!\downarrow \to Y\!\!\downarrow$

$$\begin{array}{c} Y \! \downarrow \to C \! \downarrow \\ Y \! \downarrow \to I \! \downarrow \end{array}$$

Nominal money supply decreases

Contractionary monetary policy

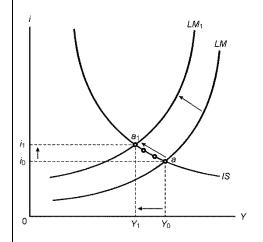
A decrease in Ms

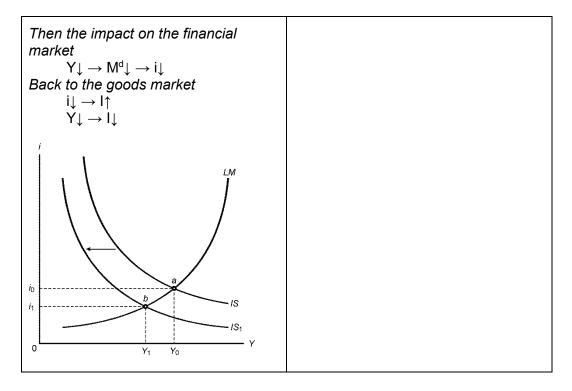
The impact is on the financial market first:

$$M^s{\downarrow} \to M/P{\downarrow} \to i{\uparrow}$$

Impact on the goods market

$$\begin{array}{l} i \uparrow \rightarrow I \downarrow \rightarrow Z \downarrow \rightarrow Y \downarrow \\ Y \downarrow \rightarrow I \downarrow \\ Y \downarrow \rightarrow C \downarrow \end{array}$$





The IS-LM model for an open economy

The first part of the chain of events will be exactly the same as for the IS-LM model in a closed economy. Since we now operate in the open economy where goods and services can be exported and imported we add the impact on the exchange rate and trade balance.

The change in the interest rate determines the impact on the exchange rate. Why?

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. This 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.

Positive effect of the depreciation on the trade balance:

The depreciation of the exchange rate reduces the price of exports and increases the price of imports Exports therefore increases and imports decrease and the trade balance improves.

Negative effect of the depreciation on the trade balance:

The rise in the price of imports increases the imports bill which impacts negatively on the trade balance and the increase in exports will lead to an increase in the demand for goods and the level of output and income which will increase imports.

$$i \downarrow \rightarrow Capital_{outflow} \rightarrow E \downarrow$$

Positive effect on the trade balance

$$\begin{array}{c} \mathsf{E} \! \downarrow \to \mathsf{X} \! \uparrow \to \mathsf{N} \mathsf{X} \! \uparrow \\ \mathsf{E} \! \downarrow \to \mathsf{I} \mathsf{M} \! \downarrow \to \mathsf{N} \mathsf{X} \! \uparrow \end{array}$$

Negative effect on the trade balance

$$P_{imports} \uparrow \rightarrow Imports \ bill \uparrow$$

We assume the negative effect is outstripped by the positive effect and overall the trade balance improves (NX \uparrow).

Secondary effect on the trade balance:

The increase in the level of output and income will result in an increase in imports:

$$E\downarrow \to X\uparrow \to Z\uparrow \to Y\uparrow \to IM\uparrow \to NX\downarrow$$

However we assume that the increase in imports induced by the increase in the level of output and income is smaller than the direct improvement in the trade balance as a result of the increase in exports and expenditure switching, thus the **trade balance improves overall**.

To summarise: We assume in this module that the Marshall-Lerner condition holds.

Thus a real **depreciation** leads to an increase in exports and a decrease in imports thus increasing net exports resulting in an improvement in the trade balance:

$$E \downarrow \to X \uparrow \to NX \uparrow$$
$$E \downarrow \to IM \downarrow \to NX \uparrow$$

And the level of output and income will increase due to the increase in exports and expenditure switching:

$$E \downarrow \to X \uparrow \to Z \uparrow \to Y \uparrow$$
$$E \downarrow \to IM \downarrow \to Z \uparrow \to Y \uparrow$$

The opposite is also true: An increase in the interest rate causes an appreciation of the nominal exchange rate:

$$i{\uparrow} \to \text{Capital}_{\text{inflow}} \to \text{E}{\uparrow}$$

$$\begin{array}{c} \mathsf{E}\!\uparrow \to \mathsf{X}\!\!\downarrow \to \mathsf{NX}\!\!\downarrow \\ \mathsf{E}\!\!\uparrow \to \mathsf{IM}\!\!\uparrow \to \mathsf{NX}\!\!\downarrow \end{array}$$

 $P_{imports}{\downarrow} \to Imports \; bill{\downarrow}$

 $Y \downarrow \to IM \downarrow \to NX \uparrow$ (we assume the positive effect is outstripped by the negative effect and overall the trade balance deteriorates $(NX \downarrow)$

Chain of events in the IS-LM model for an open economy and diagrams:

Expansionary fiscal policy An increase in G / A decrease in T	Expansionary monetary policy An increase in Ms
Government spending increases	Nominal money supply increases
The impact on the goods market first $G\uparrow \to Z\uparrow \to Y\uparrow\\ Impact on the financial market Y\uparrow \to M^d\uparrow \to i\uparrow\\ i\uparrow \to I\downarrow\\ Y\uparrow \to I\uparrow\\ Then \ back \ to \ the \ goods \ market \\ i\uparrow \to I\downarrow \to Z\downarrow \to Y\downarrow\\ Impact \ on \ the \ exchange \ rate \ and \\ trade \ balance \\ i\uparrow \to Capital_{inflow} \to E\uparrow\\ E\uparrow \to X\downarrow \to NX\downarrow\\ E\uparrow \to IM\uparrow \to NX\downarrow$	The impact is on the financial market first $ \begin{array}{c} M^s \uparrow \to M/P \uparrow \to i \downarrow \\ Impact on the goods market \\ i \downarrow \to I \uparrow \to Z \uparrow \to Y \uparrow \\ Y \uparrow \to I \uparrow \\ Y \uparrow \to C \uparrow \\ Impact on the exchange rate and trade balance \\ i \downarrow \to Capital_{outflow} \to E \downarrow \\ E \downarrow \to X \uparrow \to NX \uparrow \\ E \downarrow \to IM \downarrow \to NX \uparrow \\ \end{array} $
What will be the impact on the financial account of the balance of payments? The increase in the domestic interest rate relative to the interest rate in the rest of the world leads	What will be the impact on the financial account of the balance of payments? The decrease in the domestic interest rate relative to the

to an increase in the demand for domestic bonds which creates a capital inflow and thus an improvement of the financial account

Taxes decrease

The impact on the goods market first $T\downarrow \to Y_D\uparrow \to C\uparrow \to Z\uparrow \to Y\uparrow$ Impact on the financial market

$$\begin{array}{l} Y \! \uparrow \to M^d \! \uparrow \to i \! \uparrow \\ i \! \uparrow \to I \! \downarrow \\ Y \! \uparrow \to I \! \uparrow \end{array}$$

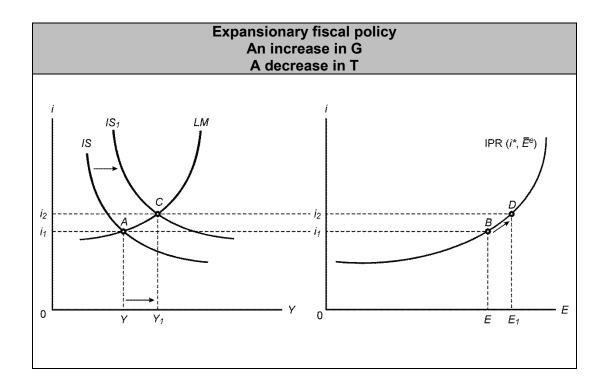
Then back to the goods market $i\uparrow \rightarrow I\downarrow \rightarrow Z\downarrow \rightarrow Y\downarrow$

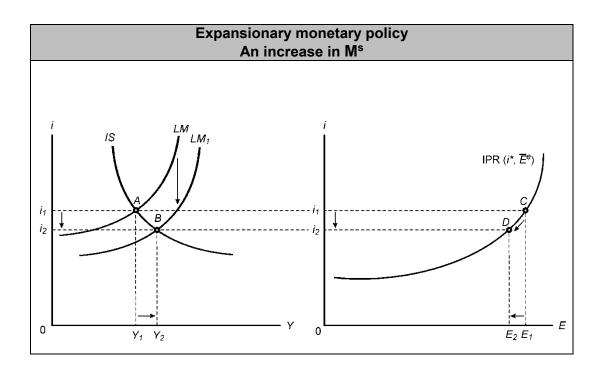
Impact on the exchange rate and trade balance

$$\begin{array}{l} i\!\uparrow \to \mathsf{Capital}_{\mathsf{inflow}} \to \mathsf{E}\!\uparrow \\ \mathsf{E}\!\uparrow \to \mathsf{X}\!\!\downarrow \to \mathsf{NX}\!\!\downarrow \\ \mathsf{E}\!\!\uparrow \to \mathsf{IM}\!\!\uparrow \to \mathsf{NX}\!\!\downarrow \end{array}$$

What will be the impact on the financial account of the balance of payments? The increase in the domestic interest rate relative to the interest rate in the rest of the world leads to an increase in the demand for domestic bonds which creates a capital inflow and thus an improvement of the financial account

interest rate in the rest of the world leads to a decrease in the demand for domestic bonds which creates a capital outflow and thus a deterioration of the financial account





Contractionary fiscal policy A decrease in G An increase in T

Government spending decreases

Impact is first on the goods market

$$\begin{array}{l} G \! \downarrow \to Z \! \downarrow \to Y \! \downarrow \\ Y \! \downarrow \to C \! \downarrow \\ Y \! \downarrow \to I \! \downarrow \end{array}$$

Then the impact on the financial market

$$Y \downarrow \rightarrow M^d \downarrow \rightarrow i \downarrow$$

Back to the goods market

$$\begin{array}{c} i{\downarrow} \to I{\uparrow} \\ Y{\downarrow} \to I{\downarrow} \end{array}$$

Impact on the exchange rate and trade balance

$$\begin{array}{l} i \downarrow \rightarrow \mathsf{Capital}_{\mathsf{outflow}} \rightarrow \mathsf{E} \downarrow \\ \mathsf{E} \downarrow \rightarrow \mathsf{X} \uparrow \rightarrow \mathsf{NX} \uparrow \\ \mathsf{E} \downarrow \rightarrow \mathsf{IM} \downarrow \rightarrow \mathsf{NX} \uparrow \\ \end{array}$$

What will be the impact on the financial account of the balance of payments? The decrease in the domestic interest rate relative to the interest rate in the rest of the world leads to a decrease in the demand for domestic bonds which creates a capital outflow and thus a deterioration of the financial account

Contractionary monetary policy A decrease in M^s

Nominal money supply decreases

The impact is on the financial market first:

$$\begin{array}{c} \mathsf{M}^s{\downarrow} \to \mathsf{M}/\mathsf{P}{\downarrow} \to \mathsf{i}{\uparrow} \\ \mathit{Impact on the goods market} \\ \mathsf{i}{\uparrow} \to \mathsf{I}{\downarrow} \to \mathsf{Z}{\downarrow} \to \mathsf{Y}{\downarrow} \\ \mathsf{Y}{\downarrow} \to \mathsf{I}{\downarrow} \\ \mathsf{Y}{\downarrow} \to \mathsf{C}{\downarrow} \end{array}$$

Impact on the exchange rate and trade balance

$$\begin{array}{l} i \! \uparrow \to Capital_{inflow} \to E \! \uparrow \\ E \! \uparrow \to X \! \downarrow \to NX \! \downarrow \\ E \! \uparrow \to IM \! \uparrow \to NX \! \downarrow \end{array}$$

What will be the impact on the financial account of the balance of payments? The increase in the domestic interest rate relative to the interest rate in the rest of the world leads to an increase in the demand for domestic bonds which creates a capital inflow and thus an improvement of the financial account

Taxes increase

Impact is first on the goods market

$$\begin{array}{c} T \! \uparrow \to Y_D \! \downarrow \to C \! \downarrow \to Z \! \downarrow \to Y \! \downarrow \\ Y \! \downarrow \to C \! \downarrow \\ Y \! \downarrow \to I \! \downarrow \end{array}$$

Then the impact on the financial market

$$Y{\downarrow} \to M^d{\downarrow} \to i{\downarrow}$$

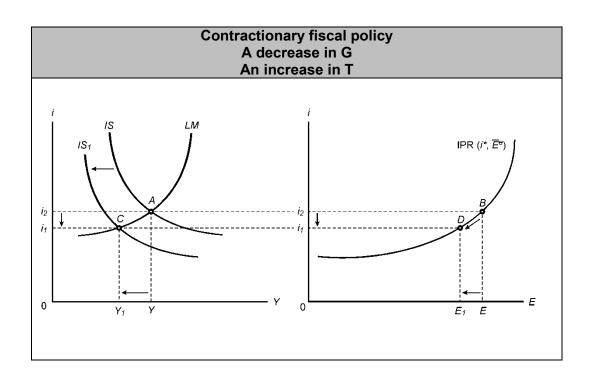
Back to the goods market

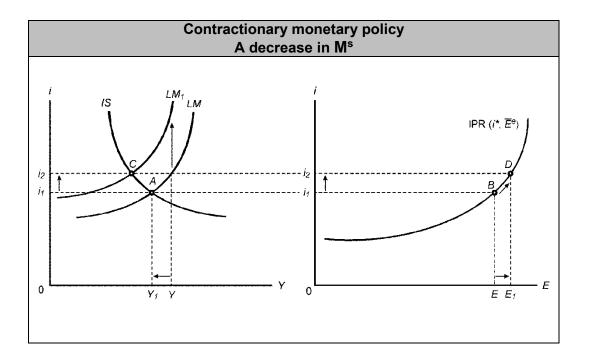
$$\begin{matrix} i \! \downarrow \to I \! \uparrow \\ Y \! \downarrow \to I \! \downarrow \end{matrix}$$

Impact on the exchange rate and trade balance

$$\begin{array}{l} i \! \downarrow \to \mathsf{Capital}_{\mathsf{outflow}} \to \mathsf{E} \! \downarrow \\ \mathsf{E} \! \downarrow \to \mathsf{X} \! \uparrow \to \mathsf{NX} \! \uparrow \\ \mathsf{E} \! \downarrow \to \mathsf{IM} \! \downarrow \to \mathsf{NX} \! \uparrow \end{array}$$

What will be the impact on the financial account of the balance of payments? The decrease in the domestic interest rate relative to the interest rate in the rest of the world leads to a decrease in the demand for domestic bonds which creates a capital outflow and thus a deterioration of the financial account





AS-AD model (in a closed economy)

The AS-AD model is a combination of the IS-LM model and the labour market.

In the AS-AD model the price level is not fixed (as it has been in the previous models).

The AS-AD model looks at the determination of output and income in both the short run and medium run.

The AS relation

The AS relation captures the effect of a change in the level of output and income (Y) on the price level (P) and is derived from the behaviour of wages (W = $P^eF(u,z)$) and prices (P = (1 + m)W) in the labour market.

In the labour market model we assumed that the actual price level was equal to the expected price level $(P = P^e)$, but in the AS-AD model it is only true for the short run.

The AD relation

The AD curve is derived from the IS-LM model by assuming a change in the price level.

The AD curve shows a negative relationship between the price level and the level of output and income, and represents combinations of the price level and the level of output and income where the goods and financial markets are in equilibrium.

In terms of a chain of events, the derivation of the aggregate demand curve can be represented as follows:

$$P \uparrow \rightarrow M/P \downarrow \rightarrow i \uparrow \rightarrow I \downarrow \rightarrow Z \downarrow \rightarrow Y \downarrow \text{ or } P \downarrow \rightarrow M/P \uparrow \rightarrow i \downarrow \rightarrow I \uparrow \rightarrow Z \uparrow \rightarrow Y \uparrow$$

Changes in monetary and fiscal policy will result in a shift of the AD curve, however any of the factors which could shift the IS or LM curves will also result in a shift of the AD curve (e.g. a change in investor or consumer confidence).

<u>Difference between the short run and medium run</u>

In the short run, it is possible to be at a position away from the natural level of output and employment.

The short run will last for as long as the expected price level remains unchanged.

In the short run only the AD curve will shift to the right or to the left because of the implementation of fiscal and/or monetary policies.

AD curve will shift to the right: expansionary fiscal and/or monetary policies.

AD curve will shift to the left: contractionary fiscal and/or monetary policies.

In the medium run, however, the economy returns to the natural level of output and employment.

Once the expected price level changes, we enter the medium run.

In the medium run the AS curve will shift downwards or upwards as a result of the impact of the implementation of fiscal and/or monetary policies in the short run.

For example: where $P > P^e$

In the short run eventually workers will realise that the actual price level is higher than the price level they expected, and during the next round of wage negotiations they will adjust their expected price level and nominal wage demands upwards. This now brings us to the medium run. 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. This increase in the price level, however, affects the financial market, 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:

$$P^{e} \!\!\uparrow \to W \!\!\uparrow \to P \!\!\uparrow \to M \! / \!\! P \!\!\downarrow \to i \!\!\uparrow \to I \!\!\downarrow \to Z \!\!\downarrow \to Y \!\!\downarrow$$

This process continues until the natural level of output and employment is reached, where the expected price level (P^e) = the actual price level (P). This then is the medium run position.

The opposite is also true.

Chain of events in the AS-AD model and diagrams:

The first part of the chain of events will be the exactly the same as for the IS-LM model in a closed economy.

In the AS-AD model we add the impact on the labour market in the short run and moves from the short run to the medium run.

Expansionary fiscal policy An increase in G A decrease in T

Expansionary monetary policy An increase in Ms

Government spending increases

Nominal money supply increases

Short run: Pe is the same

Short run: Pe is the same

The impact on the goods market first $G \uparrow \to Z \uparrow \to Y \uparrow$

The impact on the financial market first $M^{s} \uparrow \rightarrow M/P \uparrow \rightarrow i \downarrow$

Impact on the financial market

Impact on the goods market $i \downarrow \rightarrow I \uparrow \rightarrow Z \uparrow \rightarrow Y \uparrow$

$$\begin{array}{c} Y \uparrow \to M^d \uparrow \to i \uparrow \\ i \uparrow \to I \downarrow \end{array}$$

$$\begin{array}{c} Y \uparrow \rightarrow I \uparrow \\ Y \uparrow \rightarrow C \uparrow \end{array}$$

$$\begin{array}{c} I_1 \to I_1 \\ Y \uparrow \to I \uparrow \end{array}$$

Since M↑ the AD will shift to the right

Then back to the goods market $i \uparrow \rightarrow I \downarrow \rightarrow Z \downarrow \rightarrow Y \downarrow$

Events in the labour market

Since G↑ the AD will shift to the right

Events in the labour market

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

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

An upward movement along the AS curve occurs. This is the short run equilibrium position.

An upward movement along the AS curve occurs. This is the short run equilibrium position.

In the medium run: Pe changes

In the medium run: Pe changes

Events in the labour market

Events in the labour market

$P^e \uparrow \rightarrow W \uparrow \rightarrow P \uparrow$

$$P^{e}\uparrow \rightarrow W\uparrow \rightarrow P\uparrow$$

Expected price level on which workers based their real wage negotiations turned out to be lower than the actual price level. Therefore workers revise their expected price level upwards and the nominal wage increases and in reaction to the higher nominal wages. firms increase their price levels.

Expected price level on which workers based their real wage negotiations turned out to be lower than the actual price level. Therefore workers revise their expected price level upwards and the nominal wage increases and in reaction to the higher nominal wages, firms increase their price levels.

The AS curve will shift upwards.

The AS curve will shift upwards.

Events in the financial and goods market

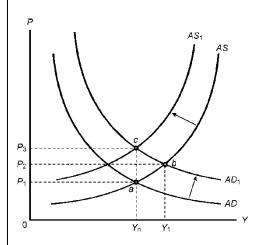
$$P \! \uparrow \to M \! / \! P \! \downarrow \to i \! \uparrow \to I \! \downarrow \to Z \! \downarrow \to Y \! \downarrow$$

$$P {\uparrow} \to M/P {\downarrow} \to i {\uparrow} \to I {\downarrow} \to Z {\downarrow} \to Y {\downarrow}$$

A movement along the AD curve occurs. This process continues until a point 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.

A movement along the AD curve occurs. This process continues until a point is reached, where the level of output is at the natural level of output the unemployment rate implication is equal to the natural rate of unemployment.

This is the **medium run position**.



Taxes decrease

Short run: Pe is the same

The impact on the goods market first $T\downarrow \to Y_D\uparrow \to C\uparrow \to Z\uparrow \to Y\uparrow$ Impact on the financial market

$$\begin{array}{l} Y \uparrow \to M^d \uparrow \to i \uparrow \\ i \uparrow \to I \downarrow \\ Y \uparrow \to I \uparrow \end{array}$$

Then back to the goods market $i\uparrow \rightarrow I\downarrow \rightarrow Z\downarrow \rightarrow Y\downarrow$

Since $T\downarrow$ the AD will shift to the right.

Events in the labour market

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

An upward movement along the AS curve to point b occurs. This is the **short run equilibrium position**.

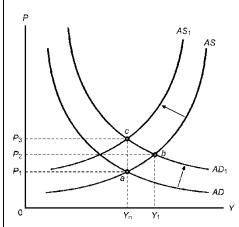
In the medium run: <u>Pe changes</u> Events in the labour market

$$P^e \uparrow \rightarrow W \uparrow \rightarrow P \uparrow$$

Expected price level on which workers based their real wage negotiations turned out to be lower than the actual price level Therefore workers revise their expected price level upwards and the nominal wage increases and in reaction to the higher nominal wages, firms increase their price levels.

AS curve will shift upwards

This is the **medium run position**.



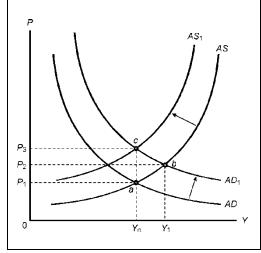
THE NEUTRALITY OF MONEY

The impact of an expansionary monetary policy in the medium run is neutral, which means that it only changes nominal variables (nominal money supply, the nominal wage and the price level) are higher and not the real variables in the model (the level of output and income, the level of employment and the unemployment rate, the interest rate, investment spending, and the real wage) which are equal to their original values.

Events in the financial and goods market

$$P \! \uparrow \to M \! / \! P \! \downarrow \to i \! \uparrow \to I \! \downarrow \to Z \! \downarrow \to Y \! \downarrow$$

A movement along the AD curve occurs. This process continues until a point 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 run position**.



Contractionary monetary policy A decrease in M^s

Government spending decreases

Contractionary fiscal policy

A decrease in G

An increase in T

Short run: Pe is the same

Impact is first on the goods market

$$\begin{array}{c} G \downarrow \to Z \downarrow \to Y \downarrow \\ Y \downarrow \to C \downarrow \\ Y \downarrow \to I \downarrow \end{array}$$

Then the impact on the financial market

$$\begin{array}{c} Y{\downarrow} \to M^d{\downarrow} \to i{\downarrow} \\ \textit{Back to the goods market} \end{array}$$

Since G↓ the AD will shift to the left

Events in the labour market

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

Nominal money supply decreases

Short run: Pe is the same

The impact is on the financial market first:

$$M^s \downarrow \to M/P \downarrow \to i \uparrow$$

Impact on the goods market:

$$\begin{array}{l} i \! \uparrow \to I \! \downarrow \to Z \! \downarrow \to Y \! \downarrow \\ Y \! \downarrow \to I \! \downarrow \\ Y \! \downarrow \to C \! \downarrow \end{array}$$

Since M↓ the AD will shift to the left

Events in the labour market

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

A downward movement along the AS curve occurs. This is the **short run equilibrium position**.

In the medium run: Pe changes

Events in the labour market

$$P^e \downarrow \rightarrow W \downarrow \rightarrow P \downarrow$$

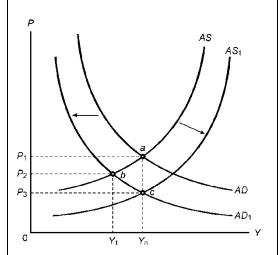
Expected price level on which workers based their real wage negotiations turned out to be higher than the actual price level. Therefore workers revise their expected price level downwards and the nominal wage decreases and in reaction to the lower nominal wages, firms decrease their price levels.

AS curve will shift downwards

Events in the financial and goods market

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

A movement along the AD curve occurs. This process continues until a point 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 run position**.



Taxes increase

Impact is first on the goods market
$$T \uparrow \rightarrow Y_D \downarrow \rightarrow C \downarrow \rightarrow Z \downarrow \rightarrow Y \downarrow$$

$$\begin{array}{c} Y \downarrow \to C \downarrow \\ Y \downarrow \to I \downarrow \end{array}$$

A downward movement along the AS curve occurs. This is the **short run equilibrium position**.

In the medium run: Pe changes

Events in the labour market

$$P^{e} \downarrow \rightarrow W \downarrow \rightarrow P \downarrow$$

Expected price level on which workers based their real wage negotiations turned out to be higher than the actual price level Therefore workers revise their expected price level downwards and the nominal wage decreases and in reaction to the lower nominal wages, firms decrease their price levels.

AS curve will shift downwards

Events in the financial and goods market

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

A movement along the AD curve occurs. This process continues until a point 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 run position**.

Then the impact on the financial market

$$Y{\downarrow} \to M^d{\downarrow} \to i{\downarrow}$$

Back to the goods market

$$\begin{matrix} i \downarrow \to I \uparrow \\ Y \downarrow \to I \downarrow \end{matrix}$$

Since T↑ the AD will shift to the left.

Events in the labour market

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

A downward movement along the AS curve occurs. This is the **short run equilibrium position**.

In the medium run: Pe changes

Events in the labour market

$$P^e \downarrow \rightarrow W \downarrow \rightarrow P \downarrow$$

Expected price level on which workers based their real wage negotiations turned out to be higher than the actual price level Therefore workers revise their expected price level downwards and the nominal wage decreases and in reaction to the lower nominal wages, firms decrease their price levels.

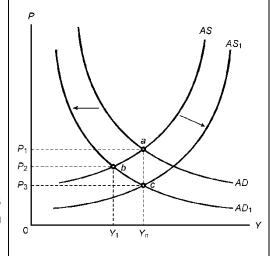
The AS curve will shift downwards.

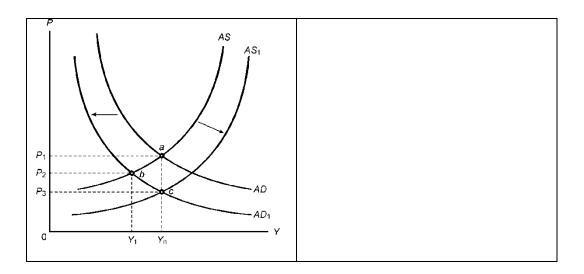
Events in the financial and goods market

$$P \! \downarrow \to M/P \! \uparrow \to i \! \downarrow \to I \! \uparrow \to Z \! \uparrow \to Y \! \uparrow$$

A movement along the AD curve occurs. This process continues until a point is reached, where the level of output is at the natural level of output and the unemployment rate by implycation is equal to the natural rate of unemployment.

This is the **medium run position**.





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