

CHAPTER 1: THE STATE OF MACROECONOMICS

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Chapter Objectives:-At the end of this chapter students will be able to understand what is macroeconomics all about including its objectives and its evolution and also will have a thorough understanding on the instruments of macroeconomics:

1.1. What is Macroeconomics all about?



Dear distance learner, Macroeconomics, is concerned with the structure, performance and behavior of the economy as a whole (aggregate economic life). This implies that the prime concern of macroeconomists is to analyze and attempt to understand the underlying determinants of aggregate trends in an economy with respect to the total output of goods and services (GDP), unemployment, inflation along with various policies that affect consumption and investment, trade balance, wages and prices, money stock, government budget, interest rate, national debt, the balance of payment, among others.

Generally, macroeconomics asks how economic aggregates are determined, why problems related to aggregate economic performance occur, and what government can and should do about such problems. This implies that in macroeconomics we are concerned with both explanations and policy prescriptions.

1.2. Objectives of Macroeconomics

Dear distance learner the objective of macroeconomics is mainly to develop better economic policies that help to maximize the wellbeing of a given society. Some of its objectives are:-

- i. Low rate of Unemployment
- ii. Price Stability
- iii. Rapid and Sustainable economic Growth and development
- iv. Equitable distribution of income,
- v. Elimination of the government budget deficit



Dear learners can you explain some of other objectives of macroeconomics

1.3. Instruments of Macroeconomics

Dear Leaner! It is essential to be aware of that macroeconomics instruments which are economic actions that can be used under the direct or indirect control of the government so as to affect one or more of macroeconomic objectives discussed earlier which policies are usually. Economic policy in this sense refers to the guiding/governing principle which determines specific actions. Policy also refers to decisions which are designed to guide (constrain) future decisions or initiate or guide the implementation of previous decisions. Some of the economic policies are:-

Monetary policy: - monetary policy is all about the management of money supply, interest rate, exchange rate, credit market etc by the central bank (The National bank of Ethiopia, in our case). Changes in monetary policy and the money supply affect interest rates, output, employment, inflation and price level in a given economy. The most important tools of monetary policy include Open Market Operation (OMO), change in discount rate, and change in required reserve ratio. Like the directions of fiscal policy, the action of monetary policy can be either expansionary or tight (restrictive) effects on macro-variables.

Fiscal policy:- this policy is concerned with action of Tax Policy (T) and Government Spending (G) by the government, with the intention to affect the economy such as promoting rapid growth rate; maintaining stable price level; achieving low unemployment, etc. The

action (direction) of fiscal policy can be either expansionary or restrictive fiscal policy by its nature. While expansionary fiscal policy refers to an action by the government, which would involve some combination of (i) cuts in personal income taxes (ii) cuts in corporate taxes and (iii) increased government spending, and results in a possible output and employment expansion; Restrictive Fiscal Policy is related to reducing aggregate demand by raising taxes or cutting government spending. Restrictive fiscal policy is usually taken by the government in a bid to combat inflationary gap in a given economy.



Dear learners can you explain some of other macroeconomics instruments?

1.4. Evolution and Development Of Macroeconomics

Macroeconomics, as the subject has developed and changed over time as new empirical and theoretical techniques have been invented and as historical events have raised new questions for which people have urgently desired answers.

Dear distance learners there have been several macroeconomic schools of thought that played great role in the development of macroeconomics as a subject. But at the same time, it is important to note that those schools of thought have been with significant conflicts of opinion. They especially disagree more over theoretical issues, empirical evidence and the choice of policy instruments than they do over the ultimate objectives of policy.



Dear distance Learner! The most important macroeconomic schools of thought that able to come up with various views on macroeconomics are the following:

- Pre-classical before 1776
- Classical economists
- Keynesians
- Neo-classical synthesis (a.k.a. neo-Keynesian synthesis)
- Monetarists
- New-Classical economists

I. Pre-Classical Before 1776

Dear learner the earliest macroeconomic thinking started from the days of “mercantilists” when they were concerned with the government policies for the promotion of economic growth of economic resources. After mercantilists the physiocrats also looked at the

economy as a whole and analyzed the circular flow of wealth Quesnay's Tableau economique" (1758) represented the first systematic attempt in national income analysis.

II. The Classical Economists



Dear learner, can you guess some of the fundamental premises of classical economists?

The period of classical economics runs from 1776-1936, in which the distinction between micro and macro was not this much clearer. On this regard, among others, the most famous economist is Scottish philosopher Adam Smith (1723–1790) whose 1776 book:-*An Inquiry into the Nature and Causes of the Wealth of Nations* set the terms of discussion for centuries to come.

According to classical model, all markets including labor market always clear themselves. That is, the economy always operates at equilibrium and at equilibrium all resources are fully employed. In fact, classical economists are aware of the fact that free economy could deviate from its equilibrium level of output and employment. However, they insist that such disturbances would be temporary and very short-lived as market mechanism operate quickly and efficiently to restore full employment level of equilibrium. In this way, for classical economists no government intervention is needed in the form of stabilization policies. It is neither desirable nor necessary to achieve full employment. Rather, according to classical, policies from government create havoc (disturbance) than harmony to the system. In their view the government should limit its activities to ensure environment in which market force act to achieve market clearing outcomes.

Dear distance learner such economic assertion basically comes due to the following strong assumptions.

- All economic agents (firms and households) are rational and aim to maximize their profit or utility.
- All markets are perfectly competitive so that agents decide how much to buy and sell on the basis of a given set of prices which are perfectly flexible
- All agents have perfect knowledge of market conditions and prices before engaging in trade.

- Trade only takes places when market –clearing prices have been established in all markets.
- Agents have stable expectation

III. The Keynesian Economists(1936 – 1970)

Dear distance learner under classical school we have seen how full employment of resources are determined under flexible price assumption and increase in general price using Quantity theory of money. However the classical market clearing (full employment) cannot handle the 1930's great depression. From 1929 to 1932 there was collapse of industrial production and GDP of major capitalist economies. Unemployment rises at alarming rate and commodity and whole sale price collapse. High unemployment persisted throughout the 1930's, and classical economic theory did not seem to be of much help in either explaining or correcting the situation. The market mechanism of classical could not restore full employment of output. Reaction to the empirical observation of persistent mass unemployment during the great depression gives rise to the birth of Keynesian school. The publication of the British economist John Maynard Keynes' *the General Theory of Employment, Interest, and Money* in 1936 was a watershed event. In this book, Keynes (pronounced "canes") argued that Say's Law was wrong. Keynes strongly argues that it is possible for an economy to have a level of demand for goods that is insufficient to meet the supply from production. In such a case, producers, unable to sell their goods, will cut back on production, laying off workers, and thus creating economic slumps. The key to getting out of such a slump, Keynes argued, is to increase aggregate demand—the total demand for goods and services in the national economy as a whole. The main thesis of the Keynesian stream is that the economy is subjected to failure so that it may not achieve full employment level. Thus, government intervention is inevitable.

Keynes's explanation of interest rate determination differs from classical predecessors. For classical interest rate was a reward for postponement of current consumption (saving). In general theory of Keynes interest rate is purely a monetary phenomenon determined by the liquidity preference (demand for money) of the public in conjunction with the supply of money which is determined by monetary authorities.

Keynesian rejects the classical notion of *neutrality of money* owing to the dependence of aggregate output and employment on aggregate expenditure, which consists of investment spending and consumption spending. Investment spending is not stable since it depends on business expectation which is related to uncertainty in the future. Uncertain future creates the desire for liquidity, so that variations in the demand for money as well as change in money supply can influence output and employment through its impact on aggregate demand.

The theory **of prices level** is another area of difference between Keynes and classical. For Keynesian, rise in the general price (Inflation) is the result of increase in nominal wage. An increase in wage causes an increase in aggregate demand. These will cause excess demand over the amount of output supplied resulting inflationary condition.

Basic Economic Tent of Keynesians: For Keynes to do about recessions, the first and most obvious thing to do is to make it possible for people to satisfy their demand for more cash without cutting their spending, preventing the downward spiral of shrinking spending and shrinking income. The way to do this is simple to print more money, and somehow get it into circulation.

This implies that the usual and basic Keynesian answer to recessions is a monetary expansion. But Keynes worried that even this might sometimes not be enough, particularly if a recession had been allowed to get out of hand and become a true depression. Once the economy is deeply depressed, households and especially firms may be unwilling to increase spending no matter how much cash they have; they may simply add any monetary expansion to their hoarding. Such a situation, in which monetary policy has become ineffective, has come to be known as a “**liquidity trap**”. In such a case, the government has to do what the private sector will not spend. When monetary expansion is ineffective, fiscal expansion must take its place. Such a fiscal expansion can break the vicious circle of low spending and low incomes and getting the economy moving again.

Dear distance learner it is worth noting that the Keynesian School of macroeconomics differs from others by the following features.

- The economy is inherently unstable and subject to erratic shocks. These shocks are attributed primary to changes in the marginal efficiency of investment following from

a change in the state of business confidence, or what Keynes referred to as change investors' animal spirits.

- The economy can take long time to return to full employment level after being subjected to some disturbance, i.e. the economy is not rapidly self-equilibrating because of the **rigidities of prices**. As a result involuntary unemployment of labor is the major feature of Keynesian macroeconomics. Therefore fiscal and monetary policies play an important role in stabilizing the economy.
- Even in modern industrial economies prices and wages are not perfectly flexible and therefore changes in aggregate demand both anticipate or unanticipated, will have great effect in the short run on real output and employment rather than on nominal variable.
- The aggregate level of output and employment is essentially determined by aggregate demand. The authorities can intervene to influence the level of aggregate effective demand to ensure a more rapid return to full employment to improve the performance of the economy.

IV. Neoclassical Synthesizers

Dear learners the neo-Keynesian synthesis was developed by neo classical economists who allowed for a short run with Keynesian properties and a long run with classical properties. Since it contains both classical and Keynesians elements, the approach is often referred to as the neoclassical synthesis.

There are actually different versions of the neo-Keynesians synthesis, depending on the assumptions made about the labor market. The first version maintains that nominal wages are rigid down-wards. This opens up the possibility of unemployment and an upward sloping section of the AS. The second version of the neoclassical synthesis allows nominal wages to be fully flexible upward-but uses the Adaptive Expectation Hypothesis (AEH) to make the expected price level a slowing moving variable. Full employment will eventually be retorted, depending on the speed at which agents adapt to expectation errors.

The main tents of the neoclassical synthesis can be summarized as:

- Pick best elements of Classical and Keynesian approaches
- Economy is “Keynesian” in the short run but “Classical” in the long run
- Long-run AS curve vertical, short-run AS curve upward sloping
- Various sub-species exist, depending on the rationalization of the upward sloping Short-run AS curve
- Nominal wage, sticky downward in the short run
- expected price level, P_e , sticky in the short run (adaptive expectations)
- Both monetary and fiscal policy can affect the economy)
- *Underlying* presumption is that the government should pursue a counter-cyclical policy

V. Monetarists

Dear distance learner monetarism, as advocates of free market, started challenging Keynes’s theory in the 1970S. Milton Friedman, the founder of monetarism, attacked Keynes’s idea of smoothing business cycles on the ground that such active(fiscal) policy is not only unnecessary but actually harmful, worsening the very economic instability that is supposed to correct, and should be replaced by simple, mechanical monetary rules. This is the doctrine that came to be known as monetarism.

Friedman began with a factual claim: most recessions, including the huge slump that initiated the Great Depression, did not follow Keynes’s script. That is, they did not arise because the private sector was trying to increase its holdings of a fixed amount of money. Rather, they occurred because of a fall in the quantity of money in circulation.

Policy under Monetarism: If economic slumps began when people spontaneously decide to increase their money holdings, then the monetary authority must monitor the economy and pump money in when it finds a slump is imminent. If such slumps always are created a fall in the quantity of money, then the monetary authority need not monitor the economy; it needs only make sure that the quantity of money does not slump. In other words, a straightforward rule—“keep the money supply steady “— Constant growth rate of money supply is good

enough; so that there is no need for a discretionary/ fiscal policy of the form “Pump money in when your economic advisors think a recession is inevitable”. Monetarists believe that monetary policy is potent but, the problem is policy maker makes timing errors (“long and variable lags”) and may exacerbate the cycle *constant* money growth rule.

VI. The New Classical School

This school of macroeconomics shares many policy views with Friedman. It sees the world as one in which individuals act rationally in their self-interest in markets that adjust rapidly to changing conditions. The government, it is claimed, is likely only to make things worse by interfering. The central working assumptions of the *New Classical* are the following;

- **Economic agents maximize:** household and firms make optimal decisions given all available information in reaching decisions and those decisions are the best possible in the circumstances in which they find themselves.
- **Expectations are Rational** (REH (or PFH): which means that they are statistically the best predictions of the future that can be made using the available **Information Set**. Rational expectations imply that people will eventually come to understand what ever government policy used, and thus that is not possible to fool most of the people all the time or even most of the time.
- **Markets Clear:** there is no reason why firms or workers would not adjust wages or prices if that would make them better off. Accordingly prices and wages adjust in order to equate supply and demand. They strongly believe on the flexibility of prices/wages, full employment, efficient markets; in other words, **markets do clear efficiently!** For instance, any unemployed person who really wants a job will offer to cut his or her wage until the wage is low enough to attract an offer from some employer. Similarly, anyone with an excess supply of goods on the shelf will cut prices so as to sell. The essence of the new Classical approach is the assumption that markets are continuously in equilibrium. Thus, they strongly forward the idea of Policy Ineffectiveness Propositions (PIP) for those who are intended to formulate policies against some macroeconomic instability in a given economy.

Summary

- Macroeconomics studies the working of an economy in aggregation or averages such as fluctuations in the level of employment of labor, fluctuations in the average price level, fluctuations in the general level of money wages, the allocation of resources between the production of consumer goods and capital goods; the rate of growth of productive capacity; the relation between international trade and the levels of employment, prices and growth in the economy, among others.
- The most important macroeconomic instruments taken by authorities are fiscal policy, monetary policy and income (labor) policy
- The main objectives of macroeconomics policy of any country focuses in achieving important objectives such as good living standards (say, continuous economic growth), stability and security (say, full employment and stable price level) and above all sustainable development (say, environmentally friendly development). This is far from an exhaustive list. Some economists may give higher priority to other goals such as an equitable distribution of income, elimination of the government budget deficit, balanced foreign trade, economic efficiency, reduction of pollution, economic security, and so on. Macroeconomic goals can also be either complementary or sometimes conflicting goals.
- The most important schools of thought that made an enormous contribution to the development of macroeconomics are classical economists, Keynesians, monetarist, new classical and new Keynesian schools. The debate among the schools shows that the evolution of modern macroeconomics has been rooted to the classical and Keynesian macroeconomics. This is so more so because many macroeconomists began combining elements of both classical and Keynesian economics, making a distinction between the long-run and the short-run.

Checklist

Dear learner did you understand the following concepts?

	<u>YES</u>	<u>NO</u>
a. Can you define macroeconomics?	☐	☐
b. Are you able to mention some of the macroeconomic	☐	☐
c. Are you familiar with some of the macroeconomic policies?	☐	☐
d. Do you think living standards gets improved whenever Economic growth comes?	☐	☐
e. Can you mention the main macroeconomic schools of	☐	☐
f. Are you able to explain the difference between “Classical” economist and “Keynesian” economists?	☐	☐

:-SELF EVALUATION TEST

PART ONE:-SAY TRUE OR FALSE

1. Keynesian economists believe that an economy that experiences a high rate of unemployment will quickly self-correct.
2. Economic growth always leads to improved living standards.

PART-TWO: SUBJECTIVE QUESTIONS

1. Discuss the main objectives and instruments of macroeconomics
2. Discuss how the Great Depression of 1930s led to the emergence of new economic thinking

References

- Gregory Mankiw (2000) Macroeconomics, McGraw Hill, U.S.A.
- Rudger Dornbusch and Stanley Fischer (1994), Macroeconomics, McGraw Hill, USA.

CHAPTER 2: NATIONAL INCOME ACCOUNTING AND BUSINESS CYCLE

Learning Objectives

- 2.1. Introduction
- 2.2. Measuring macroeconomic performance
 - 2.2.1. Approaches to measure GDP
 - 2.2.2. Other Social accounts measures of output/income
 - 2.2.3. Calculating GDP Growth
 - 2.2.4. Real GDP versus Nominal GDP
 - 2.2.5. Price Index
 - 2.2.6. What is missed from GDP?
- 2.3. Business Cycle
 - 2.3.1. Phases of Business cycle
- 2.4. Inflation and Unemployment
 - 2.4.1. Inflation
 - 2.4.2. Unemployment

Chapter Objectives:-The objectives of this chapter is to introduce you to the concept of national income accounting and its measurement, fluctuation in GDP and the business cycle, to issues of inflation and unemployment.

After the completion of this chapter learners will be able to:-

- Define GDP and able to calculate by using either the expenditure or income or production approach.
- Understand different approaches to define national income
- Understand differences between nominal GDP and real GDP and you should decide on what is better to measure an economy's performance?
- Explain the nature and causes of business cycle

2.1.Introduction



Dear Distance Learner! The national accounts have developed over the last many decades for several reasons. The economy itself has evolved, for example moving from being strongly oriented towards agriculture and manufacturing, and then towards a structured economy in which service and information activities are increasingly important. Therefore this chapter will demonstrate how GDP, economic growth, measures of price changes (inflation rate), and national savings are commonly measured.

2.2. Measuring Macroeconomic performance



Dear distance learner what are some of the measurement of national income?

Dear learner the figures on the growth rate of GDP are often taken to signal the success or failure of macroeconomic policy-making unit in a given economy

Gross Domestic Product (GDP) is defined as a measure of the total value of final goods and services newly produced in a country over a period of time (usually one year). This definition contains several key phrases. Some of them are easy to understand, while others rely on complicated conventions.

Gross National Product (GNP) is defined as a measure of the total value of final goods and services newly produced over a period of time (usually one year) by one country nations

.This significant economic scenario leads us to develop two very similar concepts in measuring the value of a nation's aggregate output, called **Gross domestic product (GDP)** and **Gross National Product (GNP)**. The difference between GNP and GDP is the income from the goods and services produced abroad using the labor and property supplied by Ethiopian residents less payments to the rest of the world for the goods and services produced in Ethiopia using the labor and property supplied by foreign residents. This is referred to a *Net Factor Payment from abroad*. In a simple example as mentioned earlier, the profits of a Chinese-owned factory in Ethiopia would be included in our GDP, but not in GNP; while the profits of Ethiopian-owned firm in Kenya or other **remittance** from abroad would be included in our GNP, but not in GDP.

Algebraically, GDP differ from GNP by the Net Factor Income (NFI) received from abroad in the following way:

$$\text{GNP} = \text{GDP} + \text{NFI}$$

Where NFI= Factor income received from abroad minus Factor income paid abroad

For this reason, GNP can be $>$, $=$ or $<$ GDP. This depends on the magnitude of the NFI

- a) $\text{GNP} > \text{GDP}$, if $\text{NFI} > 0$
- b) $\text{GNP} < \text{GDP}$, if $\text{NFI} < 0$
- c) $\text{GNP} = \text{GDP}$, if $\text{NFI} = 0$

2.2.1. Approaches to measure GDP

Dear distance learner GDP is a flow concept. It tells us the amount of Birr flowing among different economic agent (firms, households and other) per year or months.

Sometimes in dealing with national accounts economists hence use the terms “production,” “income,” and “expenditure” interchangeably, the idea is that in this imaginary simple economy

- a. Using a production approach, which might seem to be the most natural and direct method, we could sum up the Birr value of all final goods and services produced in each sector such as Agricultural sector, Industrial sector, Service sector etc
- b. However, using the spending approach, we could look at who buys the final goods and services that have been produced in the various sectors. Since we assumed that no goods are carried as inventory in this very simple economy, everything produced must be bought. Totaling up the Birr value of spending on all various kinds of goods and services by all sectors in this imaginary simple economy will give a second way of arriving at the figure for a country’s aggregate production.
- c. Lastly, since in this simple economy everyone who is involved in production also receives a monetary payment for their contribution to it, we could, alternatively, take an income approach. In this approach, we total up the compensation received by everyone involved in production, including workers, investors, creditors, and owners of land or

equipment rented for productive use. While there is a rough equivalence in theory among the product, spending and income approaches to calculating GDP, making estimates for an actual economy requires a number of conventions and adjustments. So it is imperative to see each of the above approaches more in detail

a. The Product Approach or The value added approach

Dear learners in this method of measuring GDP, it is important to include only final goods and services in order to avoid double counting. Double counting will arise when the output of some firms are used as the inputs of other firms. There are two possible ways of avoiding double counting; either taking only the value of final goods and services, or taking the sum of the value added by all firms at different stages of production. In short according to this approach to national income accounting process, the total output of a country, Gross domestic Product (GDP) is obtained by adding the new values of goods and services created at different stages of process or in different sectors (agricultural sector, industrial sector, service sectors....). To avoid double counting, it is also necessary to use value added method. Value added is the market value of firm's output less the value of the inputs purchased from others.

Dear learner let us assume a farmer produces oil seeds and sells it to edible oil factory for birr 10,000. And an oil factory uses this oil seeds to produce edible oil, which it again sells to retailers for birr 15,000. Further, Retailers buy the oil and sell it for birr 24,000.

Table 2.1 summarizes the stages of production

Stages of production	Value of output	Cost of intermediate goods	Value added
Farmer	10000	0	10000
Oil factory	15000	10000	5000
Retailers	24000	15000	9000
Total			24000

As you observe in the above table, the sum of value added is equal to the final value (24000).

b. Expenditure Approach

Dear distance learner in this expenditure approach we measure total economic activity by adding the amount spent by all ultimate or final consumers of products and services. Total GDP is the sum of four categories of final demand:

$$\text{GDP} = \text{C} + \text{I} + \text{G} + \text{NX}$$

Where, C = consumption expenditures, I = investment, G = government spending, NX = net exports [exports (E) minus imports (M)]

Consumption (C): includes all spending by domestic households on final goods and services, with the exception of housing, which is reported as residential investment (see Investment below).

Consumption expenditures are grouped into three categories:

- i. Durable goods - goods that have a useful life of more than one year (cars, furniture)
- ii. Nondurable goods - goods ordinarily used up in the same period they are produced (Food, clothing, fuel)
- iii. Services (haircuts, lawyers, health care)

Business investment (I). Investment in macroeconomic models represents the flow of spending that adds to the physical stock of real capital. This includes business fixed investment such as spending on new plants and equipment's by firms, residential investment and inventory investment (investment made to change firm's inventories of goods).

Government purchase or spending (G) is spending made on domestic goods and services by federal, state and local government. It includes investment made by government on different types of infrastructures, military equipment's and spending made for services of government employees. There is a significant exception when accounting for government expenditures, however. The government may spend money for which it does not receive any good or service in return like in **Transfer payments** which includes social security benefits, unemployment compensation, pension and various social welfare benefits. Those are excluded from government spending, and so does from GDP. This is because they do not reflect productive activity in the period in which they occur. Similarly, interest payments on

the national debt are not counted as part of government spending in the GDP accounts. We shall see more in detail toward the end of this chapter, wherein we see other social measures of national income.

Net Exports (NX):-Net exports are positive if exports are greater than imports (a trade surplus) and negative if imports exceed exports (a trade deficit).Exports are included as a positive addition to GDP because exports are final goods and services produced within the country that are purchased by foreigners.

Table 2.2. Expenditure Approach to Measuring GDP for a hypothetical economy

	Billions of Current Birrs	% GDP
Personal Consumption (C)	11,004	70.5 %
Durable goods	951	
Nondurable goods	2,200	
Services	4,610	
Gross Private Domestic Investment (I)	1,666	15.1 %
Fixed investment – nonresidential	1,095	
Fixed investment – residential	572	
Change in business inventories	- 1	
Government Purchases of Goods and Services (G)	2,076	18.9 %
Federal	752	
State and Local	1,323	
Net Exports (NX)	- 498	- 4.5 %
Exports	1,046	
Imports	1,544	
Gross Domestic Product (GDP)	11,004	

c. Income Approach

Dear distance learner we add up all the incomes earned by different factors of production: land, labor, capital and so on when we use the income approach to measure GDP,. These components basically include the following.

- Employment payment made for labor in the form of wages and salaries(**W**)
- Rents payments for use of land, building and other capital input (**R**)
- Interest income received by households on their saving deposit or Interest on borrowed capitals (**I**)
- Profit earned by the owner of firms in return to the output produced after deduction of cost of production (**II**). This is the sum of proprietor profit and corporate profit.

Thus to arrive at GDP, indirect business taxes (IT) and depreciations (D) need to be added as well. Thus, based on the income approach, the GDP figure is given by the following relation.

$$\mathbf{GDP = Y = W + R + I + \Pi + IT + D}$$

Where, depreciation represents consumption of fixed capital which can be considered as cost of production. Indirect business tax such as sales taxes are payments that represent the difference between what buyers pay for final product and what users receives from excise and sales taxes. Since it is the amount that sellers receive, it is converted to factor payments. This implies indirect business tax and depreciation enter the income side in GDP computation.

The following table represents an example of GDP computation for hypothetical economy using income approach.

Table 2.3. GDP of hypothetical economy in billions of dollars

Component of GDP	Values in dollars
• Wages and salaries	\$6,657.4
• Rents	\$153.8
• Interest rate	\$ 546.7
• Profit	\$2,020.9
National Income	\$9,378.8
• Plus depreciation	\$ 1,479.9
• Plus Indirect business tax	\$885.9
• Minus net foreign factor income	\$38.2
• Plus statistical discrepancy	\$90.4
GDP	\$21,252.00

Note: in all the three approaches used to measure GDP, there are basic ideas that should be considered.

2.2.2. Other Social accounts measures of output/income

There are also other measures that are used to represent the total output produced in an economy which are alternatives of GDP.

- i. **Net domestic product (NDP)** –It represent the value of total output of an economy after net out depreciation. $\text{NDP} = \text{GDP} - \text{depreciation}$.

ii. **Net national product (NNP)**-measures the value of total output produced by a citizen of a given country within a specified time period after subtracting the consumption of fixed capital (depreciation). $NNP = GNP - \text{Depreciation}$

iii. **National Income (NI)** – It is the total income earned by resource owner from current production. National income can be computed in two ways. First, by summing up the factor incomes earned in producing total output. Second, by making adjustment to net national income through subtracting indirect business tax from NNP.

$$NI = NNP - \text{Indirect business tax (e.g. sales tax)}$$

$$NI = GNP - \text{Depreciation} - \text{Indirect business tax}$$

$$NI = \text{wages and salaries} + \text{proprietors income} + \text{Rental income} + \text{corporate profit} + \text{Interest income.}$$

iv. **Personal income** –is the amount of income that households and non - corporate businesses receive. It can be obtain from national income after series of adjustment. First reduces from the national income the amount of corporate earn but pay to its shareholders (retain earning and taxes). Second increase the national income by the amount government pay transfers to individuals. Thirdly, national income is adjusted for interest rate that households earn rather than interest rate paid by firms.

Personal income (PI) =National Income-corporate profit -Social Insurance contributions.-Net interest + Dividends + Government transfer + Personal interest income

v. **Disposable income (Y_d)** is the amount of income that is left for a person after payment of any taxes and transfers. It is the amount that the person is free to spend on whatever he/she likes or to save. It is given by the following identity.

$$Y_d = PI - (\text{direct or personal income taxes}).$$

However, sometimes all transfers and taxes are considered at the same time. In that case, the disposable income is directly calculated from national income which is usually represented by (Y). Thus, the disposable income identity is given as follows.

$$\text{Disposable income } Y_d = Y + \text{Transfers} - \text{Taxes}$$

$$Y_d = Y + TR - T$$

vi. Personal savings (S) is the amount of disposable income that is left over and above consumption expenditure. In other words, personal saving is the difference between disposable income (Y_d) and consumption expenditure (C) and it is given as follows:

$$S = Y_d - C$$

Where 'C' is consumption expenditure, S is personal saving and Y_d is disposable income

2.2.3. Calculating GDP growth

a. Growth rates

Dear distance learner beyond measuring the level of national income, it is vitally important to introduce you how to calculate the growth rate of GDP. In estimating the rates of economic growth, economists usually look at how GDP changes over time, which can be calculated using the standard percentage change formula:

$$\text{Growth rate} = \frac{\text{GDP in a year} - \text{GDP in the previous year}}{\text{GDP in the previous year}} \times 100$$

To know whether it is calculated based on real GDP or nominal GDP, it is important to have a more detailed discussion on the concepts of nominal and real GDP so as to identify whether the calculated growth rate is a reflection of a reality.

2.2.4. Real GDP versus Nominal GDP

Nominal GDP is a figure that is not adjusted for price changes. The figures of NGDP could be misleading either by overestimating (during inflation) or underestimating (in time of deflation) the actual GDP of an economy. This is because not only does output change between two years, but the prices at which output is valued change as well. Hence, it is always advisable to gauge the nominal figures with a real GDP calculated based on a reference year. Real GDP in this sense is a measure of GDP that seeks to reflect the actual value of goods and services produced, by removing the effect of changes in prices between years.

The first step in calculating real GDP is to pick a "base" year. The choice is arbitrary. The objective is to take a snapshot of market prices at some point in time and to apply those prices to the quantities of goods sold in different years.

For a hypothetical economy, Table 2.4 presents a sample calculation of real GDP for the years 2012 and 2014, assuming 2012 is the base year. Real GDP for 2012 is 2012 quantities times' 2012 base year prices. Real GDP for 2012 is 2012 quantities times' 2012 base year prices.

Table 2.4. Calculating Real GDP (Base Year = 2012)

	Average Prices (Birr)			Quantity Sold		2012	2012	2014	2014
	2012	2014	change	2012	2014	Nominal GDP	Real GDP	Nominal GDP	Real GDP
Food	12	14	17%	4	5	48	48	70	60
Housing	9	10	11%	3	3	27	27	30	27
Fun	4	5	25%	3	4	20	20	20	16
Machine	20	20	0%	2	2	40	40	40	40
					Bi	127	127	160	143

2014 Nominal GDP = sum of [2014 (current year) Prices x 2014 (current year) Quantities]

$$= (\text{Birr } 14 \times 5) + (\text{Birr } 10 \times 3) + (\text{Birr } 5 \times 4) + (\text{Birr } 20 \times 2)$$

$$= \text{Birr } 70 + \text{Birr } 30 + \text{Birr } 20 + \text{Birr } 40 = \text{Birr } 160$$

2014 Real GDP = sum of [2012 (**base** year) Prices x 2014 (current year) Quantities]

$$= (\text{Birr } 12 \times 5) + (\text{Birr } 9 \times 3) + (\text{Birr } 4 \times 4) + (\text{Birr } 20 \times 2)$$

$$= \text{Birr } 60 + \text{Birr } 27 + \text{Birr } 16 + \text{Birr } 40 = \text{Birr } 143$$

$$\text{Nominal GDP Growth rate} = \frac{\text{Nominal GDP } 2014 - \text{Nominal GDP } 2012 \times 100}{\text{Nominal GDP } 2012}$$

$$= \frac{160 - 127 \times 100}{127} = 25.98\%$$

The growth rate of GDP from 2012 to 2014 is 25.98%. But if you look carefully, you can see that only part of the change is due to an increase in the production, but the calculated growth rate might be overestimated as there appears an increase in the price of food, housing and fun as well. Hence, in order to get an idea of the "real" value of production, we can calculate the 2012 and 2014 real GDP figures. This is because an increase in nominal GDP really tells us

nothing as we don't know if the increase was due to higher prices or more physical output. So let's prove the above growth rate with the calculation of real GDP as follows:

$$\text{Real GDP Growth rate} = \frac{\text{Real GDP 2014} - \text{Real GDP 2012} \times 100}{\text{Real GDP 2012}} = \frac{143 - 127 \times 100}{127} = 12.62\%$$

As the change in prices has been eliminated in the calculation of real GDP, an increase in real GDP tells us that the hypothetical economy actually expanded by 12.6% between 2012 and 2014. But there is a point that we can still make out. That is, the nominal GDP growth rate overestimates the expansion of the economy by more than twice, which needs a caution while interpreting the data.

2.2.5. Price indexes

A price index is a number that shows how the average level of prices has changed over time. A price index does not directly measure the average level of prices. But it helps us drive the inflation rate. To create a price index we (arbitrarily) assign one year as the base year. We determine all changes in prices from that base year then weight the change in price for each good by the value of that good sold. The price index for the base year is (again arbitrarily) assigned a value of 100. The price index for years other than the base year indicates the change in the average level of prices between any year and the base year, which can be expressed as percentage changes.

There are a range of price indexes that are used to drive inflation in a given economy. Some of those include GDP deflator, Consumer Price Index and Producer Price index. Two of those price indexes are discussed below.

GDP Deflator

The GDP Deflator (also known as the Implicit GDP Deflator or Implicit Price Deflator) is a price index that represents the change in the average level of prices of all goods and services produced in an economy (i.e., included in GDP). The GDP deflator is measured by comparing the current value of total output (nominal GDP) to the value of the output if prices had not changed from the base year (real GDP). That is,

$$\text{GDP deflator} = \left(\frac{\text{Nominal GDP}}{\text{Real GDP}} \right)$$

2014 GDP deflator = 2014 Nominal GDP

2014 Real GDP

$$= \frac{\text{sum of } [(\text{current prices}) \times (\text{current quantities})] \times 100}{\text{Sum of } [(\text{base year prices}) \times (\text{current quantities})]} = \frac{\text{Birr } 160 \times 100}{\text{Birr } 143} = 111.9$$

The GDP Deflator (and any price index) is equal to 100 in the base year and inflation (or deflation) is then calculated as the percent change in the GDP Deflator:

$$\text{Inflation Rate (\%)} = \frac{(\text{GDP Deflator Year 2} - \text{GDP Deflator Year 1}) \times 100}{\text{GDP Deflator Year 1}}$$

$$\text{Inflation Rate (\%)} = \frac{(111.9 - 100) \times 100}{100} = 11.9\%$$

Consumer Price Index (CPI)

An alternative measure of price inflation is the Consumer Price Index (CPI). The CPI is a specialized measure of inflation in that it measures only the inflation rate of goods purchased by the typical household. It excludes some products covered by the GDP Deflator such as capital goods purchased by firms and goods and services purchased by the government. But the CPI includes household purchases of imports that are excluded from GDP and the GDP deflator. This implies that CPI is an approximate measure of changes in the cost of living of consumers, implying that the CPI is based on a typical "market basket" of goods and services purchased by the average household.

One significant characteristic of the CPI is that the goods and services included in the index are assumed not to change over time. Consequently, the CPI is described as a fixed-weight price index, which measures the cost of a fixed basket of goods relative to a base period. In other words, the quantities of goods and services included in the CPI do not change from year-to-year as they do in the GDP Deflator.

Assume in the simple economy in the table above that 2012 is the base year and that the quantity of food, housing, and fun sold in 2012 represents the quantities in the fixed market basket of goods (machines are excluded because they are purchased by businesses and not households). Since 2012 represents both the base year for prices **and** the quantities of goods

in the fixed market basket, we know that the CPI for 2012 equals 100. We can then calculate the CPI for 2014

$$2014 \text{ CPI} = \frac{\text{sum of } [(current \text{ prices}) \times (fixed \text{ market basket quantities})] \times 100}{\text{Sum of } [(base \text{ year prices}) \times (fixed \text{ market basket quantities})]}$$

$$2014 \text{ CPI} = \frac{(Birr 14 \times 4) + (Birr 10 \times 3) + (Birr 5 \times 3) \times 100}{(Birr 12 \times 4) + (Birr 9 \times 3) + (Birr 4 \times 3)}$$

$$2014 \text{ CPI} = \frac{(Birr 101) \times 100}{(Birr 87)} \quad 2014 \text{ CPI} = 116.$$

2.2.6. What are missed from GDP?



Dear distance learner, what are some of the problems of GDP?

GDP does not capture the value of all resources consumed, productive efforts, and costs of production. All in all, GDP has the following drawback or shortcomings by its nature.

3. GDP omits the value of **leisure time**. Time is a limited resource and if its use in leisure were not highly valued, we would all be working 16-hour days, 7 days a week. If the government were to reduce the 40-hour work week there would be a decrease in GDP because of the reduction in production, income and spending. But, would we necessarily be worse off? It depends on how much a few additional hours of leisure time is valued
4. **Home and volunteer services** are productive efforts that are not included in GDP. GDP does not include productive efforts that are not exchanged in a market (e.g., a price paid and/or income received). The services of a hired housekeeper would be included in GDP, while the identical effort of someone doing their own housework is not. Hiring a contractor to remodel your home is included in GDP, do-it-yourself remodeling is not. Volunteer charitable work, home education, child raising, and many other productive efforts for which an income is not paid are left out of GDP
5. GDP does not include market transactions that are not reported to the government. The **underground economy** consists of transactions that are not documented for various reasons. For example, the transactions may be illegal

(e.g., drugs) or income may be hidden to avoid taxes or compliance with regulations. Government statisticians do make an attempt to include an estimate of the underground economy's size, but these estimates are not included in GDP.

6. GDP does not include costs of production that are not paid by firms and thus are not included in market prices. Pollution represents a cost or reduction in social welfare. The operating and capital costs to control or reduce pollution are included in the price of the good or service provided and the total market value of output. However, the pollution that firms are not held responsible for are not reflected in market prices and do not appear in GDP. GDP may grow because of increases in output, but the possible associated increase in pollution is not recognized. Not only do these omissions from GDP make it inappropriate as a measure of social welfare, but they also make international comparisons of output unreliable. Some countries (such as US) are taking steps to address some of these omissions such as pollution by developing the *Integrated Environmental and Economic Satellite Accounts, instead of the National Income Account*
7. GDP does not tell us the long term sustainability of gains from production. These values do not tell us whether the current trend of growth is going to continue in the future.
8. GDP do not indicate composition of national outputs.
9. GDP does not show income distribution

2.3. Business cycle

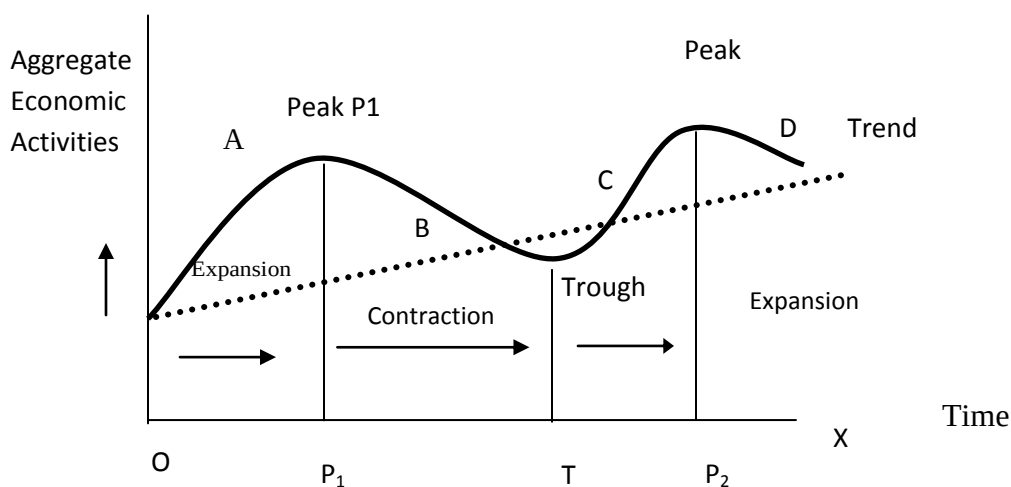
2.3.1. Phases of Business cycle

Dear distance learner one of the basic purposes of macroeconomics is to answer questions like what causes the recurrent ups and downs of the economy, where these ups and downs of the economy, in the short run are known as business cycle. It is a regular pattern of expansion and contraction in economic activity around trend growth. Even though the fluctuation characterizes all macro variables, in most case business cycle primarily represents fluctuation of output or GDP along the trend.

The classification of the cycles is indicated in figure 2.1 below. The economy passes through four distinct phases to complete one business cycle.

(A) Peak (Boom) → (B) Contraction (Recession) → (C) Trough (Bottom) →
 → (D) Expansion (Recovery) → A) Peak (Boom) →

This sequence repeats itself in different length of periods for different economies, from 'A' to 'B', from 'B' to 'C' and then from 'C' to 'D', from the 'D' to 'A', 'A' to 'B', and so on.



In the figure, X-axis represents the time period and Y-axis represents the aggregate economic activities. Trend Line is indicated by the straight dotted line and business cycle which passes through points of actual economic activity measured by GDP is shown by bold line. From 'O' to 'P₁' in the figure, one can find that economy is above the trend line. This phase is therefore, known as **Expansion phase**. Economy reaches its peak, which is at point 'P₂'. From 'P₁' to 'T' economy is in recession, which means economic activities are slowing down. This trend is shown by the downward movement of the cycle. This phase is known as **Contraction phase**. The figure depicts that contraction phase brings or leads to the bottom of the economic activities, which is known as **trough** represented by point 'T'. From the figure one perceives that from bottom point the economy again starts recovering because of some corrective measures or favorable conditions created for the economy; i.e. expansion phase begins. This process continues again that is by reaching peak followed by trough.

Having characterizing the nature of business cycle in this way, the next question is then what causes the deviation of GDP from its trend. Each phase of the business cycle has its own sources or factors leading the economy to take that phase. These phases have also some characteristics. Economic variables like total output, employment or unemployment, aggregate demand for commodities and factors of production have different values throughout the different phases of the business cycle. For instance, economic recessions (or contractions) and economic troughs are the result of the following major factors:

- Natural factors such as drought caused by shortage of rainfall;
- War which diverts resources from production;
- Inappropriate economic policies;
- Underemployment of the existing economic resources or factors of production; and so on.

These phases are again characterized by the following cyclical recession or cyclical trough:

- Low output or GDP;
- High unemployment (or low employment);
- Low aggregate demand for both products and factors of production;
- Low per capita income (PCI); and so on.

On the other hand, economic expansion (or recovery) and peak are the result of the following major factors which are opposite to the factors that lead to cyclical recession and cyclical trough.

- Political stability;
- Use of appropriate economic or macroeconomic policies;
- Discovery and use of new economic resources or factors of production such as minerals like petroleum or oil and deposits of precious metals like gold.
- Utilization of idle resources or factors of production such as labour;
- Use of improved quality workers through training and so on.

These phases of cyclical expansion or recovery and peak are characterized by:

- Higher aggregate output or GDP;

- Low unemployment (or high employment) of factors of production such as labour and capital;
- High aggregate demand for products and factors of production;
- Larger Percapita Income (PCI); and so on.

The phases of business cycle show the movements of the economy at different periods. Economy sometimes performs well and sometimes it lags behind from its trend path which is nothing but the average performance of the economy. The deviation from the trend path creates gap in the output. Deviation of output from trend is known as **output gap**. The output gap measures the gap between the output the economy could produce at full employment (trend line) given the existing resources and actual output (cyclical line). Full employment output is called **potential output**. Output gap is the difference between potential output and actual output.

Output Gap = Potential Output (Trend) - Actual Output (Cyclical)

= $Y_t - Y_a$, Where; Y_t : is trend or potential output

Y_a : is actual output or cyclical output

There are three possibilities of output gaps. That means the output gap can take three different values.

Possibility 1: From A to B in the above figure, (Figure 2.1), when Actual output is greater than the potential output which is given by the straight dotted line in the figure. Here output gap is Negative.

Possibility 2: From B to C in the above figure, (Figure 2.1), when Actual output is less than the potential output (the value on the straight line). Here output gap is Positive.

Possibility 3: At point A, B and C in the above figure when Actual output is exactly equal to potential output. The two curves have equal values at the point of their intersection. Here output gap is Zero.

Output gap allows us to measure the size of the cyclical deviations of output from the potential output or trend output (deviation from the potential output that the economy can produce with full capacity utilization of the existing resources).

- a) A negative gap indicates that there is over employment, overtime for workers, more utilization of the capacity of the machineries and so on.
- b) A positive Output gap indicates unemployment, underutilization of capacity and actual output falls below the potential output.
- c) A zero output gap indicates that we are or the economy is at full employment of existing resources or factors of production.

2.4. Inflation and Unemployment



Dear learner, can you define what inflation is?

In this section we will consider other measures of performance the economy Known as inflation and unemployment. Specifically, we will discuss/issues related to different aspect of inflation and unemployment like its meaning, measurement and effect of inflation as well as the relationship between inflation and unemployment.

2.4.1. Inflation

In a broad sense, inflation is defined as a sustained rise in the general level of prices. Two points about this definition need emphasis. First, the increase price must be a sustained one, and it is not simply a once for all increase in prices. Second, it must be the general level of prices, which is rising; increase in individual prices, which can be offset by falling in prices of other goods is not considered as an inflationary. Thus we define inflation (Π_t) as:

$$\Pi_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100, \text{ Where } P_t \text{ is overall price index (CPI, GDP deflator) for time } t, P_{t-1} \text{ is over}$$

all price index for time $t-1$

Measured in this way and on the basis of speed, inflation can categorized as:

- Creeping
 - walking,
- } Low rate of inflation

- Running, galloping
 - Hyper inflation
- } High rate of inflation

Theories that deal with the causes of inflation generally grouped into demand pull and cost push factors.

Demand pulls factors: According to demand pull theory, inflation is resulted from more rapid increase in demand for goods and services than supply of goods and services (fixed level of goods and services supplied). Classical and Keynesian explain differently the reason for increase in demand for goods more rapidly than supply. For classical economist it is the result of monetary expansion. Increase in money supply (additional flow of money in the economy) will increase demand for new investment and rises aggregate demand for goods and services.

This will create excess demand in the economy equals to $Y_1 - \bar{Y}$. At equilibrium price, P_0 consumers, businesses firms and government would want to purchase Y_1 amount, but producer still supply only, $\bar{Y}$ amount. This excess demand causes the price to rises to P_1 . In other words increase in money supply means households and firms find themselves holding more money. The price theory tells us that, in a competitive market price of a commodity are determined by the market demand and supply of a commodity. Variation in price of the commodity is caused by the variation in demand and supply factors. Likewise, the aggregate price level is determined by the aggregate demand and aggregate supply. Variation in the aggregate price-level is caused by the variation in the aggregate demand and aggregate supply than they desire. The excess money balance that is created due to increase money supply is used to purchase goods and services. If the supply of goods and services is constrained by the predetermined full employment level of output as classical assumed or cannot increase as fast as demand, the excess demand in goods market cause raise in general level of price (inflation)

The central bank of a given country is assumed to control the amount of money circulating in an economy. So, why government allow money supply to increase? The answer to this question related to the way government finance its deficit. Government finances its

budgetary deficit using three different ways. It can borrow from the public, i.e. issue bonds to the public, print money i.e. borrow from central bank and raises additional tax revenue.

Keynesian on the other hand, made important departure from the classical view. Classical economists considered an increase in money supply as a cause of increase in aggregate demand and then inflation. For Keynesian aggregate demand can increase also due to an increase in real factors such as increase in consumer demand, investment demand, government expenditure, Net export. Such change may take place even when supply of money is constant. Inflation for Keynesian model is therefore initiated by fiscal or other a non-monetary disturbance that causes excess demand for goods and services. In general demand pull inflation is inflation initiated by some events, whether monetary, fiscal or private spending behavior that cause increase in the aggregate demand above aggregate supply.

i. Cost push (supply side) factors

There are non-demand factors that cause inflation. During 1958 recession in western countries, aggregate demand was declining but prices do not decline. In recent times, it is common experience to have inflationary condition combine with rate of unemployment when there is economic stagnation. Such conditions which are not demand side factors are explained by supply side factors.

Cost push inflation occurs when different factors which increases cost of production (increases price of input) and other structural bottle neck cause firms to reduce the supply of goods and services below existing demand.

Let us consider different factors which causes shrink in supply of goods and services. One factor which cause decline in supply of goods and services at ongoing demand is increase in price of input like labor, oil and other raw material. For instance, the monopoly groups of the society like strong labor union having high bargaining power often succeed in setting nominal wage above competitive equilibrium without an increase in the productivity of labor. The minimum wage legislation interventions in labor market also keep the price of labor market above equilibrium during the period of recession. These factors cause increase in cost of production, decrease in labor employment and output supplied.

The other supply side factors that causes inflationary condition is different types of supply shocks which result in unexpected disturbance in supply position of some major commodities or key industrial inputs. When the shocks reduce the supply of some items that have large weight in price index, there is sudden rise in the general prices of an economy. Such items for example includes food prices due to crop failure and price of industrial input like coal, steel , cement, oil and basic chemicals.

The rise in price may be also caused by supply bottleneck in domestic economy or international events. The Sudden rise in the OPEC oil prices during 1970s due to Arab-Israel war can be cited as supply shock that causes inflation.

Economic effect of inflation

Inflation affects economic agents which depend on the market for their income and consumption of goods and services in different ways. The effect may be low or high depending up on the rate of inflation (too high or too low)

The following are some of them.

1. Generally inflation reduces real money balance $\left(\frac{m}{p}\right)$ or purchasing power of money. It

is similar to changing the measurement unit of money according to the classical theory of money. Since it reduces the purchasing power of money, inflation reduces the welfare of individuals. For example, if an increase in income by 6 percent causes inflation rate of 8 percent, then purchasing power (the amount of goods and service you can buy with the same amount of money) your income decreases by 2 percent as a result of increase in price emanated from increase in income.

2. Banks charge their customer a nominal interest rate from their loans. Nominal interest rate however determined based on inflation rate as it is represented by fisher's equation below. $I = r + \Pi$ -----Fisher's equation

Where I-nominal interest rate, r-real interest rate

Π -expected inflation.

Therefore, increase in inflation will increase in the nominal interest rate and cost of money holding. That is, the opportunity cost of holding money is the interest income foregone by holding liquid money rather than buying government bonds or deposits of bank. This implies inflation decreases demand for money (cash holding) and changes asset portfolio management. Since durable goods are services as alternative asset to money, increase in price shifts asset holding of individuals from money to durable goods. This is because as prices level rise, the value or purchasing power of durable goods remain roughly constant as durable prices rise along with general prices index. On the other hand the purchasing power of money falls with increase in prices. If the portfolio holding shifts from money to consumer durable, inflation causes decline in economic growth by reducing investment. But if the portfolio management shifts to capital goods, inflation increases economic growth by initiating capital accumulation.

3. Inflation reduces investment by increasing nominal interest rate and creating uncertainty about macro-economic policies. Moreover, increases in prices reduce consumer demand by reducing the real wealth (income) of households. Reduction in investment and consumer demand reduces the output produced by reducing aggregate demand according to Keynesian macroeconomists. In addition inflation reduces net export by making domestic goods more expensive in the international market compared to other countries goods. This will lower domestic production and then economic growth.
4. Inflation increases uncertainties about macroeconomic policy and adversely affects the public decision making ability. Inflation is an indicator of the overall ability of government to manage the economy. High inflation is believed to be characteristics of government that lost control over the economy. Therefore, high inflation economies government introduces different price control policies such as change in tax and trade policies. This will create uncertainties to businessmen and other sector of public to make investment decisions and then economic growth.
5. Inflation redistributes wealth among individuals. For example long term loan contract agreement specify at nominal interest rate which is based on the rate of expected inflation at the time of agreement. If expected inflation different from what it is expected to be, real return that debtor pay creditor differ from what the parties anticipates.

6. Unanticipated inflation hurts individuals with fixed income (pension). Workers often agree on a fixed nominal pension when given labor services for retirement ages. As a result their income remains constant while prices increase and then causes reduction in purchasing power of their income.
7. Shoe leather cost of inflation. Inflationary condition lowers the purchasing power of money. So if people hold more money its cost will increase which is measured in terms of interest rate forgone by holding liquid money. Therefore people hold lower money balance on average and they must frequently go to banks to withdraw their money. This will cause different type of cost and metaphorically it is known as shoe leather cost of inflation
8. High inflation always associated with variability of prices which includes firms to change their price list more frequently and requires printing and distributing new catalog. This is known as menu cost of inflation.

Some economist believes that moderate level of inflation (2 to 3) percent per year is good to stimulate the economy. That is a moderate level of inflation reduces real wage and then increase level of employment (decreases unemployment). As we have discussed early according to classical macroeconomists increase in level of employment increase the total output produced in the economy. Therefore to increase labour supply cutting of nominal wage is not possible to decreases real wage. The only way to decrease real wage is to allow inflation to do the job. Without inflation real wage is sticky above the equilibrium level resulting in high unemployment. Due to information problem, unanticipated inflationary shock reduces real wages and then expands level of employment and output. This is because when there is increasing in nominal wage workers are slowly adjusting their perception about price. Increase in nominal wage will be taken as an increase in their real wage and hence increase labor supply and then output.

Such relationship between nominal wage and level of unemployment can be represented by a curve known as Philips curve as indicated by figure 2.4. Even though Philips curve original used to shows the relation between wage and unemployment, the curve relates rate of increase in price –inflation and unemployment

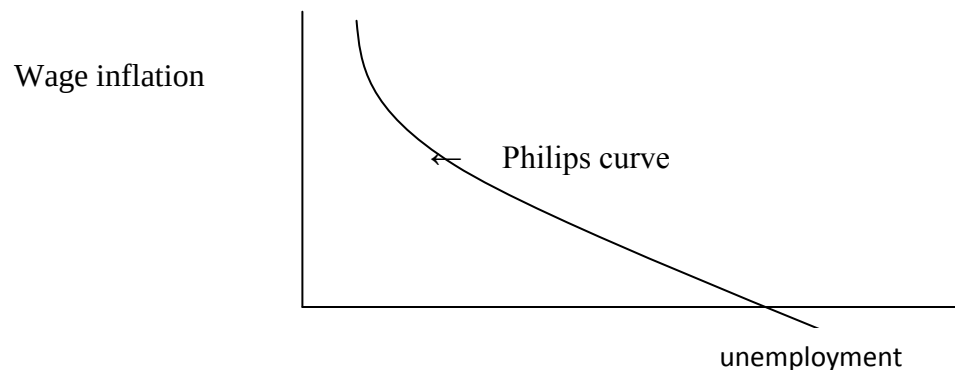


Figure:-the Philips curve

Philips curve shows non-linear inverse relationship between growth in nominal wage and rate of unemployment in the short run. In other word it shows the tradeoff between unemployment and inflation. That is when the rate of wage decreases, unemployment rate increases. Suppose that W_t be wage in this period and W_{t+1} wage next period, and then rate of wage inflation 'g' can be defined as;

$$g_w = \frac{W_{t+1} - W_t}{W_t}$$

If u^* represent the natural rate of unemployment, then Philips curve can be represented as

$$g_w = -\varepsilon(u - u^*)$$

Where ε represent the measure of the responsiveness of wages to unemployment.

Based on Philips curve we can design macroeconomic policies that help us to achieve different combination of unemployment and inflation. For instance, macroeconomic policies that are used to reduce unemployment causes high inflation or those policies which reduces inflation causes high rate of unemployment in the economy. Even though the main goals of economics policies are to maintain low inflation and unemployment the two objectives are conflicting at least in the short run as indicated in the example.

Measures to control inflation

Economists agree that inflation beyond a certain level is bad and causes different type of disastrous to the economy. Therefore, it should be controlled by using appropriate mix of

fiscal and monetary policies. However, following the controversy on what cause inflation, there is also controversy on methods to control inflation. At the same time, there are divergences of opinion on the effectiveness of fiscal and monetary policies in the policy mix. Monetarists argue that monetary measures should give prime role in anti-inflationary policy mix, while fiscalists argue on the contrary. In addition to monetary and fiscal policies, there are other policy intervention measures that are used to control inflation. Therefore, the following policy measures are used in combination to control inflation.

- i. Monetary measures
- ii. Fiscal measures
- iii. wage and price control
- iv. Population Control (long term plan)

i. Monetary measures

As we discussed before, classical macroeconomist argue that inflation is any time a monetary phenomenon. That is inflation originate from increase in money supply in excess of its optimal level. Therefore, they hold the view that control of money supply through appropriate monetary policy (Bank rate, reserve requirement ratio, open market operation) greatly effective in controlling inflation.

ii. Fiscal measures

Keynesians or fiscalists argue that demand pull, inflation originates in the real (product) sector due to an increase in aggregate demand in excess of aggregate supply. The excess demand may result from the increase in expenditure by households, firms and government. They emphasize that the excess demand arises mainly due to excessive government expenditure. Therefore, fiscal policy or the budgetary measure are a more powerful and effective weapon to control demand pull inflation. When excess demand is caused by the government expenditure in excess of real output, the most effective policy measure is to cut public expenditure. On the other hand if the excess demand is caused by the

private expenditure, that is, the expenditure by households and firms, taxation of incomes is a more appropriate measure to control inflation since taxation reduces disposable income.

iii. **Price and wage control measures.**

Monetary and Fiscal policies are ineffective in controlling cost push inflation. Thus if the inflationary condition is the result of cost push, it is advisable to introduce price and wage control measures rather than using monetary and fiscal policy.

iv. **Population control:** since population growth reduces the per head distribution of income, which results in intensive competition on the existing level of output. Well- managed population growths can be one solution for inflation control in the long run.

2.4.2. Unemployment

In the previous section, we have discussed about the meaning, cause and consequences of inflation. In this section we will study about other social evil known as unemployment. It is one of macroeconomic problem that affects people most directly and severely. Unemployment causes reduced living standard and psychological distress. This is why economists study unemployment to come up with public policies that are used to reduce unemployment.

Let us begin our discussion by defining what we mean by the term unemployment. Unemployment is a situation in which able bodied persons willing to work at prevailing wage rate do not able to find job. It is measured by rate of unemployment, which represents the percentage of those people who want to work but cannot get any job.

$$\text{Unemployment rate} = \left(\frac{\text{No of unemployed}}{\text{labor force}} \right) 100 \text{ where labor force is all persons over}$$

age 16 who are either working for paid job or actively seeking paid employment.

Unemployment can be different by the nature of its cause and consequences. Some of the most commonly type of unemployment are the following

- i. **Frictional unemployment:** the concept of frictional unemployment can be better understood with reference to the classical postdate of full employment. There is no unemployment at full employment. If there is any, it is temporary and quickly wiped out through an automatic process of market mechanism and adjustment. Such type of unemployment is said to be frictional unemployment. The reason behind frictional unemployment is that it takes time to match workers with jobs. Neoclassical focused on the imperfections in the labor and product markets in real world resulted from lack of information to explain frictional unemployment. The flow of information about job candidates and job vacancies is imperfect. Geographical motilities of workers are not instantaneous, in addition workers difference in preference and jobs have different attributes. For all these reasons, searching for an appropriate job takes time and effort. Such type of unemployment which created due to the time to get job is known frictional unemployment.
- ii. **Structural unemployment:** structural unemployment arises due to structural change in dynamic economy and wage rigidity. Such structural change includes change in the structure or sectoral composition of the economy technological change. That is gradual decline of some kind of some industries production and the emergence of new industries. This situation makes some peoples with certain specific skill out of the labor demand resulting in structural unemployment. Technological change also alters the demand pattern of different kind of skills. Some skills become obsolete and less efficient resulting mismatch between labor demand and supply.

The second reason for structural unemployment is wage rigidity. Workers are unemployed sometimes not because of the skill gap at ongoing wage rate but, the supply of labor exceeds the demand. The wage rate did not adjust to full employment level due to different factors. Some of them are presented as follows:

- **Minimum wage law:** minimum wage law is a law which set a legal minimum wages that firms pay their employee with different skills. This will cause wage rigidity not to adjust to equilibrium level and creating unemployment.
- **Unions and collective bargaining:** the wages of unionized workers are determined not by the equilibrium of supply and demand. It is determined by collective bargaining between labor union leader and management. In most cases they agree on wage above equilibrium level associated with a certain level of unemployment
- **Efficiency wage argument:** according to efficiency wage theory higher wages make workers more productive. So if wage increase the productivity of workers, firms will not cut the wage of workers even though there is excess labor supply. All the above factors make wage rate rigid above the full employment equilibrium point resulting in structural unemployment.

iii. **Cyclic unemployment:** cyclic unemployment is unemployment created associated with short run fluctuation of the economy. Workers become unemployed for some period when their job evaporates due to recession and returns to job when there is expansion in economic activities.

We have seen some of the economic impact of inflation and its control mechanism in the previous section, but some of inflation controlling measures results in increase in unemployment. This kind of situation creates a dilemma for policy makers as to whether or not to control inflation. Therefore, the cost of inflation should be identified and compared with the cost of unemployment to choose optimal policy that used to manage the economy. For this purpose first let us identify some of the costs of unemployment.

Employed workers produce goods and services whereas unemployed workers do not. Thus an increase in the unemployment rate decreases the real GDP of an economy. This negative relationship between unemployment and GDP is known as **okun's law** after the Arthur Okun, the economist who first identified the relationship. Okun's law says that the unemployment rate declines when growth is above the trend rate.

$$Du = -x (ya - yt)$$

Where; Du is change in unemployment, x the magnitude in which unemployment declines due to a percentage point growth, ya actual growth rate of output, and yt is trend output growth rate.

According to the original formulation of Okun's law, each additional percent of unemployment translated to a loss of 3 percent in real output.

More recent estimates of Okun's laws put the ratio at about 1 to 2, largely due to the changing composition of both the labor force and output.

The other cost of unemployment is it reduces living standard and causes psychological distress. Unemployment has also income distribution effect. It causes inequality among employed and unemployment workers.

Summary

- A very common measure of the aggregate output of an economy is GDP, or the market value of all final goods and services produced in the economy for a given period (usually a year). Note that final goods and services do not include inputs that are used up in the production process. e.g. the petrol used by a taxi operator is not included in GDP, but petrol bought by a family is included.
- **Nominal Gross Domestic Product (GDP)** - the market value of final goods and services *produced by a nation* during a specific period, usually 1 year.
- **Nominal Gross National Product (GNP)** - the market value of final goods and services *produced by labor and property supplied by the residents of a nation* during a specific period, usually 1 year.
- The difference between GNP and GDP is the income from the goods and services produced abroad using the labor and property supplied by domestic residents less payments to the rest of the world for the goods and services produced in the assumed economy using the labor and property supplied by foreign residents (referred to net factor payments from abroad).
- GDP can be measured either product approach, expenditure or income approach
- Transfer Payment - a payment made for which no goods or services are provided in return. Transfer payments are excluded from GDP.
- There are also two types of GDP. (1) **Nominal GDP**: measures the market value of final goods and services produced using current prices and (2) **Real GDP**: measures the market value of the output of final goods and services produced using prices of some base period; and an increase in real GDP results only from an increase in output produced.
- **Inflation**- increase in the *average* level of prices.
- **Deflation**- decline in the *average* level of prices.

- **Price Index** - a measure of the average level of prices for some specified set of goods and services, *relative to* the prices in a specified base year.
- **GDP Deflator**- the economy's aggregate price index, equal to the ratio of nominal GDP to real GDP;
- **Consumer Price Index (CPI)** - an approximate measure of changes in the cost of living of consumers. The CPI is based on a typical "market basket" of goods and services purchased by the average household. In our case, it is calculated by the Ethiopian Central Statistical Authority.
- **Economic activities like** leisure time, crime, home and volunteer services, underground economy Pollution are omitted from GDP, which make it an adequate indicator of social welfare
- Business cycle is a fluctuating with the level of economic activity of a country or an economy around the trend path.
- Business cycle phases are stages through which an economy passes to complete the business cycle (to complete one cycle). These phases are Peak (Boom), Contraction (Recession), Trough (Bottom) and Expansion (Recovery)
- Deviation of output from trend is known as **output gap**.

☑ Checklist

No	Question	Yes	NO
1	Can you define what GDP is all about?	☐	☐
1.	Are you able to differentiate GDP from GNP?	☐	☐
2.	Can you mention the three measuring approaches for GDP?	☐	☐
4	Do you think GDP is a good indicator of welfare?	☐	☐
5	Are you able to distinguish between Nominal versus Real GDP?	☐	☐
6	Can you define what business cycle?	☐	☐
7	Are you able to mention the four phases of business cycle?	☐	☐
8	Can you explain some theories of business cycle?	☐	☐
9	Are you able to explain unemployment?	☐	☐
10	Can you mention some type of unemployment?	☐	☐
11	Do you think GDP demand pull inflation is different form supply push inflation?	☐	☐
12	Can you say something on the inflation-unemployment relationship?	☐	☐



SELF EVALUATION TEST

PART I:-MULTIPLE CHOICES

- A type of inflation that occurred due to excess demand of goods and services over the available supply resources is
 - Wage-push inflation
 - Cost-push inflation
 - Profit-oriented inflation
 - Demand –pull inflation
- One of the following is bad for the economy and for the society as a whole
 - A unemployment
 - Inflation
 - All
 - None

3. Which of the following is not true about Hyperinflation
 - A. It is an economic scenario where “too many goods chasing too little money”
 - B. It is an inflation with a rate of greater than 100% per annum
 - C. It is a situation where “too much money chasing too few goods”
 - D. It is an extreme and severe type of inflation
 - E. None

4. People who are in transitions ‘**between jobs**’ are examples of
 - A. Frictional Unemployment
 - B. Structural unemployment
 - C. Hidden unemployment
 - D. Cyclical unemployment

5. To fight inflation, government or the central bank should not do one of the following
 - A. Increasing discount interest rate
 - B. Managing the require reserve ratio
 - C. Conducting open market sale
 - D. All
 - E. None

6. Which of the following is not rue about the effect of inflation?
 - a. It may discourage investment and retard economic growth.
 - b. It benefits producers and harms consumers
 - c. It benefits lenders and harm borrowers
 - d. It results in declining living standards to those who have fixed income level.
 - e. None

7. The unemployment type that arises because people's skills, experience, education and location do not match what employers is
 - A. Structural unemployment
 - B. Frictional unemployment
 - C. Cyclical unemployment
 - D. Natural rate of unemployment

PART II:-DISCUSSION AND WORKOUT QUESTIONS

1. Do you think that a change in nominal GDP reflects a similar change in economic wellbeing?
2. Define business cycle
3. What are the stages of business cycle
4. List the possible causes of business cycle
5. What is the difference between nominal GDP and real GDP?

6. Suppose an extremely simple economy produces only two goods, **Commodity-X** and **Commodity-Y**. In the first year, 4 **Commodity-X** are produced, and sold at birr 20 each; 10 **Commodity-Y** are produced, and sold at birr 8 each. In the second year, 16 **Commodity-X** are produced, and sold for Birr 16 each; 24 **Commodity-Y** are produced, and sold at birr 12 each.
- What is the nominal GDP in each of the two years?
 - What is the growth rate of nominal GDP over the two years?
 - What is the real GDP in each year, take year1 as base year?
 - What is the growth rate of real GDP over the two years?
 - Calculate the GDP deflator or price index for the second year.

REFERENCES:

- N.Gregory Mankiw, 2007, Macroeconomics 4th edition
- William H. Branson, 2006 Macroeconomic Theory and Policy

CHAPTER 3: AGGREGATE DEMAND AND EQUILIBRIUM OUTPUT OF A CLOSED ECONOMY

Learning Objectives

3.1.Introduction

3.2.The Simple Keynesian Model of income determination

3.2.1. Aggregate Expenditures

3.2.2. Consumption function

3.2.3. Autonomous spending

3.2.4. Equilibrium income determination

3.2.5. Fiscal policy effects

3.3.The IS-LM Model: an extended aggregate demand

3.3.1. The structure of ISLM model

3.3.2. Driving the IS Curve

3.3.3. Driving the LM Curve

3.3.4. IS-LM Equilibrium and Multipliers

3.3.5. Fiscal and Monetary Policy under the IS-LM Frame Work

3.4.Driving the aggregate demand

3.5.Effect of monetary and fiscal policy on AD

Summary

Check list

Self-evaluation test

References

Learning objectives

Dear distance learner after the completion of this chapter you will be able to:-

- explain the simple Keynesian cross and how equilibrium output is reached using this simple model
- have knowhow on the nature of government budget balance
- understand fully what the goods and money markets represent in an extended aggregate demand analysis
- estimate equilibrium output using an IS-LM model

- drive the aggregate demand from the IS-LM model assuming a flexible price level
- get firsthand experience on the effectiveness of fiscal and monetary policies under the Keynesian and Classical policy ranges (assumptions).

3.1. INTRODUCTION



Dear Distance Learner! The foundation of Keynesian macroeconomic theory is that prices, wages, and interest rates are fixed. Prices and wages are directly related because firms could not lower product prices if wages were not lowered. Classical economic theory suggested that high unemployment rates would lead to lower wage rates, which would lead to lower prices, which would lead to higher demand because of the increased purchasing power of existing wealth. But Keynes observed that wages were not falling. Keynes could not apply an economic theory to explain why those out of work were unwilling to accept a lower wage in order to get a job. He simply accepted it as an unexplained economic fact of life and built a theory around the assumption that prices and wages were rigid.

3.2. The Simple Keynesian Model of income determination

Dear distance Learner! To reach at how output of a given economy can be determined from the demand side, we begin with an accounting definition for aggregate expenditures because this is the heart of the Keynesian model. We will convert the accounting identity for aggregate expenditures into a model by first proposing an equilibrium condition in which aggregate output equals aggregate expenditures. Second, we will propose a behavioral equation for consumption in which people vary their consumption spending based on their level of income. By doing this we convert consumption from the level of *actual* spending in the accounting equation to the *desired* level of spending in the model. We can then build a simple model that will reveal perhaps the most important feature of the Keynesian theory—spending multipliers. Like, a Birr 1 increase in (government) spending will lead to a larger increase in aggregate output because of the multiplier process. Finally we will expand our representation of government to include different forms of taxes and spending to refine the multiplier for government fiscal policy.

3.2.1. Aggregate Expenditures

Total spending on goods and services in the economy is the sum of four components: consumption, investment, government spending, and net exports. Equation (3.1) is an accounting identity that corresponds to the calculation of a country's GDP. We call this aggregate expenditure rather than aggregate demand because prices are assumed to be fixed. Somewhere and sometime it became the convention in economics to use the term aggregate demand only in a graph of price versus quantity, in which prices are variable.

$$AE = C + I + G + NX \quad [3.1]$$

Where, AE = aggregate expenditures, C = consumption, I = investment, G = Government spending, NX = net exports (exports - imports)

Since prices are assumed constant in the Keynesian model there is no need to distinguish between nominal and real expenditure and income.

The first step in converting the above aggregate expenditures into a macroeconomic model is to propose an equilibrium condition. The economy is in equilibrium when aggregate output is equal to aggregate expenditures. Firms are selling as much as they produce and households are buying the amount they want to purchase

$Y = AE$: Where, Y = aggregate output, or income

3.2.2 Consumption Function

The relationship between consumption and income is described by the consumption function. The consumption function represents the "planned" or "desired" level of consumption for a given level of income. Other non-income factors that may affect consumption such as the weather, wealth, interest rates, and prices are assumed constant, at least for the time being.

$$C = C_0 + cY_D, \text{ where,}$$

C = desired level of consumption spending, C_0 = fixed (autonomous) level of consumption, $C_0 > 0$, c = constant, $0 < c < 1$, also called the "marginal propensity to consume" (MPC), Y_D = total income

Consumption is made up of two components: autonomous consumption, C_0 , which is consumption that is independent of the level of income, and income induced consumption, cY_D , which does depend on the level of disposable income

When income is zero total consumption is equal to the autonomous level of consumption. You might think of autonomous consumption as the minimum level of consumption necessary to survive (often called the "subsistence" level). Even if you are unemployed you still have to eat and hopefully sleep under a roof. You still consume food and housing.

The income induced part of consumption is critical to the Keynesian model. As income increases consumption rises by a constant fraction of that increase. The change in consumption for every Birr 1 change in income is called the **marginal propensity to consume**, or MPC. If the MPC is 0.8, a Birr1 increase in income raises consumption by Birr 0.80. A Birr 1,000 increase in income raises consumption by Birr 800. In short, MPC is given as:

$$MPC = \frac{\text{change in consumption}}{\text{change in income}}$$

We can use some simple calculus to show that the MPC is equal to the coefficient c in the consumption equation. Take the derivative of the consumption function with respect to income and we get the marginal propensity to consume out of income:

$$MPC = \frac{dC}{dY_D} = c$$

3.2.3. Autonomous Spending

There are three components of aggregate expenditure we still need to define: investment, government spending, and net exports. We assume that all three components are *autonomous*, not determined by any variable within the model. In particular, we assume these three components are independent of the level of income.

Investment Spending: $I = I_0$, Government Spending: $G = G_0$, Fixed taxes $T = T_0$, Net Exports: $NX = NX_0$

Where, I = investment spending, I_0 = autonomous level of investment, G = government spending, G_0 = autonomous level of government spending, NX = net exports, NX_0 = autonomous level of net exports

Assuming that investment spending is autonomous is obviously a very strong assumption too. In normal economic conditions we should expect investment spending to be a function

of interest rates, wealth, income and other variables. But, as we mentioned in the opening section, Keynes observed that we should not expect investment to respond to changes in income or the interest rate in the short run when capacity is underutilized.

Assuming government spending is independent of income is more of a problem. Income tax revenues rise when income increases. When government revenues go up, government spending usually increases. But we still don't allow government spending to increase with income. Keynes advocated that government should be more fiscally responsive and responsible. During a recession when tax revenues decline the government should not cut spending but rather do the opposite, otherwise the recession would get worse. The government should run a deficit during the recessionary phase of the business cycle. When income rises as the economy recovers, the government should refrain from increasing spending but run a budget surplus to pay off the earlier deficit

3.2.4. Equilibrium Income Determination

Dear distance learner, using the components of the aggregate expenditure discussed above, we can now drive the equilibrium at which the output of a given economy can be determined. This characterizes the Keynesian model as strictly a model of demand. The supply side is essentially ignored. Firms simply increase or reduce output to meet the level of demand at the fixed price level. The aggregate supply curve is flat at the fixed price level and only shifts in spending result in changes in aggregate economic output.

To solve the equilibrium model, first, we are given the following equations about how the economy works, which have been described above.

$AE = C + I + G + NX$, $C = C_0 + c Y_D$, $I = I_0$, $G = G_0$, $T = T_0$, $NX = 0$ (as we assumed a closed economy)

Step 1. Substitute the equations for the four spending components into the aggregate expenditure equation (4.1):

$$AE = C_0 + cY_D + I_0 + G_0$$

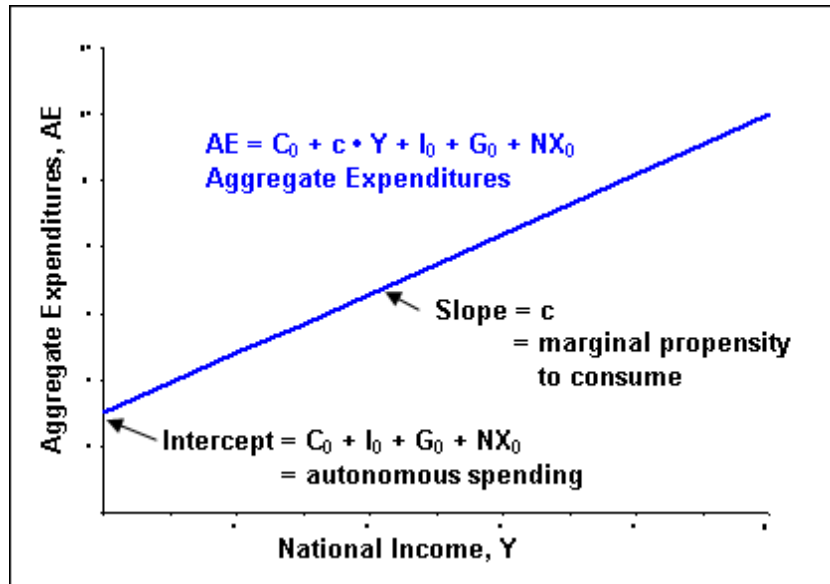


Figure 3-1 Aggregate Expenditures

step 2. Apply the equilibrium condition, equation: $Y = AE$

The equilibrium condition is drawn in Figure -4 4as the dashed line starting at the origin. This equilibrium line (often called the "45 degree line") identifies all possible points of equilibrium where aggregate expenditures equal total income.

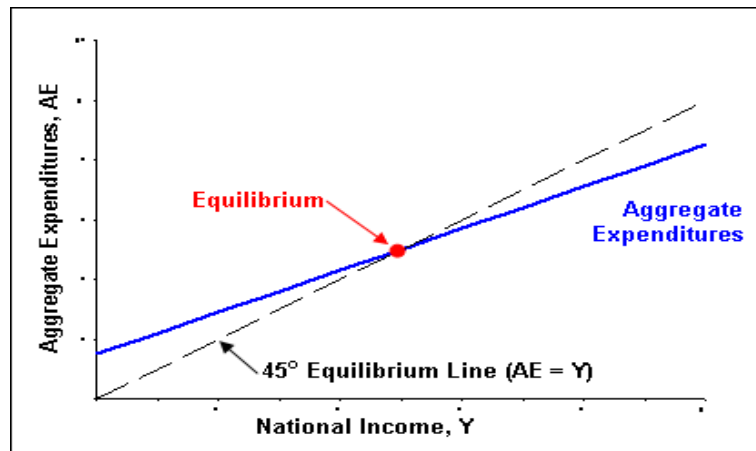


Figure 3-2. Equilibrium between Expenditures and Income

Step 3. Substitute AE from Step 1 into the equilibrium condition in Step 2:

$$Y = (C_0 + I_0 + G_0) + c(Y - T_0)$$

Step 4. Collect the Y terms on the left hand side and solve for national income, Y.

$$Y - cY = C_0 + I_0 + G_0 - cT_0$$

$$(1 - c)Y = C_0 + I_0 + G_0 - cT_0$$

$$Y = \frac{1}{1-c} (C_0 - cT_0 + I_0 + G_0)$$

This equation reveals what is perhaps the most important feature of the Keynesian model, which is commonly called as *Keynesian cross*.

The Multiplier

Dear learner the concept of “multiplier” was first introduced by R.F Kahn, a colleague of Keynes and this was used as an employment multiplier i.e. finding the effect of an increase in investment in an employment. Keynes borrowed this concept and developed another type of multiplier called the income multiplier or the investment multiplier. In this way, a multiplier is the ratio expressing the relationship between the increase in national income and the increase in investment which induces the rise in income. Precisely the multiplier can be defined as the ratio of change in income to the change in autonomous spending.

$$\text{Autonomous spending multiplier} = \frac{1}{1-c} = \frac{1}{1-MPC}$$

The multiplier concept explains the cumulative effect of change in any of the autonomous on income via their effect on consumption expenditures. It describes the fact that additions to spending have an impact on income greater than the original increase or decrease in spending itself. In other words, even small increments in spending can multiply their effects.

3.2.5. Fiscal Policy effects



Dear Learner! Can you derive the multiplier equation when there exist an income tax rate in the model?

Dear learner a government can spend money, G_0 , but tax revenue is independent income. We simply assume government has collected some fixed tax level. In this section we propose a more complete representation of the government sector by including taxes out of income. This will allow us to consider the potential impact of a change in government fiscal policy that includes either a change in spending, a change in taxes, or both.

Adding income tax to the model will change the magnitude of the multiplier but not the general features of the Keynesian Cross. First, we propose that government can spend money in one of two ways. The first is autonomous spending, G_0 . The second is transfer payments such as social security benefits, unemployment benefits, etc.

Government Spending = $G_0 + TR$, Where, G_0 = autonomous government spending, TR = transfer payments

We shall also propose the government has two sources of revenues: lump sum taxes and income tax:-Government Revenues = $T_0 + tY$, Where, T_0 = lump sum tax, t = income tax rate

Government fiscal policy represents a change in either spending or taxes. For example, if the economy is in a recession the government could increase autonomous spending, increase transfer payments, reduce lump sum taxes, or reduce the income tax rate. With the Keynesian model we can predict the potential effect of government fiscal policy action on the economy through the multiplier effect.

There is one additional change to the Keynesian model. Beyond the fixed tax level, there is income that has to be reduced from the disposable income. As you remember from the discussion on National Income Accounting, disposable income is a take-home pay after taxes have been deducted. Hence, disposable income is total income plus government transfer payments less taxes:

$$YD = Y + TR - T_0 - tY$$

Thus, in this advanced Keynesian model, the consumption function becomes:

$$C = C_0 + c (Y + TR - T_0 - tY)$$

Assume we are firstly given the following equations about how the economy works, which have been described above as equations: $AE = C + I + G + NX$, $C = C_0 + c (Y + TR - T_0 - tY)$, $I = I_0$, $G = G_0$, $NX = 0$ (as the chapter is all about a 'closed' economy)

The solution of the equilibrium model follows the same four steps as we have seen in the previous simple Keynesian Cross.

- **Step1.** Substitute the equations for the four spending components into the aggregate expenditure equation : $AE = C_0 + c (Y + TR - T_0 - tY) + I_0 + G_0$
- **Step2.** Apply the equilibrium condition, equation : $Y = AE$
- **Step3.** Substitute **AE** from Step 1 into the equilibrium condition in Step 2:

$$Y = C_0 + c (Y + TR - T_0 - tY) + I_0 + G_0$$

- **Step4.** Collect the Y terms on the left hand side and solve for national income, Y.

$$Y - cY + ctY = cTR - cT_0 + C_0 + I_0 + G_0 = (1 - c + ct)Y = cTR - cT_0 + C_0 + I_0 + G_0$$

$$=[1 - c(1 - t)]Y = cTR - cT_0 + C_0 + I_0 + G_0$$

$$Y = \frac{1}{1 - c(1 - t)} (cTR - cT_0 + C_0 + I_0 + G_0)$$

Therefore this is the equilibrium model solution when tax is a function of income. As the result of the introduction of tax rate to the level of income, the autonomous spending multiplier in equation (3.12) is slightly different from the previous model.

$$\text{Autonomous spending multiplier} = \frac{1}{1 - c(1 - t)}$$

3.3. THE IS-LM MODEL:AN EXTENDED AGGREGATE DEMAND

3.3.1. The structure of IS-LM model



Dear Learner! Before proceeding into the details of the IS-LM model, it is essential to have a quick look at its structure first. The structure of the IS-LM model is given in the diagram presented below. The IS-LM model deals with the interaction of the Goods and Asset (money) markets. It is apparent to observe that interest rate serves as a bridge between the goods and money market. The fact is that in the simple Keynesian model we have looked at income determination by arguing that income affects spending, which in turn affects the output and income. However, in this IS-LM model, we add the effect of interest rates on spending, thus on income and the dependence of money markets on income. This is because higher income raises the demand for money and thus interest rates. Hence, interest rates and income are jointly determined in the Goods and Assets markets.

Dear learner the IS-LM model is set up in two parts.

- First, the **IS** sector covers aggregate expenditures. The IS sector is identical to the Keynesian aggregate expenditures model presented in the last section with the exception that investment is now a function of the interest rate.
- Second, we add the **LM** sector, which includes money supply and money demand. Money demand is also a function of the interest rate as well as income.
- Finally, the two sectors are combined and solved simultaneously for equilibrium income and the interest rate.

3.3.2. Driving the IS Curve

As we mentioned above, the IS curve represents all points of possible equilibrium in the goods market. Generally, the setup of the IS curve is identical to that of the Keynesian model in the previous chapter, but with the interest rate added. We introduce variable interest rates to our model through investment. The revised investment equation is inserted into the accounting expression for aggregate expenditures ($AE = C + I + G + NX$). The IS equation is

derived by applying the goods market equilibrium condition that national income equals aggregate expenditures ($Y = AE$) just like the Keynesian model. We finish this section by considering the characteristics of the IS equation that contribute to effective or ineffective government fiscal policy.

Investment:-Investment is now assumed to be a negative function of the real interest rate. As the real interest rate increases, investment declines. Intuitively this should be obvious. A higher interest rate means it is more expensive to borrow money for capital investment. Some new capital investment that would have been made at low interest rates will not be made at high interest rates. The investment function is presented in equation (3.14) and graphed in Figure 5. The investment curve slopes downward because an increase in the real interest rate makes investment more expensive and reduces the desired level of investment.

$I = I_0 - b \cdot i$, where, I = desired level of investment, I_0 = autonomous investment (i.e., independent of income or the interest rate, b = fixed coefficient i = real interest rate

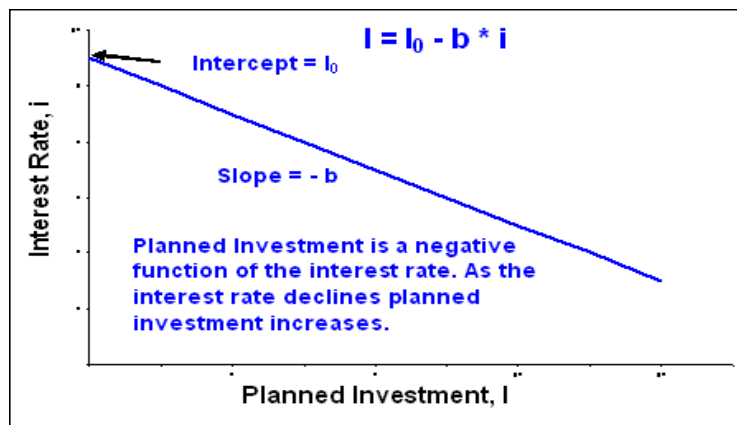


Figure 3.3. Planned Investment

Given:

$$AE = C + I + G + NX$$

$$C = C_o + cY_D$$

$$I = I_o - bi$$

$$G = G_o$$

$$NX = 0$$

$$Y_D = Y - tY - T_o + TR$$

Where ,i = interest rate ,YD = disposable income ,Y = national income, t = income tax rate, T0 = lump sum taxes, TR = government transfer payments (e.g., social security), C₀, G₀, I₀ = autonomous spending (independent of level of income or interest rate)

Solving these equations using a procedure identical to that in the previous chapter on the Keynesian model yields equation (3.15), which represents the IS curve (Figure 3-9)

$$i_{IS} = \frac{1}{b} * (C_0 + I_0 + G_0 - cT_0 + cTR) - \frac{1-c(1-t)}{b} Y$$

From this equation it is easy to identify the intercept and slope of the IS curve

$$\text{IS curve intercept} = \frac{1}{b} * (C_0 + I_0 + G_0 - cT_0 + cTR) > 0$$

$$\text{IS curve slope} = - \frac{1-c(1-t)}{b} < 0$$

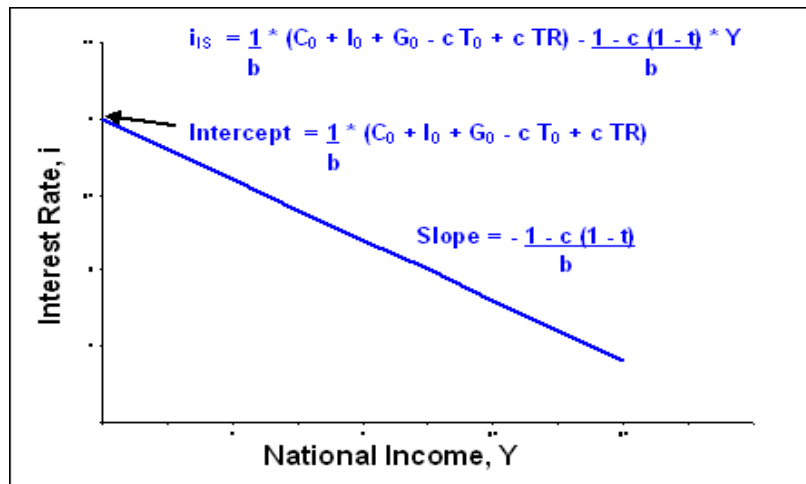


Figure 3. 4:-The IS Curve.



This basic version of the IS sector assumes a closed economy. There are no exports and no imports. Actually our assumption is that net exports (exports minus imports) equal zero, which is somewhat less severe. Assuming net exports equal zero simply suggests that imports and exports are insensitive to changes in either income or interest rates. The IS-LM model can be extended to allow for foreign trade but our results are not significantly affected. Such an extension would allow us to consider the effect of fiscal and monetary policy on the

balance of trade, but we are more interested in this chapter is establishing the basic analytical method rather than exploring all permutations of the model.

3.3.2.1. Shifts in IS Curve

The IS curve will shift to the left or right whenever the intercept of the IS curve changes. A change in any of the spending or tax variables in the intercept of the IS curve will cause the curve to shift. Any change in autonomous spending (C_0 , I_0 , or G_0), lump sum taxes (T_0), or government transfer payments (TR) will cause the IS curve to shift to the right or left. We can simplify our concerns by saying that any change in government fiscal policy (spending, taxes, or transfer payments) will cause the IS curve to shift.

$$\text{IS curve intercept} = \frac{1}{b} * (C_0 + I_0 + G_0 - cT_0 + cTR) > 0$$

While the shift in the IS curve is technically up or down (the intercept becomes larger or smaller). We traditionally describe the shift as right or left. An upward shift in the IS curve is the same as a rightward shift. So, an increase in spending raises the value of the intercept of the IS curve, which causes the IS curve to shift upwards or, equivalently, to the right.

How much the IS curve shifts to the right depends on the size of $1/b$. If $1/b$ is large (i.e., b is small) then a change in government fiscal policy leads to a larger shift in the IS curve. For example, an increase in government spending increases the interest rate. But because investment is insensitive to changes in the interest rate (b is small). There is little reduction in desired investment. In other words, an increase in government spending does not "crowd out" investment spending when the response of investment to changes in the interest rate, the b coefficient, is small. The greater the shift in the IS curve for a given change in government fiscal policy, the larger the potential change in income. Note: we don't usually talk about a "change" in b , since the coefficient is assumed to be constant. We only talk about whether b is "large" or "small". Is investment sensitive (b is large) or insensitive (b is small) to changes in the interest rate?

The slope of the IS curve may be flat or steep again depending on the sensitivity of investment to the interest rate (i.e., the value of b).

$$\text{IS curve slope} = -\frac{1 - c(1 - t)}{b} < 0$$

The IS curve is steep (slope is a large negative number) when investment is insensitive to changes in the interest rate (b is small). For a given change in the interest rate, there is only a small change in investment and income. The IS curve is flat (slope is close to zero) when a small change in interest rate leads to a large change in investment (b is large), which leads to a large change in national income. Notice that we do not talk about the effect of the marginal propensity to consume, c , in the slope of the IS curve. We ignore this possibility because the marginal propensity to consume has not been an major issue in the Keynesian-Classical debate.

3.3.2.2. Fiscal Policy Effectiveness

In general, fiscal policy is more effective (a larger change in national income results from a given change in government spending or taxes). The steeper the IS curve and the greater the shift in the IS curve. For example, for a given shift in the IS curve to the right, the increase in income will be larger the steeper the IS curve. For a given slope of the IS curve, the increase in income will be larger the greater the shift in the IS curve.

Changes in fiscal policy are less effective in the classical view because an increase in government spending or a cut in taxes raises the interest rate. A higher interest rate reduces investment spending. Thus a change in government fiscal policy is offset by an opposite change in investment. An increase in government spending "crowds out" investment spending which reduces the resulting increase in national income. Since investment is not sensitive to changes in the interest rate in the Keynesian view, the change in national income arising from a change in government fiscal policy will be larger. An increase in government spending or cut in taxes, which may raise the interest rate, does not affect investment spending and there is no crowding out effect.

3.3.3. Driving the LM Curve

The LM curve represents all possible points of equilibrium between money demand and money supply. The LM curve is derived by first assuming that money demand is a negative function of the interest rate and a positive function of income. Money supply is assumed to be fixed (i.e., does not change with a change in interest rates or income). Equilibrium between

money demand and money supply occurs at those combinations of interest rate and income where the quantity of money demanded equals the quantity of money supplied.

3.3.3.1. Money Supply and Demand

The LM sector is defined by the equilibrium between money demand and money supply. Money demand is assumed to be a positive function of income and negative function of the interest rate as shown in equation (3.15). If income increases people want to hold more cash in order to make transactions. If the interest rate increases people will try to reduce their cash balances, which do not earn

$Md = k \cdot Y - h \cdot I$, where, Md = real money demand, k , h = fixed coefficients, Y = national income, i = interest rate

Money supply is assumed to be set by the central bank (National Bank of Ethiopia, in case of ours) at some target level as represented by equation (3.16). We could easily modify the model to include an interest rate rule for money supply but that would make our solution a bit

more cumbersome without changing our basic observations: $Ms = \left(\frac{m}{p} \right)$

Where, Ms = real money supply, M = nominal money supply, P = average price level

The average price level makes an appearance for the first time. But, as we discussed in the opening of this chapter, including price as a third variable adds a great deal of complication to our model. So, while we might promote the IS-LM model as a means of highlighting the debate between Keynesian and classical economists, we don't touch all the bases since we still assume the price level remains fixed. Be thankful.

To define the LM curve, first, we are given the money demand equation and money supply equation: -Money demand: $Md = k \cdot Y - h \cdot I$ and Money supply: $Ms = M/p$

Second, we assume an equilibrium condition in the money market that money supply equals money demand, that is $Ms = Md$

We substitute the given money demand and supply equations into the assumed equilibrium condition and solve for the interest rate, i , as a function of national income, Y , the result is represents the LM equation and curve

$$i_{LM} = -\frac{1}{h}(M/P) + \frac{K}{h}Y$$

From this equation it is easy to identify the intercept and the slope of the LM curve

$$\text{LM curve intercept} = -\frac{1}{h}(M/P) < 0 \quad \text{LM curve slope} = \frac{K}{h} > 0$$

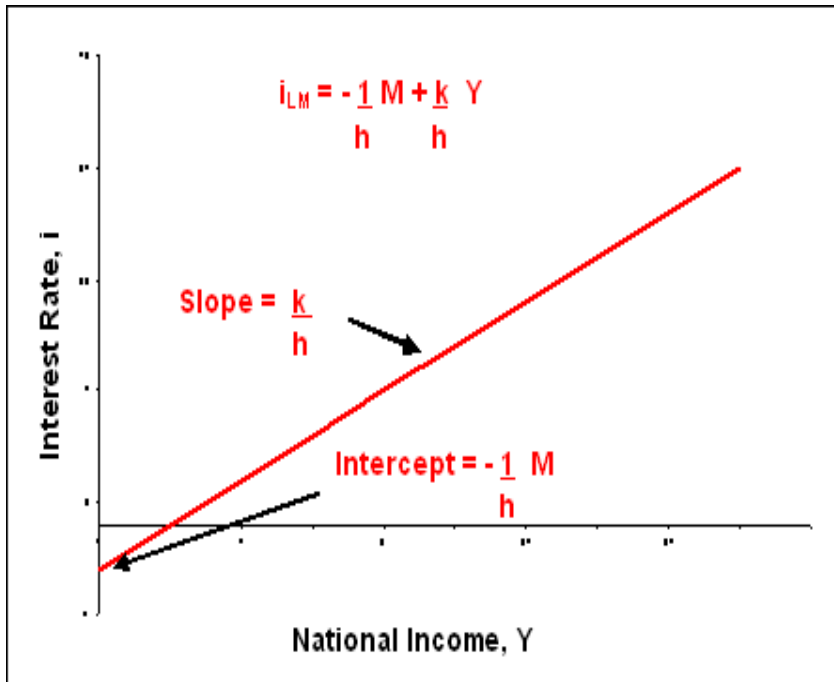


Figure 3.5. LM Curve

3.3.3.2. Shifts in LM Curve

The LM curve will shift to the left (up) or right (down) whenever the intercept of the LM curve changes. Only a change in money supply, M , can cause the LM curve to shift.

$$\text{LM curve intercept} = -\frac{1}{h}(M/P) < 0$$

Because the intercept is a negative value an increase in money supply, M , will make the intercept more negative, which corresponds to a downward shift in the LM curve. A downward shift in the LM curve is the same thing as a rightward shift. An increase in the money supply causes the LM curve to shift to the right. How much the LM curve shifts for a given change in money supply depends on the sensitivity of money demand to changes in the

interest rate, or the value of the h coefficient. There are two possibilities, which we can describe in several equivalent ways:

h is small

- money demand is insensitive to changes in the interest rate
- money demand is interest inelastic
- it takes a large change in the interest rate to change money demand

h is large

- money demand is very sensitive to changes in the interest rate
- money demand is interest elastic
- it takes only a small change in the interest rate to change money demand

A change in money supply, M , shifts the LM curve. The size of the shift depends on the value of $1/h$. If h is small, then $1/h$ is large and the shift in the LM curve will be large. If h is large, then $1/h$ will be small and the shift in the LM curve will be small. The larger the shift in the LM curve the greater effect a change in money supply may have on the economy.

One significant issue in the debate between the Keynesian and Classical economists has been over the response of money demand to changes in the interest rate. Keynes suggested that money demand was very interest elastic (**h is large**). In other words, an increase in money supply would be met immediately by an equal increase in money demand with no change in the interest rate. A change in money supply would have no effect on interest rates or the economy.

Classical economists, on the other hand, believed it would take an observable change in the interest rate to change money demand. Hence a change in money supply would be met with a large change in the interest rate, which would then impact investment spending and the economy.

The slope of the LM curve may be flat or steep again depending on how sensitive money demand is to changes in the interest rate (i. e., the value of h).

$$\text{LM curve slope} = \frac{K}{h} > 0$$

The LM curve is steep (slope is a large positive number) when money demand is insensitive to changes in interest rate (h is small). For example, when a Central Bank increases money supply a large change in the interest rate is needed to increase money demand to the new higher level of money supply. Changes to money supply have big impacts on interest rates. If a change in the interest rate significantly affects investment (and other) spending then changes in money supply can have big impacts on the economy. The LM curve is flat (slope is close to zero) when only a small change in the interest rate leads to a large change in money demand (h is large). Essentially, the public is willing to hold whatever quantity of money is supplied. A change in money supply will have little impact on interest rates and the economy. Note: we do not talk about the sensitivity of money demand to changes in income, k . This is because the relationship between money demand and income, while an important topic in economics, has not been the focus of debate between Keynesian and Classical economists.

3.3.3.3. Monetary Policy Effectiveness

In general, monetary policy is more effective (larger change in income for a given change in money supply) the steeper the LM curve and the greater the shift in the LM curve

3.3.4. IS-LM Equilibrium and Multipliers

A dear distance learner, equilibrium in the economy represents values of income and interest rate that simultaneously clear the goods and money markets. In other words, equilibrium occurs where the IS and LM curves intersect. To determine the equilibrium national income in an economy set the IS equation solution for the interest rate equal to the LM equation solution for interest rate (equation 5), and solve for national income, Y .

$$i_{IS} = i_{LM} = \frac{1}{b}(C_o + I_o + G_o - cT_o + cTR) - \frac{1-c(1-t)}{b}Y = -\frac{1}{h}(M/P) + \frac{k}{h}Y$$

The solution to the model is some simple (but messy) algebra (see Appendix C for details of the calculation). Collect all the national income, Y , terms on one side and all other terms on the other side of the equation and solve for Y .

$$Y = \frac{b}{h^*(1-c(1-t)) + b*k} (M/P) + \frac{h}{h^*(1-c(1-t)) + b*k} (C_o + I_o + G_o - cT_o + cTR)$$

The equilibrium of the IS-LM model can be also shown graphically. In figure 3.7, the intersection represents the combination of interest rate and income where both the goods market (IS sector) and money market (LM sector) are each in equilibrium.

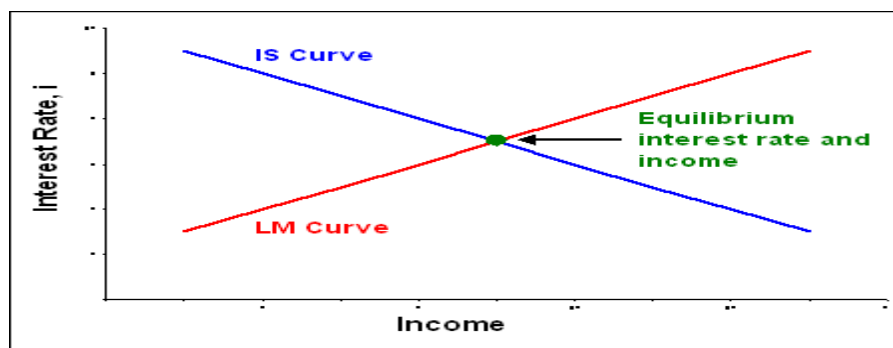


Figure 3-6. The IS-LM Curves

To solve for the equilibrium interest rate you can substitute the equilibrium solution for income back into **either** the IS equation (5. 2) or the LM equation (5.5).

In the previous sections on the IS and LM curves we only talked in general terms about how fiscal policy effectiveness relates to the sensitivity of investment to the interest rate (b) and how monetary policy effectiveness relates to the sensitivity of money demand to the interest rate (h). With the equilibrium solution to the IS-LM model we can be more specific about policy effectiveness because we can identify the fiscal and monetary policy "multipliers".

i. Fiscal policy multiplier

How much does a change in government spending affect national income? The answer depends on the magnitude of the fiscal policy multiplier, which can be calculated as follows:

$$\text{Fiscal policy multiplier} = \frac{h}{h * (1 - c(1 - t)) + b * k}$$

ii. Monetary Policy multiplier

How much does change in money supply affect national income? Similar to the fiscal policy multiplier, the answer for this question also lies magnitude level of the monetary fiscal multiplier

$$\text{Monetary policy multiplier} = \frac{b}{h * (1 - c(1 - t)) + b * k}$$

For Keynes, the coefficient h is large and b is small so that the fiscal policy multiplier reduces to $1/[1 - c(1-t)]$ (just like in the previous chapter) and the monetary policy multiplier = 0. For the Classical economists, h is small and b is large, so the fiscal policy multiplier = 0, and the monetary policy multiplier = $1/k$.

3.3.5. Fiscal Policy and Monetary Policy under IS-LM model

i. Expansionary Fiscal Policy

Expansionary fiscal policy represents an increase government spending or lower taxes. The objective of expansionary fiscal policy is to stimulate the economy and increase aggregate expenditures and national income. Expansionary fiscal policy causes the IS curve to shift to the right.

The economic effect of expansionary fiscal policy can be summarized as follows:

- An increase in government spending or cut in taxes represents an increase in both aggregate expenditures and national income. The IS curve shifts to the right. The LM curve is not affected by fiscal policy (it does not shift). The shift in the IS curve is greater (fiscal policy can have a bigger impact) the less sensitive investment is to changes in the interest rate (**b** is small).
- An increase in income motivates an increase in money demand. The quantity of money demanded now exceeds the quantity of money supplied.
- The interest rate must increase in order to lower money demand back to the unchanged level of money supply. How much of an increase in the interest rate is required to return the money market to equilibrium? If the LM curve is flat only a small change in the interest rate is required. If the LM curve is steep a large change in the interest rate will occur.
- Because desired investment spending is a negative function of the interest rate, the increase in the interest rate reduces investment spending. Expansionary fiscal policy "crowds out" investment spending. How much crowding out we get depends on

whether the IS and LM curves are steep or flat and how much of a shift in the IS curve we get.

- Keynes suggested there could be a large shift in a steep IS curve against a flat LM curve. There would be little crowding out. A flat LM curve implies only a small change in the interest rate would occur. Moreover, since investment is unaffected by changes in the interest rate (steep IS curve) a change in the interest rate, whether small or large, would have little crowding out effect on investment. Fiscal policy could be very effective. Classical economists suggested there could be significant crowding out so that fiscal policy is ineffective (e.g., an increase in government spending would be cancelled out by a decline

Keynesian Case

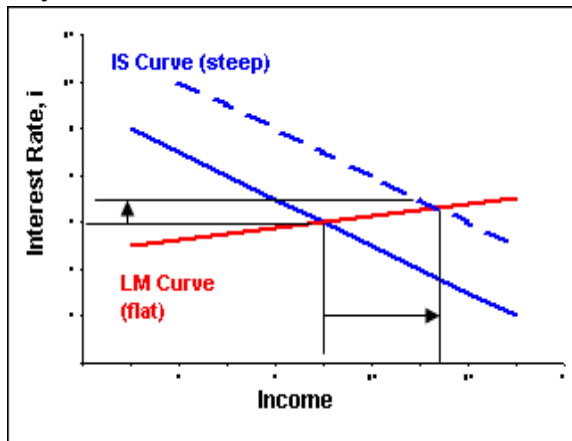


Figure 5-6A. Keynesian Fiscal Policy

Classical Case

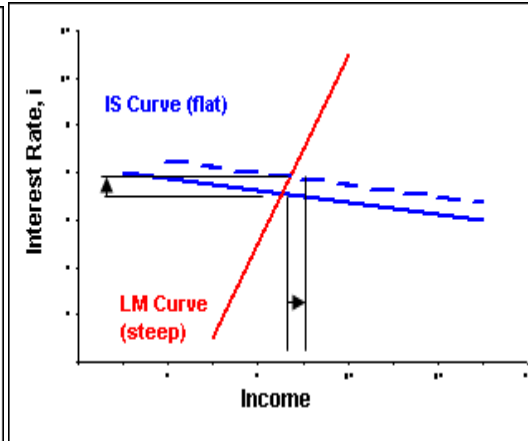


Figure 5-6 B. Classical Fiscal Policy

Flat LM curve - money demand is very sensitive to changes in the interest rate (h is large) - money demand can return to equilibrium with money supply only with a small increase in the interest rate. Essentially people are willing to hold as much money as is printed.

Steep LM curve - money demand is insensitive to changes in the interest rate (h is small) - money demand can return to equilibrium with money supply with only a large increase in the interest rate.

Steep IS curve with large shift - investment spending is insensitive to changes in the interest rate (b is small) - large changes in the interest rate have little negative effect on investment spending.

Flat IS curve with small shift - investment spending is very sensitive to changes in the interest rate (b is large) - small changes in the interest rate can have a large negative effect on investment spending.

ii. Expansionary Monetary Policy

Expansionary monetary policy represents an increase the money supply. The objective of expansionary monetary policy is to stimulate the economy and increase aggregate expenditures and national income. Expansionary fiscal policy causes the LM curve to shift to the right.

The economic effect of expansionary monetary policy can be summarized as:-The LM curve shifts to the right. The ISM curve is not affected by fiscal policy. An increase in money supply produces disequilibrium in the money market. The quantity of money supplied exceeds the quantity held by the public. The interest rate must decline in order to increase money demand to the newer higher level of money supply

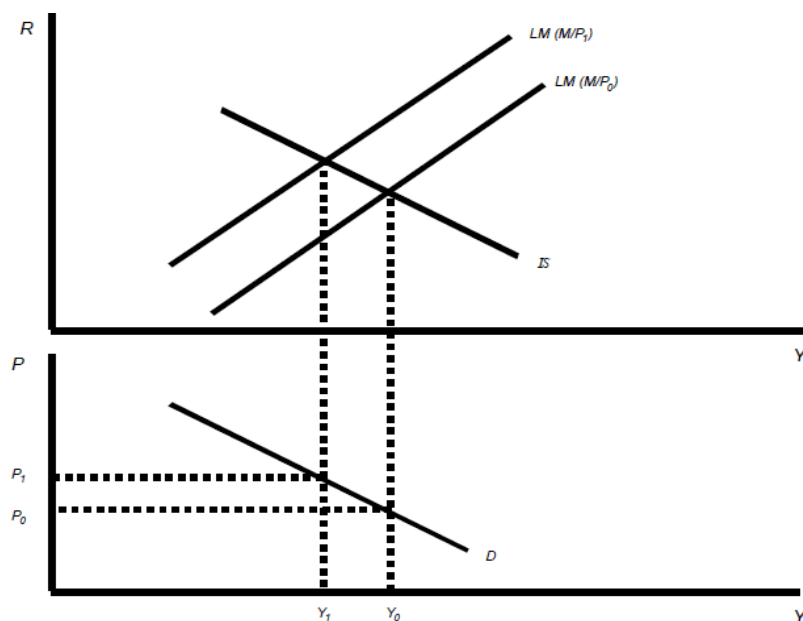
3.4. Deriving the Aggregate Demand(AD)

The price level is an exogenous variable in the Keynesian aggregate demand model. That is, it is not determined by the system, although it does appear in the model structure. The price level determines the real value, or purchasing power, of the nominal money supply, thus positioning the *LM* curve and determining the aggregate demand equilibrium. The position of the *LM* curve will change if prices change, and as it does, the output equilibrium changes as well. That is, in the *IS-LM* model there will be different output equilibrium for each level of prices. The total demand curve summarizes this relationship between the price level and the output level determined by the intersection of the *IS* and *LM* curves.

The total demand curve is a locus of Keynesian aggregate demand equilibrium for different price levels. If the price level changes while everything else (including the nominal money supply, M) remains the same, then the resulting change in the real money supply (M/P) causes the $IS-LM$ equilibrium to change.

The negative slope of the total demand curve follows from the derivation shown in Figure 1 and also agrees with one's intuition. When prices increase, nominal income also increases and the demand for money to be used for transactions goes up. If the nominal money supply is unchanged, there will be a shortage of transactions balances. This “tightness” in financial markets and/or the interest rate increases that will result restrain aggregate demand. The price increase is equivalent to a tighter money policy and similarly leads to a fall in the demand for output.

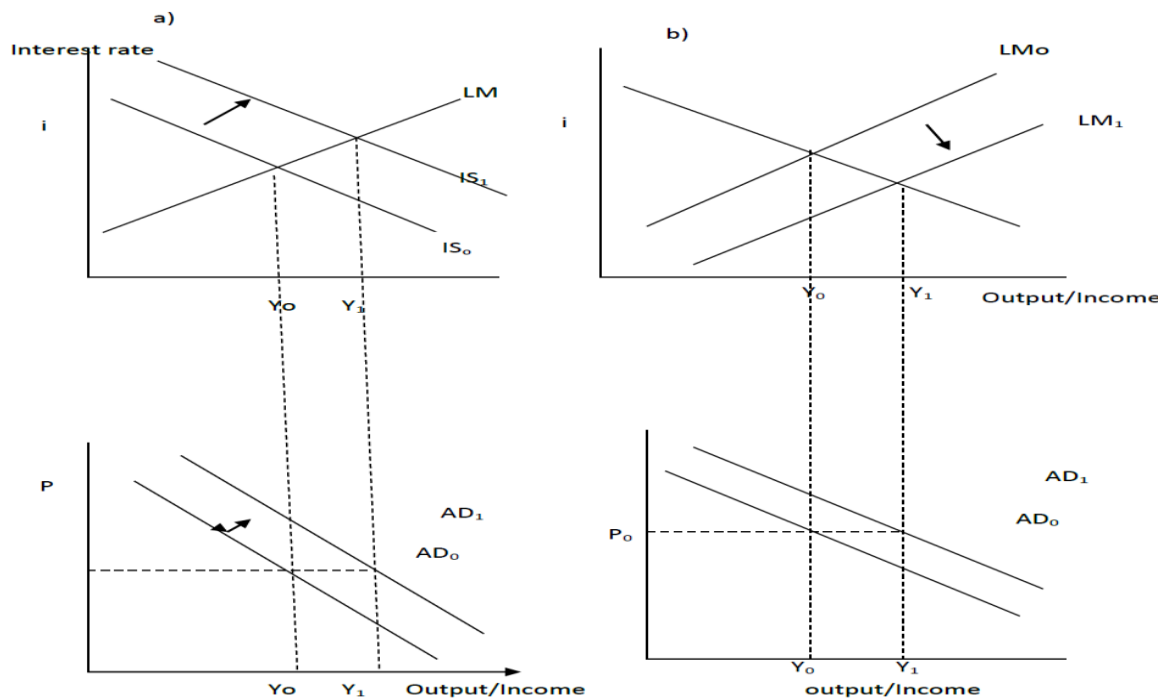
Figure 3.7:- Derivation of aggregate Demand Curve



3.5. Effect of monetary and fiscal policy on AD

Aggregate demand (AD) curve shows the combination of the price level and level of output at which goods and money markets are simultaneously in equilibrium. As derived above, AD-curve is downward sloping. Because higher prices reduce the value of money supply and causes reduction of demand for output produced. That is, if price level falls with a given nominal stock of money, the quantity of real balances increases. The increase in real balance by reducing interest rates increases investment demand and therefore increases aggregate demand. In addition the quantity equation of money is also used to explain the inverse relationship between price and money demand. The money supply M and the velocity of money V determine the nominal value of output PY according to quantity equation. That is, the nominal value of transaction which takes place in a given economy is proportional to the total amount of money found in the economy (money supply determine the amount of transaction). This implies an increase in price reduces the number of transaction by reducing real money balance. And thus reduces the quantity of goods and services demanded. Let us describe now how monetary and fiscal policy causes shift in AD curve.

Figure 3.8:- Effect of monetary and fiscal policy on AD



Aggregate demand curve is drawn for a fixed-value of money supply as a result changes in money supply cause shift in AD curve. For instance, an increase in money supply results in higher real money balance for each level of prices. This causes decline in interest rate in money market and then stimulate investment and aggregate demand which raises equilibrium level of income and spending. As a result aggregate demand curve shifts right wards as indicated in figure 3.21(b)

Similarly expansionary fiscal policy causes up and rightward shift in AD curve. That is, increase government spending or decrease in tax through its expansionary effect on aggregate demand causes the IS curve to shift outward to the right; at the initial price the shift in IS curve results in new equilibrium at higher level of income, interest rate and spending. Thus, AD curve shift outward to the right

Summary

- In the IS-LM model the IS curve stands for the "goods" market (aggregate expenditures). The "IS" refers to the equilibrium relationship between investment and savings, although we will not present the model in these terms. In the simplest formulation of the model the interest rate affects only investment spending but can be extended to include household consumption with similar results. Because a higher interest rate reduces expenditures it also reduces income. Thus there is a negative relation between the interest rate and national income.
 - An increase in government spending or a cut in taxes shifts the IS curve to the right, which raises both income and the interest rate. The magnitudes of the changes depend on the slopes of the curves and how far the IS curve shifts with a change in government fiscal policy. Keynesians suggest large income and small or no interest rate changes. Classical economists would argue there would be small income and large interest rate changes.
 - An increase in money supply shifts the LM curve to the right, which increases income and lowers the interest rate. Again the magnitude of the changes depends on the slopes and size of the shift. Keynesians come down on the side of small income and small interest rate changes.
-
- You might notice there is the interesting combination of fiscal and monetary policy changes. An increase in government spending (IS curve shifts right) combined with an increase in money supply (LM curve shifts right) can increase output without changing the interest rate. This is referred to as "accommodating" monetary policy.

CHECK LIST

Dear Distance Learner!. Below are important checklists that help you how much you have grasped the main points of the section. Please, check “**YES**” or “**NO**” in the given boxes for each question so that you will be able to check your progress.

No	Question	Yes	NO
1	Do you fully understand what aggregate demand is all about?	☐	☐
4.	Are you able to understand what the Keynesian Cross implies?	☐	☐
5.	Can define what marginal propensity to consume (MPC)?	☐	☐
4	Are you able to derive the multiplier from the simple Keynesian cross?	☐	☐
5	Can you explain what the multiplier is?	☐	☐
6	Do you think the size of multiplier gets smaller with a MPC?	☐	☐
7	Can you analyze fiscal policy effect on aggregate demand?	☐	☐

SELF-EVALUATION TEST

PART I:-TRUE/FALSE

1. The foundation of Keynesian macroeconomic theory is that prices, wages, and interest rates are fixed
2. Classical economic theory suggests that high unemployment rates leads to lower wage rates, which in turn leads to lower prices
3. In the Keynesian model with fixed prices we can have equilibrium when the economy is operating below its potential of full employment

PART II:-MULTIPLE CHOICE

1. Liquidity trap refers to
 - a. very low interest rate
 - b. a situation where the public is prepared to hold whatever amount
 - c. Monetary policy has no effect on either the interest rate or the level of income
 - d. All
2. What will happen to interest rate, private investment and income in the IS-LM analysis of the economy when there is expansionary fiscal policy?
 - a. Interest rate increases
 - b. There will be crowding out effect on private investment
 - c. The IS curve move to the left
 - d. A and B only

WORK OUR: - SHOW ALL THE NECESSARY STEPS

Suppose that for a particular closed economy, for some period, the value of government expenditure (G_0) and Investment (I_0) were birr 400 and birr 200 respectively. In addition to these, both consumption function(C) and Gross Taxes (T_x) function were stated as: $C = 160 + 0.8Y_d$, and $T_x = 120 + 0.25Y$, and The transfer payment (T_{Ro}) was birr 120. Where Y is national Income (GDP) and Y_d is net tax income, then

- a) What is the Government expenditure multiplier?
- b) What is the National equilibrium income(Y)?
- c) For social infrastructure purpose, if government expenditure is increased by 50 birr, what will be the increase (change) in national income?
- d) If both the lump sum tax (T_0) and transfer payment (R_0) are increased equally by birr 40, what will be the cumulative effect on the national equilibrium income
- e) What is the budget Balance, B_s , of the given economy
- f) Suppose that government expenditure is increased by birr 160, and then the change in the budget balance, BS is

- g) Assume the economy is at recession currently, and if government wishes to raise the level of national income to its full-employment income of birr 2,400, then what is the amount of increase in government purchase that would be necessary to lift up the economy to its full-employment income?

2. The following equations describe an economy. [think of C, I, G, etc, as being measured in millions and i as a percentage)

- Consumption: $C = 90 + 0.8(Y - T)$
- Net Taxes : $T = 0.25Y$
- Price Level (P): $P = 4$
- Investment (I): $I = 900 - 0.5i$,
- Gov't Expenditure $G = 800$
- Nominal money supply (M): $M = 2000$
- Real Money demand: $M_d = L = 0.25Y - 0.625i$

- i. What is the equation that describes the IS curve?
- ii. What is the equation that describes the LM curve?
- iii. What are the equilibrium level of income and interest rate?
- iv. What is the new equilibrium income and interest rate if government expenditure (G) is increased by 40 units? Calculate the magnitude of the crowding out effect caused by this change

References

- N.Gregory Mankiw, 2007, Macroeconomics 4th edition
- William H. Branson, 2006 Macroeconomic Theory and Policy

CHAPTER 4: OPEN ECONOMY MACROECONOMICS

Learning objective

4.1. Introduction

4.2. The Basic Model

4.2.1. Open Economy National Income Identity

4.2.2. Income determination in an open economy

4.2.3. Open-Economy Multipliers

4.2.4. The Government Expenditure Multiplier

4.2.5. Export Multiplier

4.3. The Mundell-Fleming Model

4.3.1. Derivation of the IS, LM and BP curves

4.3.2. The equilibrium Model

4.3.3. Ineffectiveness of Monetary Policy with perfect capital mobility and fixed exchange rate

4.3.4. Effectiveness of Fiscal Policy with perfect capital mobility and fixed exchange rate

4.3.5. Effectiveness of Monetary policy with perfect capital mobility and floating exchange rate

4.3.6. Ineffectiveness of Fiscal policy with perfect capital mobility and floating exchange rate

4.3.7. Limitations of the Mundell-Fleming Model

Summary

Check lists

Self-evaluation test

References

Learning objectives

After going through this chapter, student are expected to

- explain the nature of aggregate demand in open economy
- drive multipliers of different macro variables in an open economy context
- reason out as to why multipliers of an open economy are smaller in magnitude than a closed economy
- be familiar with the Mundell–Fleming model and perfect capital mobility ($BP=0$)
- Analyze the effectiveness of fiscal and monetary policy in small open economy under alternative exchange rates.

4.1. Introduction

Dear distance learner, in this chapter we extend our analysis of aggregate demand to include international trade and finance. The model developed in this chapter, called the **Mundell–Fleming model**, is an open-economy version of the *IS–LM* model. Both models stress the interaction between the goods market and the money market. Both models assume that the price level is fixed and then show what causes short-run fluctuations in aggregate income (or, equivalently, shifts in the aggregate demand curve).

The key difference is that the *IS–LM* model assumes a closed economy, whereas the Mundell–Fleming model assumes an open economy. The Mundell–Fleming model extends the short-run model of national income determination by including the effects of international trade and finance.

The Mundell–Fleming model makes one important and extreme assumption: it assumes that the economy being studied is a small open economy with perfect capital mobility. That is, the economy can borrow or lend as much as it wants in world financial markets and, as a result, the economy's interest rate (r) is determined by the world interest rate (r^f). One virtue of this assumption is that it simplifies the analysis: once the interest rate is determined, we can concentrate our attention on the role of the exchange rate. By small open economy in this model means an economy that has little effect on the world economy and is simply considered as price receiver in the world market.

One lesson from the Mundell–Fleming model is that the behavior of an economy depends on the exchange-rate system it has adopted. We begin by assuming that the economy operates under a fixed exchange rate and assess the effectiveness of fiscal and monetary policy in influencing national income and interest rates, and thus other economic variables. After examining the effectiveness of these policies in this way, we then relax the assumption so that the central bank allows the exchange rate to adjust to changing economic conditions, which has come to be termed as floating exchange rate.

4.2. The Basic Model

4.2.1. Open Economy National Income Identity

The key macroeconomic difference between open and closed economies is that, in an open economy, a country's spending in any given year need not equal its output of goods and services. A country can spend more than it produces by borrowing from abroad, or it can spend less than it produces and lend the difference to foreigners.

In an open economy gross domestic product (GDP) differs from that of a closed economy because there is an additional injection-export expenditure which represents foreign expenditure on domestically produced goods. There is also an additional leakage, expenditure on imports which represents domestic expenditure on foreign goods and which raises foreign national income. The identity for an open economy is given by:

$Y = C + I + G + X - M$, where Y is national income, C is domestic consumption, I is domestic investment, G is government expenditure, X is export expenditure and M is import expenditure.

If we deduct taxation from the right-hand side of equation [4.1] we have:

$Y_d = C + I + G + X - M - T$, where Y_d is disposable income.

If we denote private savings as $S = Y_d - C$ we can rearrange equation Y_d equation to obtain:

$$(X - M) = (S - I) + (T - G) \quad [4.3]$$

<i>Current account balance</i>	<i>Net (dis)saving of private sector</i>	<i>Government fiscal deficit/surplus</i>
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4.2.2. Income determination in an open economy

In an open economy, the equilibrium level of national income is determined where the domestic balance is equal to the external balance. Given $Y = C + I + G + X - M$; and we would make certain additions to this equation. Domestic consumption is partly autonomous and partly determined by the level of national income (Y). This is denoted algebraically by:

$C = C_a + cY$, where C_a is autonomous consumption and c is the marginal propensity to consume (MPC), that is the fraction of any increase in income that is spent on consumption. In this simple model consumption is assumed to be a linear function of income. An increase in consumers' income induces an increase in their consumption.

Import expenditure is also assumed to be partly autonomous and partly a positive function of the level of domestic income:

$M = M_a + mY$, where M_a is autonomous import expenditure and m is the marginal propensity to import, that is the fraction of any increase in income that is spent on imports. In this simple formulation import expenditure is assumed to be a positive linear function of income. There are several justifications for this; on the one hand increased income leads to increased expenditure on imports, and also more domestic production normally requires more imports of intermediate goods.

Government expenditure and exports are assumed to be exogenous; government expenditure being determined independently by political decisions, and exports by foreign expenditure decisions and foreign income.

$Y = C_a + cY + I + G + X - M_a + mY$. Rearranging, we have,

$Y - C_a - cY + I + G = X - M_a + mY$, $Y - AD(Y) = NX(Y)$, where AD is aggregate demand which is equal to $C_a + cY + I + G$ and NX is net export defined as $X - M_a + mY$

4.2.3.Open-Economy Multipliers

John Maynard Keynes in his classic work *The General Theory of Employment, Interest and Money* (1936) pioneered the use of multiplier analysis to examine the effects of changes in government expenditure and investment on output and employment. However, his work was concerned almost exclusively with a closed economy. It was not long, however, before the ideas of Keynes' work were applied to an analysis of open economies, most notably by Fritz Machlup (1943).

The assumptions underlying basic multiplier analysis are:

- i. both domestic prices and the exchange rate are fixed,
- ii. the economy is operating at less than full employment so that increases in demand result in an expansion of output, and
- iii. The authorities adjust the money supply to changes in money demand by pegging the domestic interest rate.

The implication of the last assumption is that increases in output that lead to a rise in money demand would, with a fixed money supply, lead to a rise in the domestic interest rate. But it is assumed that the authorities passively expand the money stock to meet any increase in money demand so that interest rates do not have to change. There is no inflation resulting from the money supply expansion because it is merely a response to the increase in money demand.

Rearranging the above equation $Y = C_a + cY + I + G + X - M_a + mY = (1 - c + m) Y = C_a + I + G + X - M_a$

Given that $(1 - c)$ is equal to the marginal propensity to save s , that is, the fraction of any increase in income that is saved, then we obtain:

$$Y = \frac{1}{s + m} (C_a + I + G - M_a)$$

It can be transformed into difference form to yield:

$$dY = \frac{1}{s + m} (dC_a + dI + dG + dX - dM_a)$$

4.2.4.The Government Expenditure Multiplier

The first multiplier of interest is the government expenditure multiplier, which shows the increase in national income resulting from a given increase in government expenditure. This

is given by: $\frac{dY}{dG} = \frac{1}{(s + m)} > 0$

This says that an increase in government expenditure will have an expansionary effect on national income, the size of which depends upon the marginal propensity to save(s) and the marginal propensity to import (m). Since the sum of these is less than unity, an increase in government expenditure will result in an even greater increase in national income. Furthermore, the value of the open-economy multiplier is less than the closed- economy multiplier which is given by $1/s$. The reason for this is that increased expenditure is spent on both domestic and foreign goods rather than domestic goods alone, and the expenditure on foreign goods raises foreign rather than domestic income.

4.2.5.Export Multiplier

In this simple model, the multiplier effect of an increase in exports is identical to that of an increase in government expenditure and is given by

$$\frac{dY}{dX} = \frac{1}{(s + m)}$$

In practice it is often the case that government expenditure tends to be somewhat more biased to domestic output than private consumption expenditure, implying that the value of m is smaller in the case of the government expenditure multiplier than in the case of the export multiplier. If this is the case, an increase in government expenditure will have a more expansionary effect on domestic output than an equivalent increase in exports.

4.3.The Mundell-Fleming Model

This model owes its origins to papers published by James Fleming (1962) and Robert Mundell (1962, 1963). Their major contribution was to incorporate international capital movements into formal macroeconomic models based on the Keynesian ISLM framework. Their papers led to some dramatic implications concerning the effectiveness of fiscal and monetary policy for the attainment of internal and external balance.

4.3.1.Derivation of the IS, LM and BP curves

Both the IS and LM curves have their usual shape. At this point our emphasis would be in deriving the BP curve.

The balance of payments schedule shows different combinations of rates of interest and income that are compatible with equilibrium in the balance of payments.

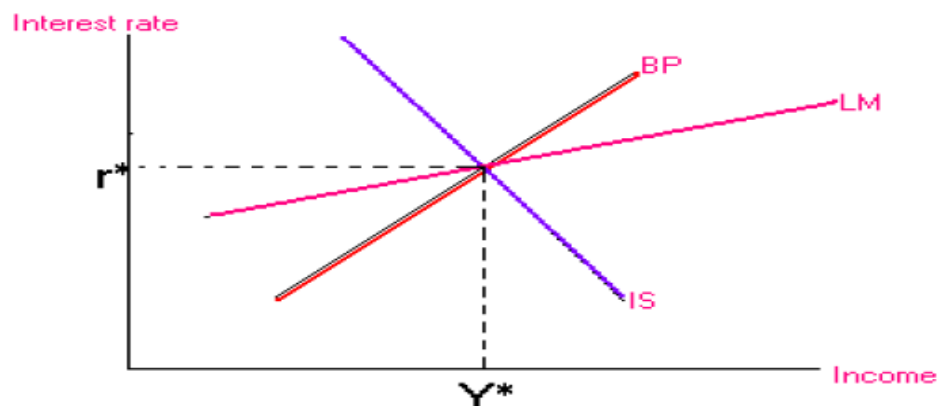
The overall balance of payment is made up of three major components: the current account balance (CA), the capital account (K) and the change in the authorities' reserve (dR). By maintaining balance in supply and demand for the currency-that is external balance-we mean that there is no need for the authorities to have to change their holdings of foreign exchange reserves. This implies that if there is a current account deficit there needs to be an offsetting surplus in the capital account so that the authorities do not have to change their reserve. Conversely, if there is a current account surplus there needs to be an offsetting deficit in the capital account to have equilibrium in the balance of payment. Since exports are determined exogenously and imports are a positive function of income, the higher the level of national income the smaller will be any current account surplus or the larger any current account deficit. The net capital flow (K) is a positive function of the domestic interest rate. Assuming that the rate of interest in the rest of the world (r^f) is fixed, the higher the domestic interest rate (r) the greater the capital inflow into the country or the smaller any capital outflow. This relationship is expressed as: $K = K(r - r^f)$

Since the balance of payment schedule shows various combinations of levels of income and the rate of interest for which the balance of payments is in equilibrium, then $X - M + K = 0$

4.3.2. The equilibrium Model

The slope of the BP schedule is determined by the degree of capital mobility internationally. The higher the degree of capital mobility then the flatter the BP schedule would be. This is because for a given increase in income which leads to a deterioration of the current account, the higher the degree of capital mobility, the smaller the required rise in the domestic interest rate to attract sufficient capital inflows to ensure overall equilibrium. When capital is perfectly mobile, the slightest rise in the domestic interest above the world interest rate leads to a massive capital inflow making the BP schedule horizontal at the world interest rate. At the other extreme, if capital is perfectly immobile internationally then a rise in the domestic interest rate will fail to attract capital inflows making the BP schedule vertical at the income level that ensures current account balance. Between these two extremes, that is, when we have an upward sloping BP schedule, we say that capital is imperfectly mobile

Figure 4.1:- Equilibrium in the model



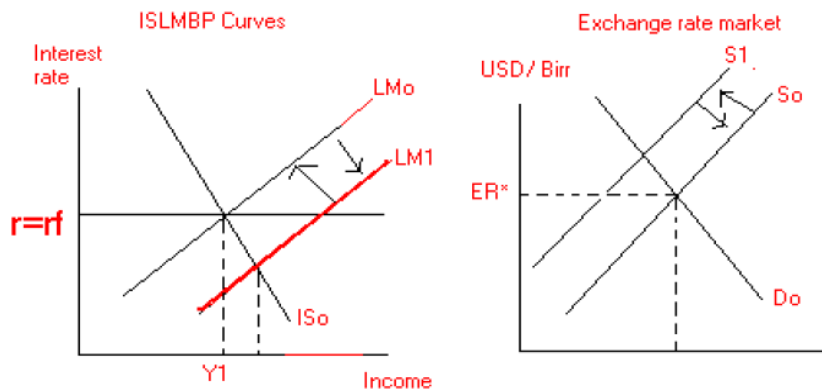
Getting everything together the basic MF Model

$$\text{IS: } Y = c(Y) + I(r) + G + X(e) - e.M(Y, e)$$

$$\text{LM: } L(Y, r) = DC + R$$

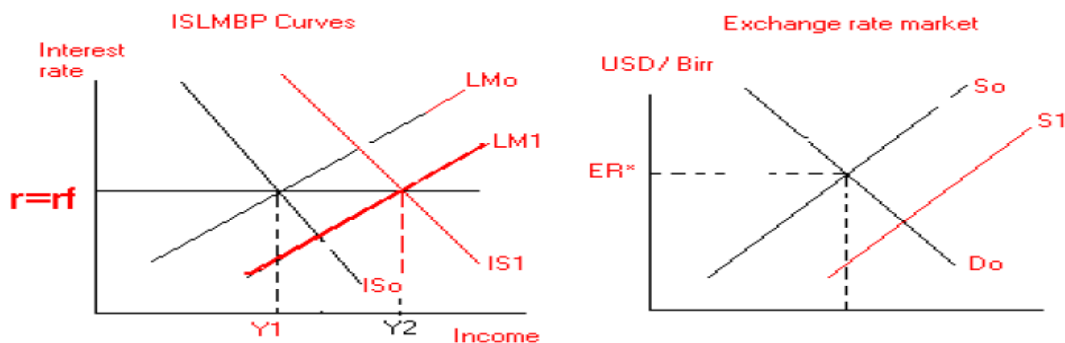
$$\text{BP: } R = X(e) - e.M(Y, e) + K(r - r^f)$$

3.3.3. Ineffectiveness of Monetary Policy in Small open economy with perfect capital mobility and fixed exchange rate



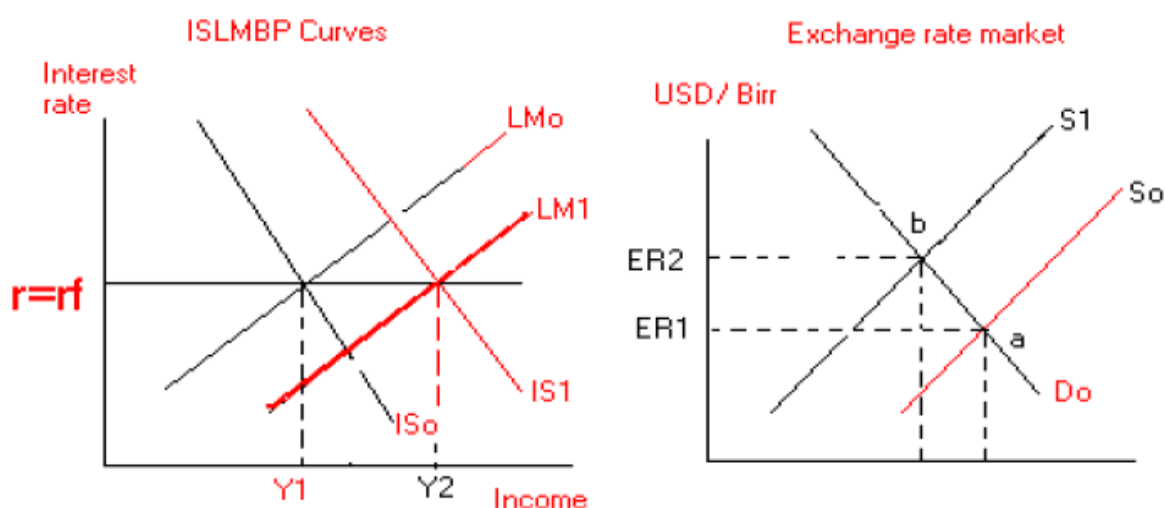
The above figure depicts a small open economy with a fixed exchange rate. The initial level of income is where the ISLMBP curves intersect at the interest rate level $r = r_f$ and income level Y_1 . If the authorities attempt to raise output by a monetary expansion, the LM curve shifts right from LM_0 to LM_1 ; there is downward pressure on the domestic interest rate and this results in a massive capital outflow. This capital outflow means that there is pressure for a devaluation of the currency (as shown in the above figure), and the authorities have to intervene in the foreign exchange market to purchase the home currency with reserves. Such purchases result in a reduction of the money supply in the hands of private agents, and the purchases have to continue until the LM curve shifts back to its original position at LM_0 where the domestic interest rate is restored to the world interest rate. Hence, with perfect capital mobility and fixed exchange rates, monetary policy is ineffective at influencing output.

3.3.4. Effectiveness of Fiscal Policy with perfect capital mobility and fixed exchange rate



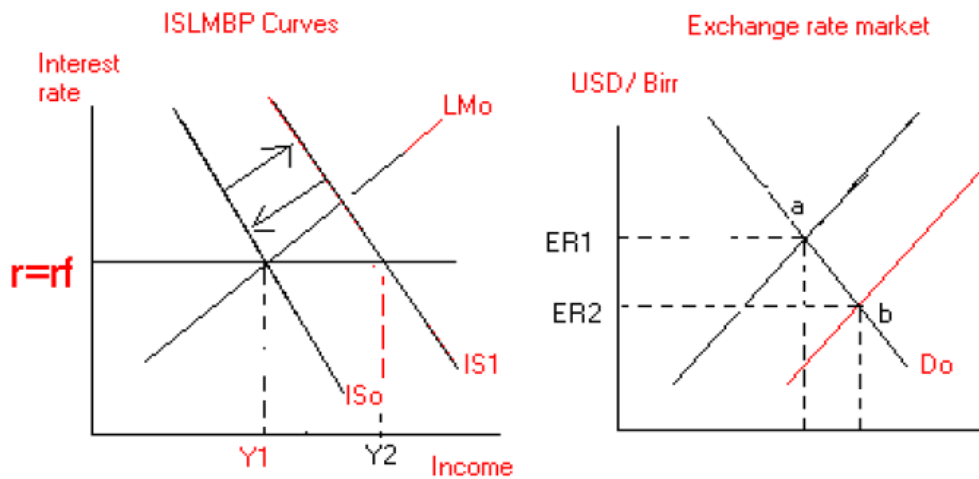
Fiscal expansion shifts the IS schedule to the right from IS_0 to IS_1 . This puts upward pressure on the domestic interest rate and leads to a capital inflow. To prevent an appreciation the authorities have to purchase the foreign currency with domestic currency. This means that the amount of domestic currency held by private agents increases and the LM_0 schedule shifts to the right. The increase in the money stock continues until the LM curve passes through the IS_1 curve at the initial interest rate. Hence, under fixed exchange rates and perfect capital mobility an active fiscal policy alone has the ability to achieve both internal and external balance. This is an exception to the instruments-targets rule, although monetary policy does have to passively adjust to maintain the fixed exchange rate

3.3.5. Effectiveness of Monetary policy with perfect capital mobility and floating exchange rate



The initial equilibrium is at the income level Y_1 where the IS_0 intersects the LM_0 . A monetary expansion shifts the LM curve from LM_0 to LM_1 leading to downward pressure on the interest rate, a capital outflow, and a depreciation of the exchange rate. The depreciation leads to an increase in exports and reduction in imports so shifting the IS curve to the right and the LM curve to the left, so that final equilibrium is obtained at a higher level of income. Clearly with an appropriate initial monetary expansion the authorities could obtain both internal and external balance by monetary policy alone.

3.3.6. Ineffectiveness of Fiscal policy with perfect capital mobility and floating exchange rate



The increase in government expenditure shifts the IS schedule to the right from IS_0 to IS_1 leading to upward pressure on the domestic interest rate resulting in a massive capital inflow and an appreciation of the exchange rate. The appreciation of the exchange rate results in a reduction of exports and an increase in imports, and this forces the IS schedule back to its original position. Hence, with perfect capital mobility and a floating exchange rate, fiscal policy is ineffective in influencing output.

3.3.7. Limitations of the Mundell-Fleming Model

1. **The Marshall Lerner condition:** the model assumes that the Marshall Lerner condition holds even though it is essentially of a short term model which is the time scale under which the Marshall-Lerner conditions are least likely to be met.
2. **Interaction of stocks and flows:** the model ignores the problem of the interaction of stocks and flows. According to it a current account deficit can be financed by a capital inflow. While such a policy is feasible in the short run, a capital inflow over time increases the stock of foreign liabilities owed by the country to the rest of the world, and this factor means a worsening of the future current account as interest is paid

abroad. Clearly, a country cannot go on financing a current account deficit indefinitely as the country becomes an ever-increasing debtor to the rest of the world.

3. **Neglect of the long run budget constraints:** the model fails to take account of long run constraints that govern both the private and public sector. In the long run private sector spending has to equal its disposable income, while in the absence of money creation government expenditure has to equal its revenue from taxation. This means that in the long run the current account has to be in balance. One implication of these budget constraints is that a forward looking private sector would realize that increased government expenditure will imply higher taxation for them in the future, and this will induce increased private sector savings today that will undermine the effectiveness of fiscal policy.
4. **Wealth Effect:** the model does not allow for wealth effects that may help in the process of restoring long run equilibrium. A decrease in wealth resulting from a fall in foreign assets associated with a current account deficit will ordinarily lead to a reduction in import expenditure which should help to reduce the current account deficit. While such an omission of wealth effects on the import expenditure function may be justified as being of small significance in the short run, the omission nevertheless again emphasizes the essentially short-term nature of the model.
5. **Neglect of supply side factors:** one of the obvious limitations of the model is that it concentrates on the demand side of the economy and neglects the supply side. There is an implicit assumption that supply adjust in accordance with changes in demand. In addition, because the aggregate supply curve is horizontal up to full employment,

increases in aggregate demand do not lead to changes in the domestic price level, rather they are reflected solely by increases in real output.

Summary

The result that fiscal policy is very effective at influencing output under fixed exchange rates and monetary policy is very effective under floating exchange rates with perfect capital mobility is of considerable relevance to economic policy design. Under fixed rates policy makers will pay more attention to fiscal policy than under floating rates when more emphasis will be placed on monetary policy. The degree of capital mobility and the exchange rate regime both demonstrate that appropriate economic policy design in an open economy is very different from that in a closed economy context.



CHECK LIST

Dear Distance Learner! Below are important checklists that help you how much you have grasped the main points of the section. Please, check “**YES**” or “**NO**” in the given boxes for each question so that you will able to check your progress.

No	Question	Yes	NO
1	Do you fully understand what aggregate demand in open economy?	☐	☐
1.	Are you able to differentiate aggregate demand in closed and open?	☐	☐
2.	Are you able to drive the multiplier form the open market economy?	☐	☐
4	Can you analyze fiscal policy effect on aggregate demand in open eco	☐	☐



SELF EVALUATION TEST

Part one: True or false

1. The value of the open-economy multiplier is less than the closed- economy multiplier
2. On the Mundell-Fleming Model with perfect capital mobility and fixed exchange rate, monetary policy is more powerful in affecting output than fiscal policy does.

Part Two: Multiple choices

1. According to the Mundell-Fleming Model with perfect capital mobility and floating rate
 - A. The impact of monetary policy on output is ambiguous
 - B. Fiscal policy is more effective in influencing the economy
 - C. Monetary policy is more powerful in affecting output
 - D. domestic interest rate is irresponsive to monetary policy changes
2. In a small open economy with perfect capital mobility, higher the domestic interest rate (r) than the rate of interest in the rest of the world (r_f) is
 - A. the greater the capital inflow into this small economy
 - B. the less the capital inflow into this small economy
 - C. the greater any capital outflow from this small economy
 - D. can't be said any based on the given information

PART THREE:-ESSAY TYPE AND WORK OUT

1. In an economy, assume that Gross Domestic Product (GDP), Personal Disposable income, consumption and Government budget deficit are Birr 6000, Birr5, 100, Birr 3,800 and Birr200 respectively. In addition to these, the current account (NX) shows a trade deficit of Birr 100. Then
 - a. How large is Government Spending (G)?
 - b. How large is Private Investment (I)?

c. How large is saving(S)?

3. Given the following data for an open economy (all in millions):

- Consumption function, $C = 0,75Y_d$, assume no C_0
- Government spending, $G = 250$
- Investment, $I = 200$
- Tax, $T = 0,15 Y$, assume again no T_0
- Transfer payments, $TR = 50$
- Export, $X = 200$
- Import, $M = 0.1Y_d$, assume M_0 .

Required!

- i. Find equilibrium income.
- ii. Check that private savings plus public savings (government budget) plus $(M-X)$ equals investment.
- iii. Find the multiplier of autonomous expenditure and current account
- iv. Now $G = 200$. Find the new value of equilibrium income. How much has income changed? Represent these two situations in an expenditure-income graph.
- v. Exports become 236. Can you tell without recalculating equilibrium income by how much equilibrium income will go up? Explain.

References

- N.Gregory Mankiw, 2007, Macroeconomics 4th edition
- William H. Branson, 2006 Macroeconomic Theory and Policy

CHAPTER FIVE

THEORIES OF INVESTMENT

Contents

Learning Objectives

- 5.1.Introduction
- 5.2.Types of Investment
 - 5.2.1. Business Fixed Investment
 - 5.2.2. Residential Investment
 - 5.2.3. Inventory Investment
- 5.3.The Stock Market and Tobin's q Model of Investment
- Summery
- Check lists
- Self-evaluation Exercise
- References

Chapter Objectives

At the end of this chapter students will be able to understand and analyze the different types of investment

5.1. INTRODUCTION



Dear learner, while spending on consumption goods provides utility to households today, spending on investment goods is aimed at providing a higher standard of living at a later date. Investment is the component of GDP that links the present and the future.

Investment makes up 20-33% of GDP, and although obviously not as large as consumption it is important because investment adds to the capital stock which a key input is used to produce output and most of the fluctuations in output seem to occur because of fluctuations in investment. As a result, it is crucial that we understand what factors affect investment and how they do so not only because it is part of GDP but because it is crucial in determining fluctuations and growth in GDP.



Dear learner, can you guess the different type of investments that you frequently came across?

5.2. TYPES OF INVESTMENT

Before developing any theories about investment choices by people, it is important to define what is meant by investment.

Investment: is the formation of real capital, tangible or intangible, that will produce a stream of goods and services in the future. Investment undertaken in an economy is classified according to the following categories:

1. Business Fixed Investment — plant and machinery, office buildings
2. Residential Construction Investment — houses, and significant additions to houses (that require building permits).
3. Changes in Firm's Inventories — as they provide revenue in the future, not today.
4. Purchases of Durable Goods by Households — cars, fridges.
5. Government Purchases of Investment Goods and Buildings — roads, hospitals, harbors.
6. Investment in Human Capital — schooling, university study, apprenticeships etc.
7. Knowledge — things we know about scientific and other areas.

The national income accounts only measure 1, 2, 3, and 5 as investment and it is not clear as to how well they measure 2 and 5 (e.g. additions not requiring permits, and durables purchased by government departments). The national accounts do not measure 6 or 7.

Investment can be undertaken not only by firms or householders, but also by the government. For example, looking at Business Fixed Investment of different countries, government sector undertakes significant proportion of this category:

INVESTMENT AFFECTS FUTURE OUTPUT

The capital stock is a very important input used to produce output and the level of investment ultimately determines the level of the capital stock and thus the growth of output. The relationship between investment and the capital stock can be expressed in the following way:

$K_{t+1} = K_t + I_t - \delta K_t$, Where, K_t = stock of capital at time t, I_t = gross investment at time t, δ = the depreciation rate. Another way of stating this relationship is looking at the net change in the capital stock which can be expressed in the following way, $K_{t+1} - K_t = I_t - \delta K_t = I_{n,t}$, Where $I_{n,t}$ is net investment at time t. This implies that if $I_{n,t}$ increases then K_{t+1} will increase and thus $Y_{t+1} > Y_t$, that is, output should increase. Note that the notation used above assumes that investment undertaken today does not really become productive until the future. This is usually the assumption we use in modern macro.

5.2.1 BUSINESS FIXED INVESTMENT

Many people are intensely interested in business fixed investment and it is not difficult to understand why; it constitutes the basic equipment used by firms to produce output whether it is computers, factories, machine tools, or offices. We will learn about two theories developed to explain this form of investment.

5.2.1.1 THE ACCELERATOR THEORY OF BUSINESS FIXED INVESTMENT

The first coherent theory for explaining the level of aggregate investment and why it behaves as it does is called the accelerator theory of investment. Its initial focus is on what firms might do and then applies the results to aggregate investment.

The theory's line of argument goes as follows. Firms produce output and they need capital to produce this output. It is likely that a firm has some desired stock of capital in mind when producing any given amount of output. If the desired capital stock differs from what the firm actually has, then it must change its capital stock and how much it changes it is the amount of investment. When would a firm change how much capital it desired? Following this line of reasoning the answer is easy, when output changed. Investment is thus the result of changes in output.

The Formal Model

We will now write the basic idea described above as a formal model. To do this, define the following variables: k_t = the actual capital stock of the firm at time t , k_t^d = the desired capital stock of the firm at time t , y_t = output produced by the firm at time t , i_t = the amount of net investment by the firm at time t , α = the desired capital to output ratio by the firm.

Next, we need to specify the two key assumptions used by the model:

There exists a long-run desired amount of capital related to the amount of output, or, $k_t^d = \alpha y_t$. There may be short-run deviations from this amount because of output fluctuations, but on average, this relationship holds.

All investment undertaken today is assumed to be ready for use today (note that this differs from the “standard” assumption that investment today only becomes productive in the future). In symbols we can show this as: $i_t = k_t^d - k_{t-1}$ and notice the different time subscripts as to why this is true. This is a strong behavioral assumption that businesses know what is going on all the time and adjust for it very quickly.

Now, put everything together. The logical implication of the second assumption is that the capital stock each period equals the desired capital stock, or that, $k_t = k_t^d = \alpha y_t$

This means that we can rewrite the above equation for net investment in the following way:

$$\begin{aligned} i_t &= k_t^d - k_{t-1} \\ &= k_t - k_{t-1} \\ &= \alpha y_t - \alpha y_{t-1} \\ &= \alpha (y_t - y_{t-1}) \\ &= \alpha \Delta y_t \end{aligned}$$

So what we find is that investment is determined by changes in output. This is called the naive accelerator model, since all the change happens in one period.

5.2.1.2. NEOCLASSICAL THEORY OF INVESTMENT

Our next theory of aggregate investment, and the one that is currently used by economists, builds on the accelerator theory but includes the possibility that firms can substitute between capital and in more sophisticated (and more mathematically complex versions) of this model also take expectations into account as well, but we will leave that for this course as it requires more maths than you currently have. The key difference between it and the accelerator theory is that whereas the accelerator theory did not explore where the desired capital to output ratio came from, the theory we are going to learn about explicitly invokes the optimization principle used in economics.

Underlying Theory

An important underlying assumption of the accelerator model is that firms do not change their production techniques. In effect they employ the same proportions of capital and labor independent of their prices. The neoclassical theory of investment looks at investment decisions as being affected by output, as with the accelerator model, but on the basis of a cost-benefit decision. That is, firms may have a desired output level they wish to produce, given the price at which the output can be sold, but the bundle of inputs they use will depend on their relative costs and benefits so as to maximize the profits of firms.

The Formal Model

We will now write the basic idea described above as a formal model. To begin with define the following variables: y = the quantity of output produced by the firm, k = the quantity of capital used by the firm, l = the quantity of labor used by the firm, $f[\cdot, \cdot]$ = the production function which relates how the inputs capital and labor are used to produce outputs.

Next, we need to specify the key assumption used by the model:

1. Firms act to maximize their profits where profits equal revenue less costs. – If firms maximize profits by hiring labor and capital, then the amount they choose to hire will satisfy the condition $MB=MC$ for each factor, or in this case their MRP equals their cost. Let,

W = the marginal nominal wage cost paid to employees.

R = the marginal nominal “rental” cost that firms incur in using capital; Where it is important to note that the implicit or explicit cost of using capital is not simply the actual price of the capital since the capital can be resold. The cost of using the capital is the implicit (or explicit if rented from another firm) cost of renting the capital over the period it is used (we will discuss this in more detail soon) which we are calling R (e.g. if we build a dam and use it to produce electricity then the capital cost per unit of electricity is not the total cost of the dam, but some fraction of it relating to what portion of it was used to produce the unit electricity). Given our assumption, we know that the logical implication is that capital and labor are employed up to the point where, $P * MPL = W$ or $MPL = \frac{W}{P}$ and

$$P * MPK = R \text{ or } MPK = \frac{R}{P}$$

There are three cases to consider:

1. If $MPK > \text{cost of capital}$, then there are potential profits a firm could earn by increasing its capital stock. This implies that K increases and the amount of net investment is positive (i.e. $K_{t+1} > K_t$).
2. If $MPK < \text{cost of capital}$, then the firm is making losses on the last units of capital it is using and it could increase profits by reducing its capital stock. As a result K decreases and the amount of net investment is negative (i.e. $K_{t+1} < K_t$).
3. $MPK = \text{cost of capital}$, then the firm is maximizing the amount of profits it can earn from using capital and does not want to change its capital stock (i.e. $K_{t+1} = K_t$).

Therefore, a firm’s decision about whether to add to its capital stock, or reduce it through depreciation depends upon the profit rate or the difference between the MPK and the cost of capital. Note that unlike the accelerator theory, the neoclassical theory shows us what determines the optimal or desired capital stock, it is the amount of capital where $MB=MC$, or no more profits can be made from changing the firm’s amount of capital.

5.2.2. RESIDENTIAL INVESTMENT

Another type of investment dear to the hearts and wallets of many households, as well as involving large expenditures, and one which varies strongly with the business cycle, is residential investment. What we want to know is what factors determine investment in residences and how they do so.

5.2.2.1. NEOCLASSICAL MODEL OF RESIDENTIAL INVESTMENT

Underlying Theory

The neoclassical model of residential investment directly uses an important concept when thinking about capital: the existing capital is a stock variable whereas investment is a flow variable. This is true of any capital and investment but is made explicit in the model we will learn about. The idea is that there are two parts to the housing: the market for the existing stock of houses which determines the equilibrium housing prices and the supply of new housing which determines the flow of residential investment. Note that this is again true for all forms of capital but we are using it explicitly here in our model.

The Formal Model

First, define the following variables: P_H = the going price of housing in an economy, P = the price level in an economy, K_H = stock of residential capital or housing., I_H = investment in housing.

Determining the Equilibrium Price P_H/P — the Market for Existing Houses

As with any normal market the relative price of housing, P_H/P is determined jointly by demand and supply. The stock of houses is fixed in the short-term and so supply curve of existing houses is vertical. If we invoke the assumption of the law of demand, then the demand for housing is of the normal downward sloping form in the relative price of housing. You might ask how, given a fixed population, the demand for housing can change if the relative price of housing changes.

We know that the supply of housing does change over time. We also know that the cost of building new houses is made up of materials, hiring labor, and hiring capital (tools, machines

etc.). These form the MC of building new housing. We will assume the law of supply that supplying extra quantities of new housing is more expensive because of diminishing returns to the factors of production used by the firms. That is, the existing resources become more expensive as firms bid up their prices to get them, additional factors require higher payments to induce them to supply their services, or the additional factors are just not as productive as existing resources used. The MB for firms or developers from building new housing is the relative price of housing. To induce construction firms to build new houses the MB, or relative price, of building new housing has to be higher than the MC. This tells us that supply of new housing curve is upward sloping in the relative price of new housing.

5.2.3. INVENTORY INVESTMENT

The last category of investment that we will study is inventory investment. It is not that large compared to the other forms of investment, but as mentioned at the beginning of this topic there is a strong relationship between changes in inventory investment and changes in output over the business cycle.

REASONS FOR HOLDING INVENTORIES

Before developing a theory of inventory investment we will study the reasons why inventories are held. Knowing the reasons for holding inventories will help us understand better the factors which influence the level of inventory investment. There are four reasons for holding inventories:

- 1. Production Smoothing:-**Often it is cheaper to produce goods at a steady rate, than to continually alter production runs. This means that during slow periods inventories build up and during boom periods inventories are run down.
- 2. Inventories as a Factor of Production:-**Firms carry inventories of spare parts in case a machine breaks down, so that the entire assembly line does not come to a stop.
- 3. Stock-Out Avoidance:-**To avoid lost sales and profits when sales may be unexpectedly high e.g. a book retailer may carry multiple copies of a book if they are not sure how popular the book will be.

4. Work in Process:-Partly completed products are counted as inventories e.g. cheese making where cheeses are aging.

a. ACCELERATOR THEORY OF INVENTORY INVESTMENT

Theory behind the Accelerator Model

You have seen this theory before applied to a different setting. The idea is the same except in the case of inventory investment the reason that firms might hold stocks of inventories that are proportional to their levels of output seem to have more justification than did the case of business fixed investment, for the reasons mentioned above which are directly related to the level of output being produced and sold. For example, say output is high and the economy is booming then production firms require more supplies, and have more work in process and retail firms want more merchandise to keep up with the higher sales. Furthermore, it is likely that firms can change their inventory investment much more quickly than they can change their fixed investments.

The Formal Model

We will now write the basic idea described above as a formal model which will look very familiar to you, but with different notation. First, define the following variables:

n_t = actual stock of inventories by the firm at time t

n_t^d = desired stock of inventories by the firm at time

$\dot{i}_t^s$ = inventory investment by the firm at time t

y_t = output of the firm at time t.

β = the desired inventory to output ratio of the firm.

Next, we need to specify the two key assumptions used by the model:

1. There exists a desired amount of inventories related to the amount of output: $n_t^d = \beta y_t$

There may be short-run deviations from this amount because of output fluctuations, but on average, this relationship holds.

2. All inventory investment undertaken today is assumed to be ready for use today (note that again this differs from the “standard” assumption that investment today only becomes productive in the future). In symbols we can show this as: $\dot{i}_t^s = n_t^d - n_{t-1}$ and notice the different time subscripts as to why this is true. This is not as strong a behavioral assumption in this context as it was in the context of business fixed investment. If we are thinking of periods of time being a year then most firms can alter their inventories to changing conditions very quickly if they choose to do so.

Now, put everything together. The logical implication of the second assumption is that the capital stock each period equals the desired capital stock, or that, $n_t = n_t^d = \beta y_t$

This means that we can rewrite the above equation for net inventory investment in the following way: $\dot{i}_t^s = n_t^d - n_{t-1} = n_t - n_{t-1} = \beta y_t - \beta y_{t-1} = \beta(y_t - y_{t-1}) = \beta \Delta y_t$

So what we find is that a firm’s inventory investment is determined by changes in output.

5.3. The Stock Market and Tobin’s q Model of Investment

Many economists see a link between fluctuations in investment and fluctuations in the stock market. The term **stock** refers to shares in the ownership of corporations, and the **stock market** is the market in which these shares are traded. Stock prices tend to be high when firms have many opportunities for profitable investment, because these profit opportunities mean higher future income for the shareholders. Thus, stock prices reflect the incentives to invest.

The Nobel Prize–winning economist James Tobin proposed that firms base their investment decisions on the following ratio, which is now called **Tobin’s q**:

$$q = \frac{\text{Market Value of Installed Capital}}{\text{Replacement Cost of Installed Capital}}.$$

The numerator of Tobin's q is the value of the economy's capital as determined by the stock market. The denominator is the price of that capital if it were purchased today.

Tobin reasoned that net investment should depend on whether q is greater or less than 1. If q is greater than 1, then the stock market values installed capital at more than its replacement cost. In this case, managers can raise the market value of their firms' stock by buying more capital. Conversely, if q is less than 1, the stock market values capital at less than its replacement cost. In this case, managers will not replace capital as it wears out.

The advantage of Tobin's q as a measure of the incentive to invest is that it reflects the expected future profitability of capital as well as the current profitability.

Summary

1. There are good theoretical reasons why we would expect that investment is inversely related to interest rates, such as the effect of r on the cost of capital, and this seems to be supported by the data.
2. Several factors can shift the demand for investment such as technological innovation or increased population.
3. Investment is highly correlated with the business cycle and there are valid theoretical reasons why this is the case. For example, say Y is higher than normal:
 - i. Employment is high as firm's sales are high $\Rightarrow \uparrow MPK \Rightarrow \uparrow I$.
 - ii. Demand for housing is high as incomes are high $\Rightarrow \uparrow PH/P \Rightarrow \uparrow I$.
 - i. Output being produced is high as sales are high $\Rightarrow \Rightarrow \uparrow$ materials and work-in-process $\Rightarrow \uparrow I$.

☒ Checklist

Dear learner did you understand the following concepts?

	<u>YES</u>	<u>NO</u>
a. Can you define investment?	☐	☐
b. Do you know the three types of investment?	☐	☐
c. Do you understand accelerator model of residential inv't ?	☐	☐
d. Do you understand what is Tobin's q all about	☐	☐



SELF EVALUATION TEST

PART I: MULTIPLE CHOICE

1. Business firm's spending on durable equipment is categorized under _____ investment.
 - a. inventory investment
 - b. machinery investment
 - c. business fixed investment
2. If a firm combines progressively more capital with relatively less labor in the production of a given amount of output, the marginal productivity of capital _____
 - a. is constant
 - b. Cannot be determined
 - c. increases
 - d. declines
 - e. None
3. Which of the following can be regarded as the marginal cost of investment?
 - a. profit
 - b. Interest rate
 - c. principal
 - d. marginal benefit
 - e. None
4. If a potential investment project involves a marginal cost just equal to the marginal benefit then the decision will be _____
 - a. undertaking the project
 - b. Not undertaking the project
 - c. cannot be determined
 - d. a matter of indifference
 - e. None

PART II: TRUE OR FALSE

1. Inventory changes are observed to be less volatile than investment in fixed capital.
2. Autonomous investment is independent of the level of income.
3. According to Tobin's Q model, when the market value installed capital is greater than the cost of replacement of capital, investment is going to increase.
4. Economic booming is one of the factors that shift the housing demand curve.

References

- N.Gregory Mankiw, 2007, Macroeconomics 4th edition
- William H. Branson, 2006 Macroeconomic Theory and Policy

CHAPTER SIX

MONEY DEMAND AND MONEY SUPPLY

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Learning objectives

At the end of this chapter distance learners will be able to:-

- explain the Fisher and the Cambridge versions of the quantity theory of money
- outline the Keynesian theory of money and identify the factors that influence the transactions, precautionary and speculative demands for money
- analyze the effect of a change in the money supply on the equilibrium rate of interest in the Keynesian model

6.1. Introduction



Dear distance learner, in this chapter we examine the factors which influence the demand for money and the important questions of how the economy reacts to changes in the supply of money. We are interested in the economy's reactions to such changes because society's ability to purchase goods and service may be affected. Additionally, changes in the money supply not only affect individual Holders of money, but may also lead to inflation and so inject a degree of instability into the economy.

6.2. Money Demand

The demand for money arises from the important functions performed by money, such as units of account, store of value and medium of exchange. Money as a unit of account does not by itself generate any demand for money, because one can quote prices in dollars without holding any. By contrast, money can serve its other two functions only if people hold it.

The demand for money as explained by the famous quantity theory assumes that the demand for real balances is proportional to income. That is: $(M/P)^d = kY$, Where, k is a constant.

However, more general and realistic money demand function assumes that the demand for real balances depends on both the interest rate and income; $(M/P)^d = L(i, Y)$

The purpose of studying money demand is to gain insight about the money demand functions. Just as studies of the consumption function rely on microeconomic models of the consumption decision, studies of the money demand function rely on micro economic models of the money-demand decision.

Theories of money demand emphasize the role of money either as a store of value or as a medium of exchange.

6.2.1. The Quantity Theory of Money

1. Fisher's version

Irving Fisher's version of the quantity theory can be explained in terms of the following equation of exchange: $MV = PT$

Where M is the nominal stock of money in circulation and V is the transactions velocity of circulation of money (that is, the average number of times the given quantity of money changes hands in transactions); P is the average price of all transactions and T is the number of transactions that take place during the time period. Both MV and PT measure the total value of transactions during the time period and so must be identical. Thus, the equation is really an identity which must always be true: it tells us only that the total amount of money in transactions is equal to the value of what is sold.

The identity, however, is converted into a theory of the determination of the price level by assuming:

A/ that the money supply is determined by the monetary authorities

B/ that the number of transactions is fixed in the short run because of the classical presumptions that the economy operates automatically at full employment; and

C/ that the velocity of circulation is also fixed in the short-run because it depends largely on institutional factors (such as whether workers are paid weekly or monthly) which themselves tend to remain constant for long periods of time.

With T and V constant, the identity can be written as follows: **$MV = PT$**

It now follows that changes in M , initiated by the monetary authorities, will cause proportionate changes in P . notice that the direction of causation runs from changes in the stock of money to changes in the general price level.

According to the quantity theory, money is held only for the purpose of making payments for current transactions. Thus, **the demand for money is called a transactions demand**. When the money supply is increased, people find themselves holding more than they need for current transactions and attempt to spend the excess. It is this extra spending which, given full employment and consequent constant number of transactions, pushes up the price level. As prices rise, the value of transaction rises and so the demand for money rises. This mechanism ceases when the demand for money and supply of money are equal again.

6.2.2. Cambridge version (cash-balance approach)

A version of quantity theory which concentrates on the factors that determine the demand for money was developed by economists at the University of Cambridge. These economists agreed that an individual's demand for cash balances (or nominal money) is proportional to the individual's money income. If this were true of all individuals, then the aggregate demand for money (M_D) could be written as proportional to money national income (Y):

$$M_D = kY, \text{ Where; } k \text{ is a constant.}$$

Notice that Y in this version represents the money value of spending on all final goods and services produced during the time period. This is much more than Fisher's versions of the value of all transactions (PT) which included spending on intermediate goods and financial assets, as well as final goods and services. Since **Y is money national income**, it can be divided into its price and quantity components, so that, $M_D = kPQ$, Where P is the general price level and Q is real income (or output).

Notice that K is the reciprocal of the income velocity of circulation of money (which can be defined as the average number of times the money supply changes hands in financing the national income). This demand for money arises to enable the community to fulfill its planned expenditure during the intervening periods between receipts of wages, salaries or other forms of income.

If we continue to assume that the money supply (M) is under the control of the monetary authorities we can write that in equilibrium: $M_s = M_D$

Substituting from above, we have, $M = KPQ$

With K constant and Q fixed because the economy is assumed to remain at full employment, an increase in M will create an excess supply of money. This leads people to increase their spending directly on goods and services so that the general price level is pulled upwards. As this happens, the demand for money increases and eventually becomes equal to the money supply again.

Thus, both the Fisher and Cambridge versions of the quantity theory come to the same important conclusion that an increase in the money supply leads directly to an increase in

spending and, with full employment, the general price level is proportional to the quantity of money in circulation.

6.2.3 The Keynesian theory of money (Income-expenditure approach)

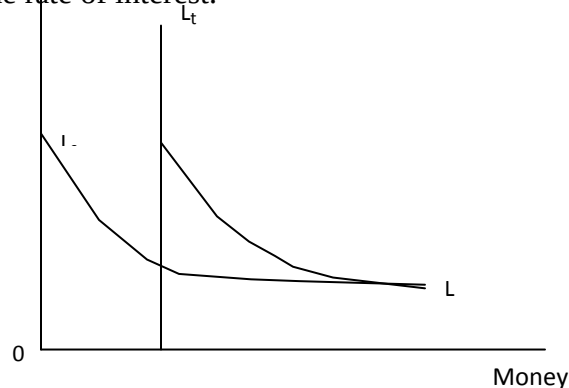
Keynes divides the demand for money into three types:

- a) **The transactions demand**, which is the demand by firms and households for holdings of money to finance day-to-day transactions.
- b) **Precautionary demand**, which arises out of uncertainty and the desire not to be caught short of ready cash.
- c) **The speculative demand**, which is the demand for money as a financial asset and therefore part of a wealth portfolio.

The transactions demand for money arises because individuals receive their incomes weekly or monthly and yet have to pay for money of the goods and services they buy on a day-to-day basis. The amount of money held by an individual to finance these transactions therefore is likely to depend on the size of the individual's money income and on institutional arrangements, such as, how often the individual is paid and how often he or she pays bills and engages in monetary transactions. If we assume that these institutional arrangements remain unchanged, then money is the main determinant. For the economy as a whole, we can expect the total demand for money for transactions purposes to depend directly on money nominal income.

Total demand for money

The total demand for money (or total liquidity preference) is found by adding together the transactions, precautionary and speculative demands. The figure below shows the total demand plotted against the rate of interest.



L_s represents the speculative demand and L_t the transactions and precautionary demands for a given level of income. The horizontal summation of L_s and L_t yields the total demand for money curve L . Note that a rise in income, which would cause L_t to increase, would shift the total demand for money curve to the right. Similarly, a fall in income would shift it to the left.

Effects of a change in the money supply

Note that the major effect of the change in the money supply is on the rate of interest. National income and employment will only be affected if the fall in the rate of interest causes a rise in investment and, possibly, consumption. In the Keynesian model, consumption and investment only respond weakly to changes in the rate of interest – that is to say, they are interest inelastic. This implies the monetary policy is not very powerful as a means of influencing output and employment.

The analysis applies in reverse for a fall in the money supply. This time, firms and households find that their actual money balances are below their desired money balances. They attempt to build them up by selling bonds. In the aggregate however, the community cannot reduce its bond holdings and the attempt to do so only drives down bond prices and, therefore, leads to an increase in interest rates. As the interest rate rises, the speculative demand for money falls and money market equilibrium is eventually restored.

The horizontal part of the total demand for money curve shown in the above figure is sometimes referred to as the LIQUIDITY TRAP, a theoretical possibility pointed out by Keynes in the general theory. The liquidity trap occurs where the demand for money becomes perfectly interest – elastic at some very low interest rate. The argument is that at abnormally low interest rates (at or below Oi_2) virtually everyone would expect the interest rate to rise toward its normal level in the near future. In this situation, then, virtually everyone would be expecting a fall in the price of bonds and, therefore, capital losses for bondholders.

Thus, if the monetary authorities increased the money supply, the whole of the increase would be added to speculative balances and the interest rate would remain unchanged. This is shown in the figure where the increase in the money supply from M^2S to M^3S leaves the

interest rate unchanged at Oi_2 . In this extreme case, the velocity of circulation falls as all increases in the money supply are added to “idle” balances and monetary policy is powerless to derive down interest rates and, therefore, is unable to give any stimulus to investment or consumption.

In retrospect, it might be argued that the significance of the liquidity trap was over-emphasized. The major weakness of the Keynesian theory of the demand for money is that it is couched in terms of a choice simply between money and bonds. More recent work has attempted to allow for the fact that holders of money balances may switch into a whole spectrum of assets, such as equities, trade bills and certificates of deposits.

6.2.4. The Modern Quantity Theory

Milton Friedman restated the quantity theory of money in 1956 as a theory of the demand for money, and this “modern quantity theory” has become the basis of views put forward by **monetarists**. In this theory, money is seen as just one of a number of ways in which wealth can be held, along with all kinds of financial assets, consumer durables, property and “human wealth”. According to Friedman, money has a convenience yield in the sense that its holding saves time and effort in carrying out transactions.

Friedman sees the real demand for money (MD/P) as depending on total wealth (W), the expected rates of return on the various forms of wealth r , the ratio of human wealth to non-human wealth (w) and society’s tastes and preferences (T).

Using functional notation, we can write: $\frac{M_D}{P} = f(W, r, w, T)$

Consider each of the independent variables in turn.

- **Total Wealth** – The demand for money will be directly related to total wealth (which is the sum of human and non-human wealth) so long as money is regarded as a “normal good” by wealth holders.

Thus, as total wealth increases, the desire to hold money (one of the components of total wealth) will also increase.

- **Expected rates of return on wealth** – since the rates of return on bonds and equities represent the opportunity cost of holding money, we can expect an inverse relationship between these expected rates of return and the demand for money. Notice that, in addition to the various market rates of interest, the expected rate of inflation should also be taken into account here. The higher is the rate of inflation, the greater is the negative return from holding money and the more attractive interest – bearing assets. Thus, there is also an inverse relationship between the rate of inflation and the real demand for money.
- **The ratio of human wealth to non-human wealth**–Friedman includes this variable because human wealth is so liquid. It cannot be sold (in the absence of slavery) and individuals have only a limited ability to transfer non-human wealth into human wealth (though individuals can, of course, invest in themselves through education or by undertaking training courses).
The higher the w ratio, the greater will be the demand for money in order to compensate for the limited marketability of human wealth.
- **Tastes and preferences** – Friedman argues that the demand for money also depends on a number of factors, which are likely to influence wealth holders' tastes and preferences for money.

The main problem with this demand for money function is that of finding a method of measuring total wealth. Friedman suggested that permanent income (YP) may provide an acceptable proxy variable. This is a long run measure of income which can be thought of as the present value of the expected flow of income from the stock of human and non-human wealth over a long period of time. It can be estimated as an average of point, present and expected future incomes.

Incorporating this in to the function, and assuming that W and T are constant in the short run, we can write: **$MD=f(Y_p, r)$**

This formulation is not dissimilar in appearance from the Keynesian liquidity preference function, $L=f(Y, I)$. There is however, two crucial differences:

- 1) The Keynesian function includes current national income, whereas Friedman is using permanent income as a proxy for total WEALTH.
- 2) In the Keynesian function (where money is a close substitute for bonds), the demand for money is interest elastic because if the rate of interest earned from holding bonds changes, wealth holders are assumed to react only by changing their money holdings, but in Friedman's function (where money is a substitute for all assets, both financial and real), the demand for money is believed to exhibit low interest, elasticity.

6.3. The supply of money



Dear distance learner, what do you know about the components of money supply?

The supply of money consists of currency – paper money and coins in the hands of the nonbank public plus demand deposits – checking account balances in commercial banks. The supply of money is a stock at a particular point of time – or the supply of money at any moment is the total amount of money in the economy.

Friedman defines money supply in broader sense: money supply at any moment of time is the number of dollars people are carrying around in their pockets, the number of dollars they have to their credit at banks or dollars they have to their credit at banks in the form of demand deposits, and also commercial bank time deposits.”

Time deposits are fixed rate of interest varying with the time period for which the amount is deposited. Thus this definition includes the narrower definition of Keynes (M_1) plus time deposits of commercial banks in the supply of money. This definition is characterized as M_2 or M_3 .fvg

Another broadest definition adds deposits of savings banks building societies, loan associations, and deposits of other credit and financial institutions on Friedman's definition.

6.3.1. Determinants of money supply

Concerning the determination of money supply one theory suggests that money supply is determined exogenously by the central bank, while another theory states that it is determined endogenous by changes in the economic activity which affects people's desire to hold currency relative to deposits, the rate of interest, etc.

Thus the determinants of money supply are both exogenous and endogenous which can be described broadly as: the minimum cash reserve ratio, the level of bank reserves and the desire of the people to hold cash relative to deposits.

- 1) **The required reserve ratio:-**The required reserve ratio is an important determinant of the money supply. An increase in the required reserve ratio reduces the supply of money with commercial banks and a decrease in required reserve ratio increases the money supply. The required reserve ratio is the ratio of cash to current and time deposit liabilities which is determined by law. Every commercial bank is required to keep a certain percentage of these liabilities in the form of deposits with the central bank of the country.
- 2) **The level of bank reserves:-**The other determinant of the money supply is the level of bank reserves. A commercial bank reserve consists of reserves on deposits with the central bank and currency in their tills or vaults. It is the central bank of the country that influences the reserves of commercial banks in order to determine the supply of money. Required reserves are determined by the required reserve ratio, the higher the required reserves to be kept by a bank, and vice versa. But it is the difference between total reserves and required reserves (excess reserves) that is important to determine money supply.

3) **Public's desire to hold currency and deposits**

If people are in the habit of keeping less in cash and more in deposits with the commercial banks, the money supply will be large. This is because banks can create more money with larger deposits. On the contrary, if people do not have banking habits and prefers to keep their money holdings in cash, credit creation by banks will be less. It is generally believed that the supply of money is created, regulated and controlled by monetary authority of the

country, But is not correct. The players of the game determine money supply, in any country, includes:-The central bank, the commercial banks, the government and , the public.

The recent trend is, to include financial intermediaries, other than commercial banks, as a source of supply of money. Changes in money supply, therefore, are brought about by transactions of these entire payers-treasuries, and the central bank creating the legal tender money or currency and other financial intermediaries creating demand deposits.

Legal tender money, comprising paper notes and coins, is the most important constituent of the total money supply. This is known as **common money**. The monetary authority has a complete control over the supply of legal tender money. The monetary authority according to the requirements of business and trade issues paper money. The expansion or contraction of paper money i.e. the financial needs of the government, business community, households and general business outlook.

In advanced industrialized economics, owing to the developed banking habits, the major proportion of the total supply of money in the form of **deposit money**, i.e., demand deposits in banks. Demand deposits can be either primary or derived. Demand deposits created out of cash deposited by individuals in their bank through the advance of loans, investment etc are derived deposits. An increase in the demand deposits does not increase in the supply of money because the cash available with the people is merely transferred to the bank in the form of deposits. The primary deposits can certainly form the basis for expansion of credit by banks i.e., for the creation of derived deposits. In this way, the derived deposits certainly lead to increase in the money supply.

To conclude, we can say, that money supply in an economy is determined by three factors.

- i. Size of monetary base
- ii. People's choice to hold cash of demand deposit in bank, and
- iii. The ratio between bank reserves and deposits

I. Size of Monetary Base

The monetary base is comprised of monetary gold stock, other types of money issued by the government and the amount of central bank credit outstanding. The relative importance of

these in bringing about variations in the monetary base differs from one monetary system to the other. In the gold standard the gold stock, for example, was the most important determinate of the size of monetary base. Under managed currency standard, the size of monetary base depends largely on other types of government money and central bank credit. The monetary base (B) is generally considered as the high powered money (H) which is the total of quantity of paper currency and coins in the hands of people (C) + the actual bank reserves (R) thus,

$$B = C + R$$

II. People's choice to hold cash or demand deposits in the bank

The relative amount of cash and deposits that people wish to hold is another determinant of money supply in the economy. If people want to hold the larger proportion of their wealth in the form of deposits then larger proportions of the monetary base will be passed to the banks and they will create more deposits by giving loans and advances. Thus, the total money supply would increase. However, people's choice for holding larger cash or larger deposits will depend up on the stage of development of the banking system in the country, banking habits among people and the degree of monetization of the economy.

III. The ratio between bank reserve and deposits

The higher the ratio of reserve and deposits the smaller would be the amount of demand deposits to be supported by a given quantity of reserve.

Earlier we mentioned about the ordinary money and high-powered money. Let us explain in little more detail ordinary money. (M) is the sum of total currency and coins (C) held by the community and demand deposit banks (DD) therefore,

$$M = C + DD$$

High-powered money (H) is the money produced by government (central bank) and held by community and banks. It is, therefore, the total of (1) currency held by the community (C), and (2) cash reserves of the banks, which are two types, viz. required reserve (RR) and excess reserve (ER). Thus,

$$H = C + RR + ER$$

An understanding of the difference between M and H is vital importance for understanding the theory of money supply. DD are money like currency. These are created by banks. For

creating these deposits, the banks have to maintain reserves, which are a portion of H, and provide H.

$$M = C + DD, H = C + RR + ER \quad M/H = C + D/C + RR + ER$$

We have seen that C is common for both M and H, the only difference being that whereas demand deposits are a component of M, reserves are component of H. since DD are a certain multiplier of H; money multiplier ratio is the ratio of M to H. the relationship between H and M can be explained symbolically:- $M/H = C + D/C + RR + ER$

Banks demand for reserves depends largely upon the volume of their deposits. It is affected by the same factors, which affect the demand for currency. If in the above equation, we divided each denominator and numerator by D then

$$M/H = [C/D + DD]/ [C/D + RR/D + ER/D]$$

Since the demand for reserves and demand for currency, both affected to a very great extent by the same factor, V12. The level of income and the rate of interest, besides other factors, it can be safely assumed that the two demands are highly-co-related. The demand for H can thus, be expressed as a function of D and two behavior ratio and namely ratio of demand for currency to deposits ($C/D = Cr$) and ratio of reserves to deposits of banks ($R/D = RRR + Err$) substituting Cr for C/D , Rr for RR/D , Err for ER/D , the above equation can be as follows.

$$M/H = [Cr + 1]/ [Cr + RRR + Err]$$

Because of the above equation, we can now express M and H as follows:

$$M = \{[Cr + 1]/ [Cr + RRR + Err]\} \times H = H = [Cr + RRR + Err] / [Cr + 1] \times M$$

It is therefore clear that H, Cr , RRR and Err determine the money supply. If the volume of Cr , RRR and Err were now, the volume of money supply would be high and if it is high then the volume of M. so, the volume of money multiplier (M) can be derived at

$$M = [Cr + 1]/ [Cr + RRR + Err]$$

6.3.2. Effects of a change in the money supply

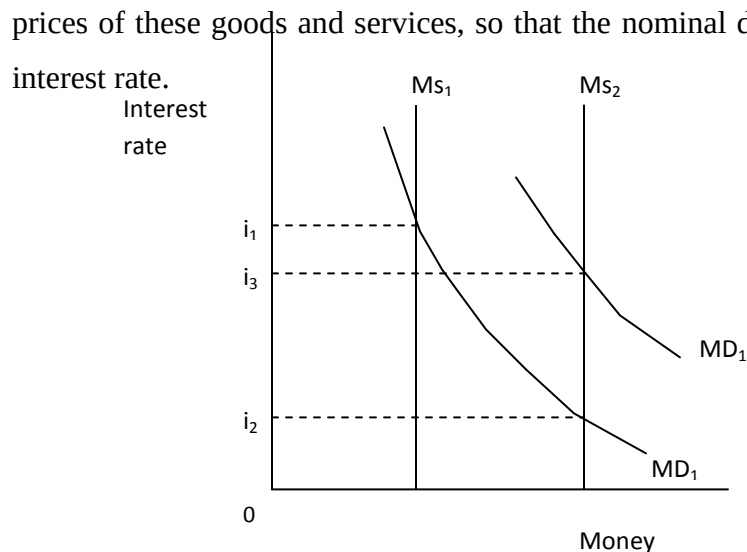
Dear learners now suppose that the central bank increases the money supply for example, by purchasing government securities on the open market. Assuming that the money market is in equilibrium initially, the policy will raise the supply of money above the demand for money, and wealthy holders will find themselves holding more money than they desire in their portfolios. They will attempt to adjust their portfolios by spending their excess money balances on a wide range of assets, financial and real.

This brings us to the key difference between the Keynesian and monetarists models.

In the Keynesian model, wealth holders attempt to spend their excess money balances on bonds, thereby forcing down interest rates.

In the monetarist case, wealth holders attempt to spend their excess money balances on all types of assets, including physical goods.

Thus, there is an effect on interest rates downwards (as in the Keynesian model), but also a direct effect upwards on the output or prices of goods and services. This is illustrated in the following diagram where the increase in the money supply is shown by the shift from MS_1 to MS_2 . If the demand for money curve remained unchanged, the interest rate would fall to Oi_2 . The increased demand for goods and services, however, leads to an increase in the output or prices of these goods and services, so that the nominal demand for money increase at every



The demand for money curve shifts from MD to MD_1 and the interest rate Oi_3 and a higher level of money national income result.

Notice that in the diagram above, the demand for money curves are drawn fairly steeply. This reflects the monetarists' view that the demand for money is interest -inelastic

6.3.3. Transmission mechanisms

The term transmission mechanism refers to the channels through which the effects of changes in one economic variable are transmitted to other variables. In this section, we are concerned with the channels through which the effects of an increase in the money supply are transmitted to real expenditure. Keynesian and monetarist transmission mechanisms are summarized in the following figure.

The transmission mechanism:-For an open economy, it is important to mention a further possible indirect effect of a change in the money supply on spending. In an open economy, an increase in the money supply which depresses the rate of interest will lead to an outflow of the effect of this on the domestic economy will depend on whether the country operates a fixed or flexible exchange rate regime.

With a completely fixed exchange rate, the outflow of short-term capital will cause the domestic money supply to fall (unless the central bank offsets this effect with a further expansionary monetary policy). Assuming no central bank intervention, the initial increase in the money supply will then be completely reversed and there will be no overall effect on the economy. We can say that fixed exchange rates insulate the domestic economy from the effects of domestic monetary changes.

With a flexible exchange rate, the outflow of short-term capital will lead to a depreciation of the domestic currency, which in turn, will cause a rise in the demand for the country's exports and fall in the demand for imports. This extra spending will add to any increase in investment or consumption induced by the lower domestic interest rate. Thus, with a flexible exchange rate, there are two main channels through which an increase in the money supply can be transmitted to spending.

a) Through the effect of the fall in the interest rate on investment and consumption and

b) Through the effect of the fall in the exchange rate on the demand for exports and import-substitutes.

6.3.4. The monetarist transmission mechanism

In the monetarist model, an increase in the money supply has both direct and indirect effects on spending as indicated in the diagram. Wealth holders can hold their wealth in a number of different forms, including money. To monetarists, an increase in money supply will mean that wealth holders (including both firms and households) will be holding excess money balances which they will attempt to spend. Some of this spending will be on goods and services, such as machinery, houses, personal computers and holdings. This, then, represents the direct effect on spending of the increase in the money supply, also known as the direct transmission mechanism. However, as noted above, the increase in the money supply will also tend to depress interest rates and so, additionally, will have indirect effects on spending, and referred to as the indirect transmission mechanism. These are essentially the same as the effects desirable under the Keynesian transmission mechanism, except that they are likely to be stronger because monetarists regard investment and consumption as being more interest-elastic. In particular monetarists believe the demand for consumer durables to be sensitive to interest rate changes.

With regard to an open economy, monetarists agree that the adoption of a completely fixed exchange rate will tend to nullify the effects of a change in the money supply, while a flexible exchange rate will help to reinforce the effectiveness of a monetary change. There is a further very important difference between Keynesians model, a fixed price level is assumed so that changes in spending affect output and employment, rather than prices. In the extreme monetarist model, the price level can vary and there is a “natural rate of unemployment” to which the economy always tends in the long run. This means that changes in spending only affect output and unemployment in the short-run: in the long-run, only the price level is affected.

Summary

Both the Fisher and Cambridge versions of the quantity theory of money state that an increase in the money supply will lead directly to an increase in spending and with full employment, the general price level will be proportional to the quantity of money in circulation.

Keynes divided the demand for money into three types: the transactions, precautionary and speculative demand for money. Transactions demand is the demand by firms and households for money to finance day-to-day transactions. Precautionary demand arises out of the need to provide for unexpected and unplanned expenditures. Speculative demand is a demand for money as part of a wealth portfolio.

The transactions and precautionary demands for money are assumed to be positively related to money national income. The speculative demand for money is assumed to be inversely related to the rate of interest. In the Keynesian liquidity-preference theory, interaction of the demand for and supply of money determines the equilibrium rate of interest.

In the modern quantity theory, it is emphasized that money is just one of a number of ways in which wealth can be held. The real demand for money is assumed to depend on a number of factors, including total wealth and the expected rates of return on the various forms of wealth.

By setting “reserved requirements”, the central bank, in turn, helps determine a money multiplier – a number larger than 1, that indicates how many dollars of money supply can exist for every \$1 of monetary base.

By manipulating the monetary base, the central bank can increase or decrease the money supply through the process called transmission mechanism, through which changes in the money supply translate themselves into changes in the nominal GDP

CHECK LIST

Dear Distance Learner! Below are important checklists that help you how much you have grasped the main points of the section. Please, check “**YES**” or “**NO**” in the given boxes for each question so that you will be able to check your progress.

No	Question	Yes	NO
1	Do you fully understand what money demand is all about?	☐	☐
6.	Are you able to understand theories of money demand?	☐	☐
7.	Are you able to know factors affecting money supply?	☐	☐

SELF-EVALUATION TEST

1. Considering that both Fisher and the Classical Cambridge economists ended with the same equation for the demand for money, $M_d = KPY$, their theories are equivalent. Is this statement true, false, or uncertain? Explain your answer.

2. What determines Velocity of money? And what is the importance of the V ?

3. Discuss Friedman's theory of the Demand for money? Compare it with the Classicals and Keynesians.

3. Keynes Concluded that the Money demand is related not only to Y (output) but also to r (interest rate) is a major departure from Fisher's view of money demand. Discuss what Keynes intended to explain.

4 What factors determine the money supply?

5 The money multiplier is necessarily greater than 1. Do you agree or disagree?

References

- N.Gregory Mankiw, 2007, Macroeconomics 4th edition
- William H. Branson, 2006 Macroeconomic Theory and Policy

:-ANSWER TO SELF-EVALUATION TEST

CHAPTER TWO:-MULTIPLE CHOICE

- | | |
|------|------|
| 1. D | 5. E |
| 2. C | 6. E |
| 3. A | 7. A |
| 4. A | |

CHAPTER THREE:-MULTIPLE CHOICE

1. D

2. D

CHAPTER FOUR

Part I:-True/False:

1. True

2. False

Part II: - Multiple choice: -

1. C

2. D

CHAPTER FIVE

Part One:-Multiple choice

1. C

2. D

3. B

4. B.

Part Two:-True/false

1. False
2. True
3. True
4. True

REFERENCES

- Edward Shapiro (1999), Macroeconomic Analysis, Galgotia Publications Ltd, New Delhi.
- Gupta R.D. and Rana A.S. (1993) Keynes Post-Keynesian Economics, Kalijanti Publishers, New Delhi.
- Rudger Dornbusch and Stanley Fischer (1994), Macroeconomics, McGraw Hill, USA.
- Gregory Mankiw (2000) Macroeconomics, McGraw Hill, U.S.A.

