PREFACE

In the curricular structure introduced by this University for students of Post-Graduate degree programme, the opportunity to pursue Post-Graduate course in Subjects introduced by this University is equally available to all learners. Instead of being guided by any presumption about ability level, it would perhaps stand to reason if receptivity of a learner is judged in the course of the learning process. That would be entirely in keeping with the objectives of open education which does not believe in artificial differentiation.

Keeping this in view, study materials of the Post-Graduate level in different subjects are being prepared on the basis of a well laid-out syllabus. The course structure combines the best elements in the approved syllabi of Central and State Universities in respective subjects. It has been so designed as to be upgradable with the addition of new information as well as results of fresh thinking and analysis.

The accepted methodology of distance education has been followed in the preparation of these study materials. Co-operation in every form of experienced scholars is indispensable for a work of this kind. We, therefore, owe an enormous debt of gratitude to everyone whose tireless efforts went into the writing, editing and devising of proper lay-out of the meterials. Practically speaking, their role amounts to an involvement in invisible teaching. For, whoever makes use of these study materials would virtually derive the benefit of learning under their collective care without each being seen by the other.

The more a learner would seriously pursue these study materials the easier it will be for him or her to reach out to larger horizons of a subject. Care has also been taken to make the language lucid and presentation attractive so that they may be rated as quality self-learning materials. If anything remains still obscure or difficult to follow, arrangements are there to come to terms with them through the counselling sessions regularly available at the network of study centres set up by the University.

Needless to add, a great deal of these efforts is still experimental–in fact, pioneering in certain areas, Naturally, there is every possibility of some lapse or deficiency here and there. However, these do admit of rectification and further improvement in due course. On the whole, therefore, these study materials are expected to evoke wider appreciation the more they receive serious attention of all concerned.

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Post Graduate Degree Programme
Master of Business Administration (MBA)
Course Code : CP-202
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Master of Business
Administration
(MBA)

Course : Macroeconomics
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Module-1

Module-2

Unit-1 ❑ What is a Macroeconomics

Structure

1.0 Objective

This unit will help you to understand

- The relationship between Economics and Macroeconomics
- The basic macroeconomic problems of an economy
- How their solution determines economic social welfare
- How the basic macroeconomic problems are solved in different types of economy

1.1. Introduction

Macroeconomics and Microecamics are the two borad disciplines of econamics. They are divided on the basis of the nature of questions that they deal with Microeconomics deals with the economic problems faced by individuals as consumers and producers. It

also deals with the determination of prices of different goods and services under different market sitnations. Macroeconomics, on the other band, is concerned with the aggregative problems that the econamy as a whole faces. Thus, the problems of unemployment in the economy, inflation, poverty, economic growth and soon, are essentially macroeconomic problems. Though each individual may have to face and solve the problems of unemployment, poverty, of rising prices and so on, in his own way, these individual problems are symptoms of the aggregate problems prevailing in the economy. The solutions of these aggregate problems are beyond the-reach of individual effort and have to be sought at the appropriate aggregate level.

1.2 The Nature of Basic Economic Problems of a Society

In the world of to-day we can make a distinction between there types of economies, namely_, free enterprise economy, socialistic economy and mixed economics. In earlier days there were other types of economys like slave economy and fendal economy and so on. But whatever may be the nature of an economy, every economy must face and solve three fundamental macroeconomic problems, namely :

1. What goods shall be produced and in what quantities ?
2. How shall goods be produced ? and
3. For whom shall goods be produced ?

The first problem highlights the fact that the needs of the people in different economics differ depending on the size of the population and the nature of geographic and culture conditions prevailing there and other economic & non-economic factors. The nature and amount of the goods to be produced must somehow or other cater to these needs.

But the resoureces available to the economy to produce different goods are limited. The problem of how to produce different goods has to be solved with reference not only to this problem of resource scarcity, but also to the skill and education of the people and the technology prevailing in the economy. Thus, the second problem is essentially a problem of economic and technical management which has to be adjusted with the historical antecedents of their solution.

All the three problems inentioned above are solved more or less simultonconsly and continuously. Yet they can be conceptnally distingnished from are another. Thus, when the first two problems are solved the economy will have produced at the end of the gestation lag different amounts of different commoclities. Then the economy will face the third problem, which is essentially a problem of distribution. What should be the principle of distributing these different goods among the people ? Will they be distributed according to the needs of the people ? Or, will they be distributed accarding to people's participation in the procestes of production ? But the children, the sick, the old may not have taken part in the processes of production. How will they be provided for ? The economy has to solve all these problems in its on way. And depending upon how these three basic macroeconomic problems are solved, the welfare of the people living in the society constituting the economy, is determined.

1.3 The Social Welfare Function

The social welfare function is a functional relationship indicating how social welfare is determined. In the above discussion we have pointed out that social welfare depends on how the three fundamental problems of the economy are solved. Though social welfare has its political and social aspects, in the economic literature the social welfare function tokes into account only the economic aspects of social welfare. Thus, the contitute the social welfacre function, let us vote that we can designate the first problem mentioned above as one of output-decision, or simply one of output (O). The second problem is a problem of cost (C), for the persons chosen, chosen the availability of resonrces and the existing technology determine the amount of cost involved to produce the economy's output. The third problem, as we have already pointed out, is a problem of distribution (D). If W refers to the (economic) welfare in the society, we can write the social welfare function as

$$W = f(O, C, D) \qquad \text{..... (1.1)}$$

The cost component C of the social welfare function involves utilisation of the society's resonsnces, which are again, in the aggregate, used to produce the economy's output. Moreover, production loads to generation of pollution, and wwear and tear of the economy's machinery. Thus, we can subtract C from O and get the economy's vet output

(*NO*). Hence, the social welfare function (*W*) can be rewritten as

$$W = F\ (NO,\ D) \qquad \text{..... (1.2)}$$

the social welfare function (1.2) indicate that if the net output of the economy increases, the state of distribution remaining the same, then the welfare in the society improves, and vice versa. If, an the other hard, the state of distribution of the social product improves without any change in net output, then also social welfare improves, and vice versa. But, if net output increases and the state of distribution deteriorates, it would be difficult to say a priori whether welfare in the society has improved or not.

1.4 Solution of the Basic Economic Problems

Today every country has its own economy. But, as we have already pointed out from the functional point of view we can distinguish between only three types of economics, namely, free enterprise economies, socialistic economies and mixed economies. Different types of economies solve the three fundamental problems of the economy in different ways. The free-enterprise economies solve these fundamental problems by the "invisible hand" of the price or market system. The free-enterprise system is based on the philosophy of laisser faire—a doctrime opposing goverment interference in economic affairs bayond the minimum necessary for the maintenance of peace and property rights. Without the interference of the government, demand and supply conditions in the market determine what goods will be produced and in what quantities. Only those goods will be produced for which there is effective demand, that is, demand backed by money or purchasing power. Effective demand follows the law of demand, whicli states that, other things remaining the same, if the price of a commodity falls, then the demand for that commodity rises, and vice versa. The law of demand in depicted in the market demand curve.

Thus, in Fig. 1.1 the curve D Dx is the demand curve of X, showing the law of demand.

Producers, on the other hand, are guided by profits. They way experiment with new goods and bring then into the market; but if these goods fail to gencuate desired amounts of demand, the produces would suffer loss and withdraw such goods from the worket. Since the cost per unit usually increases with increasing amounts of production, producers

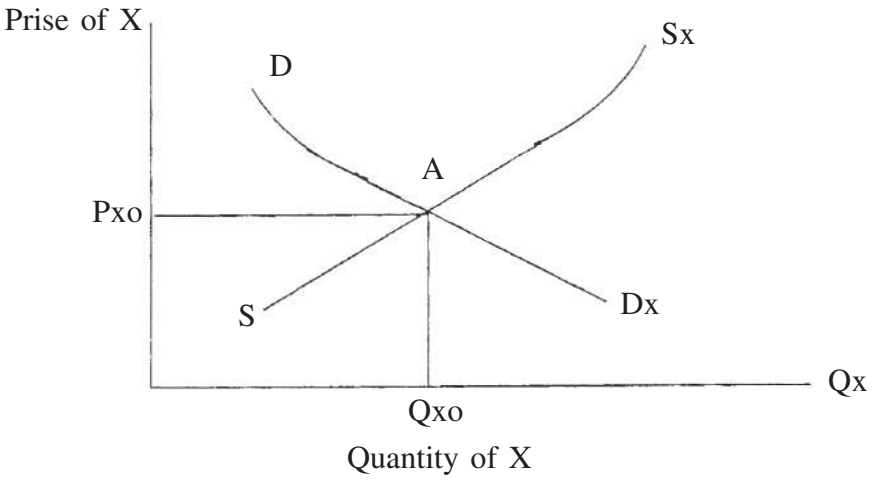

***Fig.** l.l*

being higher and higher amounts of a product if its price rises. Thus, the law of supply states that, other things remaining the same if the price of a commodity rises, its supply rises, and vice versa. The law of supply is depicted in the worket supply curve. Thus, in Fig. 1.1 S Sx is the supply curve of commodity X, solving the law of supply. S Sx curve interseets the market demand curve D Dx at point A to determine not only the equilibrim price of the commodity X, Pxo, but also the equilibrim amount of the commodity, Qxo. The combination, Pxo and Qxo, constitutes the market equilibrium for commodity X in the sense that at Pxo the amount of the commodity X, Qxo, is the same as the amount of the commodity supplied in the market, also Qxo. In this way, a free enterprise economy solves the first fundamanetal problem of the economy by determing the amounts of different commodities to be peroduced in the economy. The prices of different commodi-ties· act as a signal to both producers and consumers to adjust their supply's and demand accordingly.

In a free-enterprise system, the decision regarding the second problem is also mode up in the markets when the producers themselves decide on the technique to produce different commodities. Since producers are guided by profity, they would choose that method of production which is most efficient ensuring a maximum amount of profit under the given conditions. The most efficient and maximum profit positions way not coincide with the least-cost methods of production. But they involve efficient utilization of the resources in can formity with price enpectations.

Similarly, the third fundamental problem of the economy, which is the problem of distributing the social product among the individuals in the society, is also solved by the "invisible hand" in the market. The shore of each person of the social product is determined by the his income and the income of a person is determined by the price of the services that the person can render in the process of production. The prices of the services of the factors of production including the price of the services of labour, the wage rate, are determined, like the prices of any. other commodity, by the demand for and the supply of such factors of production. In a free-enterprise system a person can earn not only by rendering the services of his own labour, but also by owning other factors of production like land, capital and ravagement. These other factors of production earn rent, interests and profits. A person's share of the social product depends upon the amounts of wages, rent, interest or profit that he can earn in the society.

It is true that the character of the resulting distribution of income may not be very fair, for it is highly dependent upon the initial distribution of property ownership, on acquired on inherited abilities and educational opportunities, and on the presence or absence of social and sex disorientation. But, this is how a free-enterprise system operates, baring ample scope for government intervention into the economy.

In a socialistic economy with public ownership of the means of production, centralized control of the rate of accumulation and price-fixing criteria for all goods sold by the state, the solution of the three fundamental problems of the economy becomes the concern of the centralized planing and administrative authorities. With the elimination of competition among different enterprises, and abiding by the dictates from the centre, they envisage all productive institutions as subdivisions of as if were, one vast people's workshop and decide on what products are to be produced and the amount of their output. Once these decisions are taken necessary, orders are sent to different states, enterprises and collective forms. This is how a socialistic economs solves the first fundamental problems of the economy.

A long with the orders to produce specified amounts of different commodities, the centre also sends instructions regarding the technique to be followed to produce them. In preparing these production targets and the techniques to be adopted in producing them, the centre takes into account the special historical and objective conditions of different

states and techniques. The states and the collective forms may fail to produce as they are directed. The causes of their failure will influence the next round of orders. But in any case, the first two fundamental problems are solved principally by dictates from the centre.

In a free-enterprise system all the three problems of the economy are solved more an less simultaneously. Thus, the problem of distribution of the social product in not an independent one. But in a socialistic economy, the distribution of the social product is an independent problem and, theoretically, has little connection with the problem of production. In a socialistic economy, production is not meant to be sold in the market, but in meant for use, the outputs are stored in communal workhouses and are subsequently delivered to persons according to same principles decided upon by the central authorities, the ultimate aim being to supply the goods and services according to the needs of the people.

In this way, all the three fundamental problems of the economy are solved in a socialistic system practically outside the markets without the help of many.

The mixed-economy system combines elements of both the free-enterprice economy and the socialistic economy. It does so by clearly demarcating the public sector from the private sector. Though there may be some overlapping of these two sectors, the principle of operation of different enterprises in the two sectors one sought to be kept quite distinct from one another. The enterprises in the public sector are intended to follow the socialist principles of production and distribution by ignoring markets with an eye to catering to the needs of the people and different industries. The private sector enterprises, on the other hand, follow the principles of the market system with an eye to profits.

The mixed-economy approach has developed out of the recognition that both the free-enterprise system and the socialistic system have their merits and demerits. Thus, while it is maintained that productive efficiency is better attained in a market system, distributive justice is better achieved under socialism. Today most economies are mixed economies. Some of then have been able to combine the merits of both the systems in a considerable way. But tune are mined economies, which while trying to combine the better elements of both the systems have ended up with incorporating the demerits of both the systems.

1.5 The Principle to be followed

In the following pages we will follow the macroeconomic ideas as they have developed within the institutional, political and legal framework of decentralized private ownership economies. Such economic ideas are guided by the free-enterprise philosophy and are called ‘‘mainstream’’ economic thinking as distinguished from socialistic thinking.

Main stream economics tries to develop economic ideas in a ‘‘value-free’’ way. In spite of that, the norms and values prevailing in the society implicitly creep into the ideas developed. Yet the concepts and techniques used here have relevance in economies where the role of the state and the institutional frame-work are different. This is so because, as we have pointed out above, the fundamental macroeconomic problems are every where the same. It is true that the nature of these fundamental problems are socially determined, so that no only the goods to be produced are culturally and historically determined, but the way of producing the goods and the system of distributing the outputs among individuals in the society are also determinded by the systems of values and customs prevailing in the society. Yet, three facts of economic life appear in all types of society. The first is the relative scarcity of resources : however abundant in absolute terms way be the resources possessed by a society, the individuals in the society want to consume more goods and services than can be produced from those resources. This problem of scarcity is basic to all the three fundamental problems of an economy. Second, there are gives from specialization : the output of goods and services will be greater if individuals-specialise in different aspects of the production process and each does not attempt to produce all the commodities they consume. Though socialism is sometimes viewed as doing away with the boredom of specialization, it cannot ignore the boredom of specialization, it cannot ignore the gains that can be reaped out of specialization Moreover, information in every society is decen-tralized: no single individual initially knows all the economically relevant information. Since these facts are emphasized by mainstream economics, it has relevance beyond its applications to decentralized private ownership economies. The concepts and techniques developed by mainstream economics can be used to examine the functioning of economies with a wider role of the state and with using different institutional frameworks.

1.6 From Basic Economic Problems to Macroeconomic Issues

With the understanding of what, how and for whom to produce by an economic organisation of a society, some aggregative issues concerned with the over all performance of the economy require to. be addressed to. the three central issues, core of Macroeconomics are

1. What determine aggregative or macrolevel of output and employment of an economy? Why do output and employment fluctuate and some times fall and fall persistently for a longtime with an agonising problem of prolonged unemployment in the economy

2. What are sources of price inflation and how can it be controlled'? Inflation has some allocative, distributive and growth effects, desirable or undesirable. How it can be controlled to a disired level.

3. How rate of economic growth of a nation indicated by rate of growth of its output is determined and how to increase it!

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Unit-2 ❑ The Concept of National Income

Structure

2.0 Objective

This unit will help you to understand

- Why is the concept of national income so important?
- The three different approaches to the measurement of national in-come.
- How is national income actually calculated?
- How is it related to saving, investment, government expenditure, and so on?

2.1 Introduction : The concept of National Income and other related concept

We have seen in unit 1 that the state of welfare in a society depends upon the economy's net output, on the one hand, and- the state of distribution prevailing in the economy, on the other. In particular, social welfare in an economy improves if the economy's net output increases, the state of distribution remaining the same. Thus, if we want to know

whether welfare in a particular economy has improved or not over specified period, when it is known that the state of distribution in the economy has not changed, we need to be Cera! whether net output has increased or not over the same period. But it is not easy to make an assessment of change of output, for not only different outputs are measured in different units, but some new outputs may have appeared while some old outputs may have disappeared from the economy as well. Under such conditions it is impossible to add up differed types of output and arrive at an aggregate measure of output and changes in aggregate output. The problem Can be averted if money values of outputs are used, for then it would be possible to add up all different types of output. Here at the outset it is necessary to precisely define and explain the concept of national income and the related concepts.

In an economy basic economic process can be viewed in this way.

A set of persons owning four factors of production, land, labour, capital and organisation or enterpreneurship use them to produce output i.e. goods & services that is sold in the market and proceeds are appropriated in terms of return for labour i.e. wage returns for land i.e. rent, that for capital i.e. interest, the resudual or for enterpreneurship or supplier of organisational input i.e. profit. These incomes again are utilised for purchase of these goods i.e, as expendture. Thus we have $PQ = W + R + I_t + P_r = C + 1 + G + X_n$. Again the persons owning land, labour, capital, organisation may be citizens of the nation sate and part of it may be utilised domestically or part may be abroad. Similarly for the foreign citizens.

In the above equation PQ = Market value of output, $W + R + I_t$ + Pr [wage(w), rent(r) interest (I,) profit (Pr).] = factor income or factor cost; C + I + G + Xn are different types of expenditure—Private consumption (C), Private investment (I), government expenditure (G) and net [export (X) – import (M)] foreigners expenditure to purchase net domestic goods. Thus these are three approacnes to same thing national product, national income, national expenditure when they relates to the person, members of the nation and Domestic product, domestic income, Domestic expenditure when they relate to what happen with in the land of the nation.

The concepts have other demensions. These variables are flow so they must refer to a time demension i.e. flow per unit of time say current year. They have value dimensions for valuing and aggregating these are market prices that include indirect taxes. They have

some ‘originality’ and final deminsions thus organial or basic inputs, land, labour, capital, organisations are considered , and only final goods and services are accounted without considering intermedite goods and services to produce final goods and services. These are the values :1.dded by undependent producing units, this gives a different accounting procedure f sum of value added by national producing units as national produes.

With these basic ideas we proceed to elaborate the different approaches :o the measurent of national income and discuss the related different concepts.

2.2 Different Approaches to the Measurement of National Income

The national income in an economy is measured over a year, usually the inancial year. National income is the pulse of on economy and is a summary neasure of the aggregate performance of the economy. The concept of national income can be approached from three different points of view. In the first place, we have already mentioned, national income is the money value of national output produced during a given year. This is called the output approach to the neasurement of national income. Secondly, national income is the sum of all incomes earned by. all income-earning units during a year. This is called the income approach and is measured as the sum of all factor incomes (wages, interget, rents and accrming profits). The third approach is called the expenditure approach, for one person’s income is another persons expenditure and no income can be earned if an equivalent amount of expenditure is not mode. Thus, the total amount of national expenditure made during a year is the same as the total amount of income earned, which is national income. We will now discuss these three approaches in some greater detail.

The output Method

National income accounting takes into consideration only currently pro duced goods and services and includes transactions in existing commodities like existing houses, though the value of Realtors’ fees in the sale of existing horses are taken account of Secondly, the output consider only the production of final goods and services, and excludes intermediate goods which are used in the production of final commodities to avoid double counting. To ensure this production is defined as addition of value. Production is made by firms and the value added by a firm is the difference between the value of its outp mains the value of its inputs. The sum of the total value added by all firm within the economy during a year is equal to the value of the total output of the economy, which

is national income.

Finally, the money value of output is measured at market prices. It exclude the valuation of goods and services. which are not marketed. Thus, the value of housewives' services and self-made haircuts are excluded from the calculation of national income. Moreover, since only legal markets are considered, the valuation of the activities of the underground economy, like gambling and the drug trade, are also excluded from national income accounting.

If Y stands for national income, O for national output and P for price level, then by the output method we have

$$Y = P.O \qquad \text{.... (2.1)}$$

where the identity sign (≡) stands for the definitional equality of the two side.

If there are n producing units (firms) within the economy, (2.1) can also be written as

$$Y \equiv \sum_{i=1}^{n} Pi \quad Oi \qquad \text{....(2.1a)}$$

The Income Method

National income is the sum of all factor earnings from current production of goods and services. Factor earnings are incomes of factors of production : land, labour, capital and organization. All these incomes. are calculated over 1 year. Labour income over the whole year is called the wage bi 11 (W) which includes the incomes of all sataried persons. All incomes earned from the services of land is rent income (R). All interest incomes over the year constitute interest income *(I).* Entrepreneurs' total profit over the whole year is profit income *(Pr).* Adding all these incomes over the year we get national income (Y) as identically given by

$$Y = W + R + I_t + P_r \qquad \text{.....(2.2)}$$

The Expenditure Method

All incomes are generated out of expenditures. Every expenditure creates an equivalent amount of income. A person may spend less than his income in a month. The saving that is made fails to generate expenditure of the same amount during the same period criated by income earning but is equivalent to expenditure by producers as investment

intended or unintended. Thus, if we stick to the same time period, total expenditure during a year is identically equal to total income during the year. Thus, if E stands for total expenditure we have

$$Y \equiv E \qquad \text{..... (2.3)}$$

In a real open economy, total expenditure made in a country can be divided from the macroeconomic point of view, into a number of categories, namely, consumption expenditure (C), investment expenditure (I), government expenditure (G), export (X) and import (M). Thus, (2.3) can be rewritten as

$$Y \equiv E \equiv C + I + G + X - M \qquad \text{..... (2.4)}$$

In relation (2.4) export (X) and import (M) are also expenditures, for exports mean foreigners' expenditure on home-produced goods and services, and imports mean home-expenditure on foreign goods and services. Exports add to home income, since the income receiving end is the home economy, but the expenditure made on imports by the residents at home accrues as income to foreigners and is, as such, a leakage from the home income stream. Therefore, while exports are introduced with a plus sign, imports are included with a minus sign in (2.4). Sometimes, the relation (2.4) is written as

$$Y = C + I + G + NX \qquad \text{.....(2.4a)}$$

where NX is net export given by (X – M).

2.3 Elements of National Income Accounting

National income accounting as practised in many countries involves utilizations of all the three approaches mentioned above, and it also used certain technical terms which have now becomes quite common place. Thus, national income accounting introduces two concepts which are, more or less, the some, namely, gross domestic product (*GDP*) and gross national product (*GNP*). *GDP* is a measure of all currently and domestically produced goods and services. It includes earnings from current production within the country that may accrue to foreign residents or foreign-owned firms. On the other hard, gross national product (*GNP*) is defined as the value of all final goods and services produced by domestically owned factors of production within a given period. Thus, *GNP* includes earnings of· domestic corporations overseas and domestic residents marking overseas, which *GDP* does not.

It would be worthwhile to look into the relationship between *GDP* and *GNP*. To get *GNP* from *GDP* we need to add foreign earnings of domestic residents and firms on the one hand, and to subtract earnings of foreign residents and firms operating within the country on the. other :

GDP + foreign earnings of domestic residents and firms – earnings of foreign residents and firms within the country = *GNP* ..... (2.5)

Since national income is the sum of all factor earnings from current production of goods and services, to arrive at national income from *GNP* we need to subtract two things. The first charge that is not included in national income is depreciation, which is a cost of production representing the wear and tear of the capital stock. By deducting depreciation from *GNP* we get not national product (*NNP*) :

GNP — Depreciation = *NNP* ..... (2.6)

Since factor incomes are paid from the proceeds of the sellers, indirect taxes (sales and excise taxes) and some "other" items are deducted from *NNP* to arrive at national income.

NNP – Indirect taxes and "other"

= National Income ..... (2.7)

i.e. NNP is valued at market price – indirect taxes & others

= NNP at factor cots = National Income.

It should be noted that up to this point national income accounting mostly utilizes the output method, though the earnings of foreigners at home and foreign earnings of domestic residents and firms have been taken into account. After this point national income accounting utilizes the income approach and shows national income as the sum of the factor incomes as shown in relation (*2.2*). In the terminology of national income accounting, the analogous relation is :

National income = compensation of employees + corporate profits + Proprietors' income + Rental income of persons + Net interest ...(2.8)

Before showing *GNP* an national mcome as national expenditure as in relation (2.4), national income accounting shows personal income and personal disposable income. We have pointed out that national income is a measure of income earned from current

production of goods and services. For some purposes, however, it is useful to have a measure of income received by persons regardless of source. This is called personal income and is defined as income received by all persons from all sources. Thus, personal income is given by

> Personal income = National income - (corporate profits tax payments + undistributed profits and valuation adjustment + contributions to social security) + (Transfer payments to persons + Personal interest income). ... (2.9)

If we deduct personal tax payments from personal income, we get personal disposable income. Hence personal disposable income = personal income – Personal taxes ...(2.10)

National income accounting also shows personal savings as personal disposable income miniums personal outlays consisting of personal consumption spending, interest paid by consumers and transfers to foreigners. Hence,

> Personal savings = Personal disposable income Personal outlays (consisting of personal consumption spending + Interest paid by consumers + Transfers to foreigners) ....(2.11)

The national income accounting relation analogous to (2.4a) is given by

> GNP = Personal consumption expenditures + gross private domestic investment + government purchases of goods and services + Net exports. ..... (2.12)

2.4 Nominal GNP is Real GNP

In most analytical work the differences between national income, *GNP*, *NNP* and *GDP* are ignored, and GNP and national income are referred to interchangeably as output or income. All these measures are expressed in money terms and are, hence, nominal in nature; they fluctuante with changes in prices of commodities. But the welfare of the people in a community depends on the real output of goods and services, and not on their nominal values. So people often want to know how for a change in *GNP* reflects a change in output. The essential idea involved in the concept of real *GNP*, which is the value of the economy's output measured in the prices of some base year. Real *GNP* com-parisons,

based on the same set of prices, provide a better measure of changes in the economy's real output than nominal *GNP* comparisons. To estimate real *GNP* from nominal *GNP*, economists and statisticians use the concept of "the *GNP* deflator", which is the ratio

Year	(1) Nominal *GDP* (Billions of current Dollars)	(2) Real *GDP* (Billons or 1992 Dollars)	(2) Implicit *GDP* Deflator $\left(\frac{\text{column 1}}{\text{column 2}}\times 100\right)$
1960	526·6	2,261·7	23·3
1970	1,035·6	3,388·2	30·6
1980	2,784·2	4,618·9	60·3
1990	5,743·8	6,138·7	93·6
1992	6,244·4	6,244·4	100·0
1997	8,079·9	7,188·8	112·4

of nominal to real *GNP*. It is a measure of inflation from some base-year prices to current pr-ices. Since the *GNP* deflator is based on a calculation involving all goods produced in the economy, it is more frequently used to measure inflation rather than most other price indices. Thus, with 1990 prices as 100, if the *GNP* deflator for the year 2000 is 120, then there has been a 20% rise in prices over the years from 1990 to 2000. The real *GNP* has to· be calculated accordingly. To fix the ideas involved, we reproduce from Richard T. Fro yen's Macroeconomics the Economic report of the president (U.S.A.), 1998 giving the values of nominal and real *GDP* and implicit GDP deflator for selected years.

Table 2.1 : Nominal *GDP*, Real *GDP*, and implicit *GDP* Deflator, Selected Years.

2.5 Some Important Identities

2.5.1 Closed Economy without Government Spending

The relations (2·4a) and (2·12) refer to real open economies, where there are exports and imparts. But to facilitate understanding of the nature of working of an economy, we first start with a closed economy, where there is neither any export nor any import. We also assume away government spending, taxes and transfer payments. In such an economy

the relations (2·3) and (2·4) reduce to the identity

$$Y \equiv E \equiv C + I \qquad \text{.... (2.13)}$$

where Y is national income, denoting the value of national output $O(Y \equiv P.O.)$. The first part of the identity tells that the income generated from the sole of the total output (Y) is identically equal to the total amount of expenditure made on the output (E). The second part of (2·13) points out to the fact that in a closed economy there can be two types on expenditure, namely, consumption expenditure (C) and investment expenditure (Q). It should, however, be noted that all output produced in the economy may not be sold out during the same period. As a result unsold output would accumulate as inventories on firms' shelves. This inventory accumulation is treated as part of investment (as if firms sold the goods to themselves to add to their inventories).

The identity (2·13) emphasizes how income is generated out of consumption expenditure on the one hand and investment expenditure on the other. How income is disposed of it emphasized by the second identity given by

$$Y \equiv C + B \qquad \text{....(2·14)}$$

where S stands for saving.

The identity (2·14) points out to the fact that though all persons in the economy are consumers, they are not all producers. The sum of all persons' income is national income (Y), and they dispose of their income as consumption expenditure (C) and saving (S), for whatever is· not consumed out of current income is saved.

From the identities (2·13) and (2·14) we get another identity.

$$S \equiv I \qquad \text{.....(2·15)}$$

which points out to the fact that in the simple closed economy, investment expenditure is the same as the value of national output that is not consumed and, hence, is saved. Looking the other way round, what ever is saved is either· saved as inventories or is utilized for purposes other than consumption. Looking at (2·15) in yet another way, it can be stated that part of investment might be undesired inventory accumulation, occurring at as a result of mistakes by producers who expected to sell more than they actually did. Thus, identity (2·15) is a reflection of our definitions of income, consumption, saving and investment.

2.5.2. Reintroducing the Government and Foreign Trade

In a real open economy there is foreign trade and there is the public or government sector. The income identity appropriate for such an economy is the identity (2·4a) which is reproduced here as identity (2·16) :

$$Y \equiv C + I + G + NX \qquad .....(2·16)$$

In the teal economy, there is not only government spending on goods and services, but there are also taxes (*TA*) and transfer incomes (*TR*) received by the private sector. Hence, utilizing the definition (2·10), disposable income (*YD*) can be defined as

$$YD \equiv Y + TR - TA \qquad .....(2·17)$$

From (2·11) we have

$$YD \equiv C + S \qquad .....(2·18)$$

Combining (2·17) and (2·18) we get

$$C + S \equiv YD \equiv Y + TR - TA$$

$$\text{or, } C \equiv YD - S \equiv Y + TR - TA - S$$

Substituting this value of *C* in (2·16) we get

$$Y \equiv (Y + TR - TA - S) + I + G + NX$$

$$\text{or, } S - I \equiv (G + TR - TA) + NX \qquad .....(2·19)$$

The identity (2·19) is a very important are. The first set of terms on the right ·hand side of (2·19), (*G* + *TR* – *TA*), is the government budget deficit, where (*G* + *TR*) shows government spending on goods and services and on- transfer payments, while *TA* is government revenue collected from taxes. The second term on the right hand side of (2·19) is the excess of exports over imparts, or net exports. Thus, identity (2·19) states that the excess of private saving over private investment (*S* – *I*) is equal to the government budget deficit plus the trade surplus. If (*S* – *I*) is equal to zero, we have

$$G + TR - TA \equiv - NX \qquad ..... (2·20)$$

It says that, if private saving is equal to private investment, then the government's budget deficit (surplus) is reflected in an equal external deficit (surplus).

2.3 Exercises

a. Objective Type Questions :

1. An employee of a factory enjoys free quarters and gets a salary in money at the end of each month. His real income per month consists of

   (a) only free quarters

   (b) goods and services that can be bought with his money income plus free quarters.

   (c) goods and services that can be bought with his money income less free quarters.

2. The value added by a firm is equal to

   (a) the value of the output produced by the firm

   (b) the value of the inputs plus the value of the output

   (c) the value of the output less the value of the inputs.

3. A person drops his purse which contains some money into the river while crossing it in a boat. Then the loss

   (a) odds to his expenditure

   (b) adds to his saving

   (c) lowers aggregate demand.

4. A person saves out of current income. Than

   (a) national income is less than national expenditure

GNP	$ 4,800
Gross investment	800
Net investment	300
Consumption	3,000
Government purchases of goods and services	960
Government budget surplus	30

   (b) the saving by the person is part of national saving

(c) planned investment increases by the amount of saving.

b. Short-answer Type Questions :

5. Show from national income accounting that :

   (a) An increase in taxes while transfers remain constant) must imply a change in the trade balance, government purchases, or the saving-investment balance.

   (b) An increase in disposable personal income must imply an increase in consumption or an increase in saving.

   (c) An increase in both consumption and saving must imply an increase. in disposable income.

   [For both (b) and (c) assume that there are no interest payments by households or transfer payments to foreigners].

6. The following is information from the national income accounts for a hypothetical country :

   What is : (a) NNP? (b) Net exports? (c) government tax-transfers? (d) dispersible personal income? (e) personal saving?

7. What happens to GNP if the government hired unemployed markers, who had been receiving $ TR in unemployment benefits, as govern-ment employees to do nothing, and paid them $ TR? Explain.

8. What is the difference in the national income accounts between

   (a) A firm's buying an auto for an executive and the firm's paying the executive additional income to buy the automobile herself?

   (b) Your hiring your spouse (who takes care of the house) rather than having him or her do the work without pay?

   (c) Your deciding to buy an Indian car rather than a German Car?

c. Long-answer Type Questions :

9. Explain why the national income accounts-do not measure all the economic activity that takes place?

10. Define the term gross domestic product. Explain carefully which transactions in the economy are included in GDP. What is the difference between GNP and GDP?

11. Define the term national income. Why is NI not equal to GNP?
12. Define the terms personal income and personal disposable income. Conceptually how do these income measures differ from national income? Of what usefulness are these measures?

2.7 References

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Unit-3 ❑ The Simple Keynesian Model (SKM)

Structure

3.0 Obectives

This unit will help you to understand

- The concept of aggregate demand
- The essence of macroeconomic equilibrium
- The concept of the consumption function
- The theory of the multiplier.

3.1 Introduction

Modern macroeconomics can be said to have originated out of "the General Theory of Employment, Interest and Money" written by John Maynard Keynes in 1936. He pointed out that the programme of economic inquiry should be divided between "the theory of the individual industry or firm", which is now called microeconomic theory on the one hand, and "the theory of output and employment as a whole", which is now called macroeconomics on the other. Such a division of economics was in contradistinction to

the prevailing ideas making a distinction between the theories of value and distribution one the one hand and the theories of money on the other—a distinction which keynes regarded as "a false division". Keynes termed the prevailing economic inquiry as "classical economies", the twain tenets of which were that the economy always operated at the full-employment level of output, that supply creates its own demand-the so-culled say's Law of Markets, and that the wage rate is determined by "the marginal disutility of the existing employment".

Keynes pointed out that these tenets or, what he called, the "postulates" of the classical economies all stand and fall together, and he set out to attack all of them. The motivation for this assault was based on empirical observation—the observation being that of persistent mass unemployment during the great Depression of the interwar period of the 1930s. To explain the situation he almost went to the opposite extreme of say's law and maintained that a lack of effective demand, creating a situation of excess supply of commodities are a "glut", does not automatically tend towards the establishment of full-employment. According to him, an inquiry into the components of effective demand gives a better understanding of the functioning of the economy.

3.2 The Simple Keynesian Model (SKM)

The Keynesian model goes into a detailing of the components of effective demand or expenditure, which together with the output produced (Y) determine macroeconomic equilibrium. We have seen in Unit 2 that in a real open economy the components of expenditure can be divided into consumption expenditure (C), investment expenditure (I), government expenditure (G), and net exports (NX), so that the income identity can be given by

$$Y \equiv C + I + G + NX \qquad \text{.... (3.1)}$$

(3.1) is an identity in the sense that it always obtains whether the economy is in equilibrium or riot. The right-hand side of (3.1) constitutes aggregate expenditure which can be regarded as aggregate effective demand, while Y, standing for income is the money value of national output, which can be regarded as the supply of goods and services in the aggregate in the economy. By an analogy of market equilibrium, macroeconomic

equilibrium can be defined as a situation where the supply of output equals aggregate demand, or

$$Y = AD \qquad .....(3.2)$$

If we take aggregate demand as given, then, following (3.2), we can also define economic equilibrium as the level of output which exactly matches the given level of aggregate

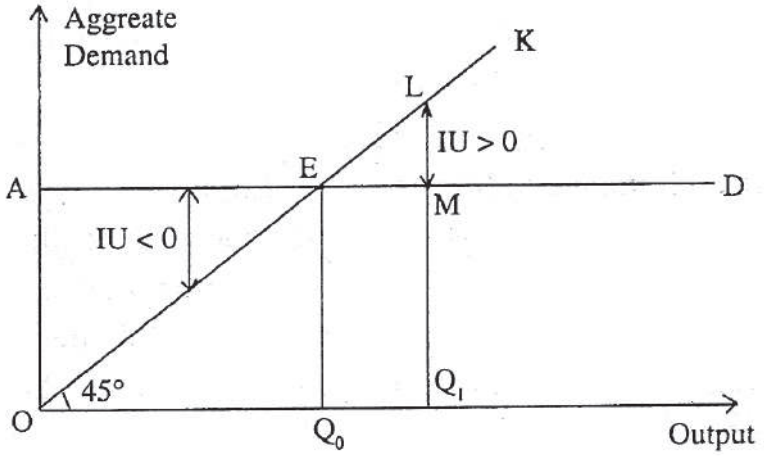

Fig. 3.1

demand. The ideas involved can be illustrated by means of Fig. 3.1, in which aggregate demand is measured along the vertical axis and output along the horizontal axis. Any point on the 45° line *OK* implies equality between aggregate demand and output; so equilibrium output must obtain at some point on the like *OK*. If *OA* stands for aggregate demand prevailing in the economy, then equilibrium output must also obtain on the line *AD*. Both these conditions are satisfied at the point of intersection, *E*, of *OK* and *AD*. Hence, *OQ*, is the equilibrium level of output.

At *E*, firms are selling as much as they have produced and people are buying the amount they want to purchase. So there is no tendency for the level of output to change. To the right of point *E*, output is greater than aggregate demand; so there is excess output. The excess output is shown by the vertical distance between the 45°-line and the level of aggregate demand shown by the line *AD*. This surplus output measures the extent of unintended inventory accumulation (*IU*), given by

$$IU = Y - AD \quad \text{... (3.3)}$$

This amount of unsold output accumulates in the warehouses and shops. In particular, if OQ, is the level of output, the level of aggregate demand being OA, the amount of unintended inventory accumulation is LM. This would send out signals to producers to produce less. As a result output would tend to fall back to the level, OQ_0. A reverse process would take place if output is less than OQ_0 where rapid expansion of stocks would require producers to replenish their desired level of stocks by producing more. So we see that an adjustment process for output changes based on unintended inventory accumulation actually moves output to its equilibrium value. Thus, the condition of economic equilibrium, given by (3.2), implies that unintended inventory accumulation defined by (3.3) should be zero. Or

$$IU = Y - AD = \text{O} \quad \text{.....(3.2a)}$$

Components of Aggregate Demand in SKM

In the real economy, aggregate demand cannot be taken as given. It is determined by various factors, which need· to be investigated in order to understand the nature of economic equilibrium. To bring out the essential factures of macroeconomic equilibrium, the simple keynesian model assumes a closed economy where there is no government expenditure. In such an economy aggregate demand consists of consumption demand and investment demand only. Moreover, as we shall see in section 3.4, the simple keynesian model also assumes a given level of investment demand. This makes. the determinants of consumption demand or expenditure the most important factors determining equilibrium in the simple keynesian model. The way consumption demand is determined defines, according to keynes, the consumption function which we discuss in the next section.

3.3 The Consumption Function

Keynes made the consumption function central to his macroeconomic theory. It is "an epoch-marking contribution to the tools of economic analysis" and has played a key role in macroeconomic theory even since. According to keynes, consumption is primarily determined by income, and he postulated that "men are disposed, as a rule and on the

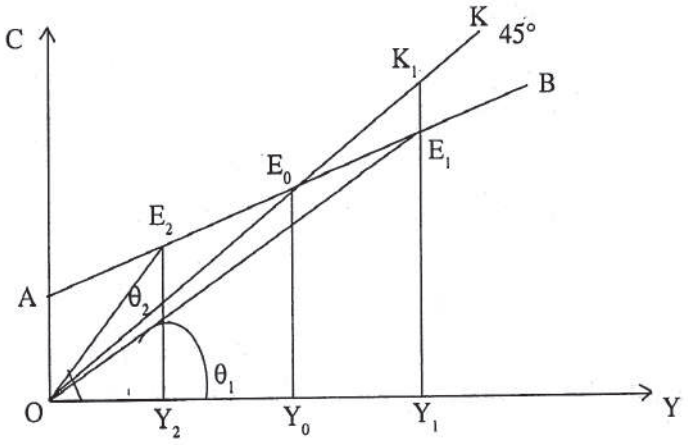

Fig. 3.2

average, to increase their consumption as their income increases, but not by as much as the increase in their income". To explain the nature of the concepts involved, we will start with a linear consumption function given by

$$C = a + eY \qquad a > 0,\ 0 < e < 1 \qquad \text{..... (3.4)}$$

where C stands for the nation's total consumption expenditure for a given year and Y stands for national income for that year.

The consumption function (3.4) is shown in Fig. 3.2 by the straight line *AB* in which income (*Y*) is measured along the borizontal axis and consumption expenditure (*C*) along the vertical anis. The intercept *OA* on the vertical anis is equal to the parameter "*a*" of the consumption function (3.4). The slope of the consumption function *AB* in "*e*" in (3.4).

Average Propensity to Consume (ape) and its Properties

The concept of the average propensity to consume (ape) gives us an idea of the rate at which the people as a whole of a community consume on the average out of their income. It is defined as the ratio of total consumption an total income which is national income. It is given by

$$apc = \frac{C}{Y} \qquad \text{.... 3.5}$$

The concept can be illustrated with reference to the consumption function *Al* in Fig. 3.2. According to the definition of ape of (3.5), if income is OY_0, *apc* is given by

$$apc\Big|Y = OY_0 = \frac{E^0Y^0}{OY_0} = \tan 45° = 1$$

Similarly, if income is OY_1, *apc* becomes

$$apc\Big|Y = OY_1 = \frac{E^1Y^1}{OY_1} = \tan \theta_1 \ (< 1)$$

and if income is OY_2, *apc* is

$$apc\Big|Y = OY_2 = \frac{E^2Y^2}{OY_2} = \tan \theta_2 \ (> 1)$$

From the above values of the average propensity to consume we see that if the consumption function is a linear one where the parameter "*a*" is greater than zero, average propensity to consume goes on falling as income rises, an vice versa.

When income is OY_2 *apc* is greater than one and people consume more than what is produced. This is possible only if the country borrows from other countries or exhansts part of the existing stock of goods. If income rises the OY_1, *apc* is less than one and people consume less than what is produced. What is not consumed is saved; at income OY_1 total saving is given by E_1K_1. That *apc* falls as income rises when the consumption tinction is a linear one marking are intercept on the vertical axis can also be. shown algebraically as follows

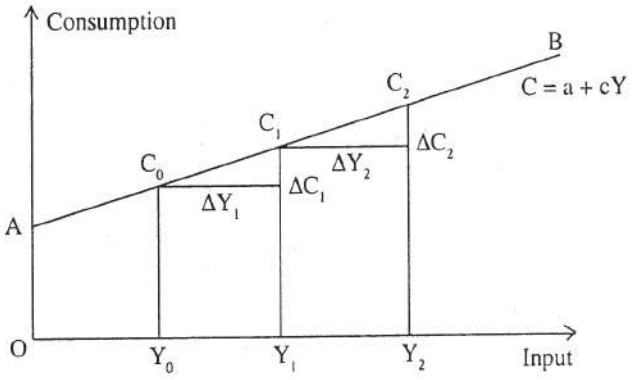

Fig. 3.3

$$C = a + eY \quad a > 0,\ 0 < e < 1$$

$$apc = \frac{C}{Y} = \frac{a}{Y} + e \qquad \text{... (3.6)}$$

As Y increases. falls, and e remaining the same, apc falls as Y increases. It should be noted that, if the consumption function is given by

$$C = eY \qquad 0 < e < 1 \qquad \text{....(3.4a)}$$

So that the consumption function is a straight live passing through the origin, then

$$apc = \frac{C}{Y} = e \qquad \text{..... (3.6a)}$$

So, if the consumption function is given by (3.4a) the average propensity to onsume is a constant and equal to the slope of the consumption function. We ill discuss about the consumption function (3.4a) later on.

Marginal Propensity to consume (*mpc*)

Unlike average propensity to consume, which is a measure the of rate at total income which / is spent on consumption, marginal propensity to consume as a measure of the part of change in income that is spent on consumption.

In Fig. 3.3, if income rises from OY_0 to OY_1, consumption increases from C_0Y_0 to C_1Y_1. The change in income is $OY_1 - OY_0 = \Delta Y_1$, and the change in consumption is $C_1Y_1 - C_0Y_0 = \Delta C_1$. The marginal propensity to consume (*mpc*) is given by

$$mpc = \frac{\Delta C_1}{\Delta Y_1} \qquad \text{..... (3.7)}$$

For the consumption function (3.4), depicted in Fig. 3.3, if income in-acreases from OY_1 to OY_2 then consumption increases from C_1Y_1 to C_2Y_2 and the corresponding mpc given by

$$mpc = \frac{\Delta C_2}{\Delta Y_2} \qquad \text{..... (3.7a)}$$

is the same as in (3.7). This is so because, the consumption function (3.4) is a straight line and *mpc* is the same as the slope of the consumption function, which is a constant, e. In general; it can be shown that the marginal propensity to consume can be measured·

at any level of income by the slope of the consumption function at that level of income. This is not only true for a straight line consumption function, whose slope at all levels of income is the same, but also for a consumption function which is not a straight line.

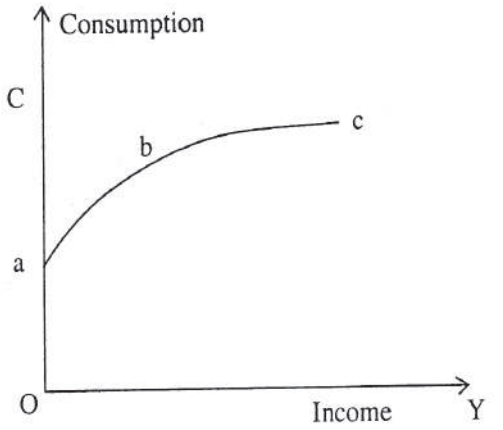

Fig. 3.4

Now we can summaries the results that we have obtained for a straight-line consumption function :

A : Consumption Function : $C = a + eY$

(i) *ape* falls as income increases;

(ii) *mpc* is a constant and is equal to *e*;

(iii) *mpc* is less than *apc* as in evident from (3.6).

B : Consumption Function : $C = eY$

ape = mpc = e for all levels of income.

The keynesian consumption Function :

The straight-line consumption function depicts all the essential features of the consumption function formulated by keynes, namely,

(1) Real consumption expenditures are a stable function of real income.

(2) The marginal propensity to consume is positive, but less than one.

(3) The marginal propensity to consume is less than the average pro-pensity to consume (which means that the latter declines with rising income).

But, keynes also maintained—though he stated it less positively—that the marginal propensity to consume probably declines as income increases. If this feature is also taken into consideration, the consumption function becomes a nonlinear curve like abe of Fig. 3.4.

3.4 Equilibrium in the Simple Keynesian Model (SKM)

We have already pointed out that in the Simple keynesian Model the components of aggregate demand are only consumption expenditure (effective consumption demand) and investment expenditure (effective investment demand). Tei emphasize the role of the consumption function in determining equilibrium income, the SKM also

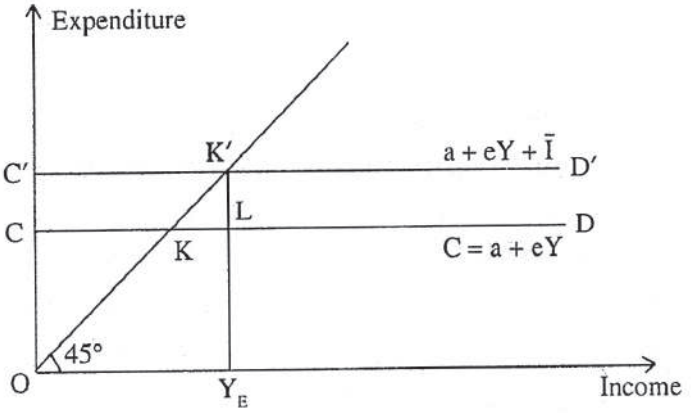

Fig. 3.5

assumes that the level of investment ex-penditure is a known quantity, say $\bar{I}$. Incorporating all these elements, the SKM can be given by the following set of relations, defining Model (M_1) :

$$Y = C + I$$
$$C = e(Y) \qquad (M_1)$$
$$I = \bar{I}$$

For simplicity's sake, we will, for the time being, assume that the con-sumption function is linear, so that (M_1) becomes (M'_1), where

$$\begin{aligned} Y &= C + I \\ C &= a + e(Y) \qquad (M'_1) \\ I &= \bar{I} \end{aligned}$$

In this model (M'_1) there are three equations in three unknowns (Y, C, I). Investment (I),

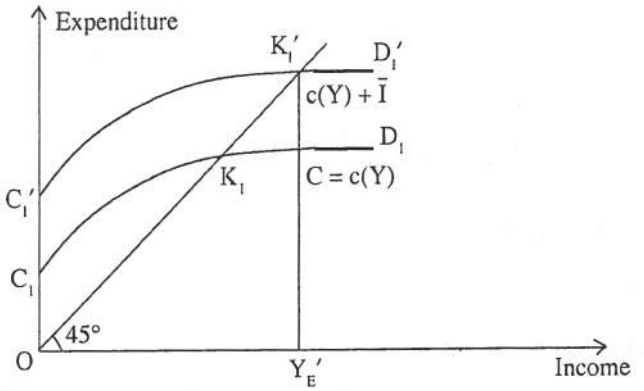

Fig. 3.6

however, is already known ($\bar{I}$). The model is consistent with equilibrium. To get the value of equilibrium income (Y_E), we substitute the values of C and I in the first equation to get

$$\begin{aligned} Y &= a + eY + \bar{I} \\ \text{or,} \quad Y(1 - e) &= a + \bar{I} \end{aligned}$$

$$\text{or,} \quad Y_E = \frac{a+\bar{I}}{1-e} = \frac{1}{1-e}(a+\bar{I}) = \frac{1}{(1-e)}A \qquad .....(3.8)$$

where A stands for ($a + \bar{I}$), called the antonomous part of the model, not related to income. Once the equilibrium value of income (Y_E) is determined, the equilibrium level of consumption is determined from the consumption function ($C = a + eY$). Investment is known already. Thus, all the unknowns are determined.

The equilibrium solution (3·8) can also be shown graphically. In Fig. 3.5 *CKD* is the consumption function ($C = a + eY$), and *CC*' is the given amount of investment

expenditure ($\bar{I}$). Adding $\bar{I}$ to the consumption function, we get the line *C'K'D'* parallel to *CKD*, showing planned amounts of expenditure ($a + eY + \bar{I}$) as a function of income. On the 45°-line through the origin expenditure is equal to income. Since expenditure must equal income, this equality must obtain on the 45°-line through the origin. On the other hand, planned amount of expenditure must obtain on the *C'K'D'*. Both these conditions are satisfied at the point of intersection, K', of the 45°-line through the origin and the line *C'K'D'*. The level of income, Y_E, correspoing to the point *K'*, is the equilibrium level of income. The equilibrium level of consumption is $Y_E L$. The level of investment $K'L = C'C$ is already known. Fig. 3.5, like Fig. 3.1 discussed above, shows that equilibrium income obtains at the point where aggregate demand equals output. The only difference is that in Fig. 3.1 we considered aggregate demand as it may obtain in a real ecoriomy, while in Fig. 3.5 we consider aggregate demand in the *SKM*. Moreover, in Fig. 3.1 we assumed aggregate demand to be the same at all levels of output (income), but in Fig. 3.5 we consider aggregate demand as a function of income.

If the *SKM* is given by (M_I), where the consumption function is not a Einear one, it would not be easy to determine the equilibrium level of income algebraically. But a graphical representation of the model would be similar to that of Fig. 3.5. It is shown in Fig. 3.6, where $C_1K_1D_1$ is the consumption function and $C_1C'_1$, is the given level of investment ($\bar{I}$). The equilibrium level f income, Y'_E, corresponds to the point of intersection (K'_1), of the aggregate demand curve $C'_1K'_1D'_1$ and the 45°-line through the origin. The equilibrium evel of consumption is $K_1Y'E$, the level of investment being given.

Properties of Equilibrium in the SKM

The level of equilibrium income (*YE*) of the SKM has some important properties.

Property 1 : Given the consumption function, every level of investment expenditure determines a unique level of equilibrium income.

The phrase "given the consumption function" means that we know the equation of the consumption function and the values of parameters of the consumption function, so that we can draw graphically the consumption function (because *C* and *Y* are the only variables in the consumption function). If the consumption function can be drawn graphically as in Fig. 3.5 and Fig. 3,6, the position of the aggregate demand function

will be determined by the level of investment demand. The point of intersection of the aggregate demand function with the 45°-line through the origin will depend on the level

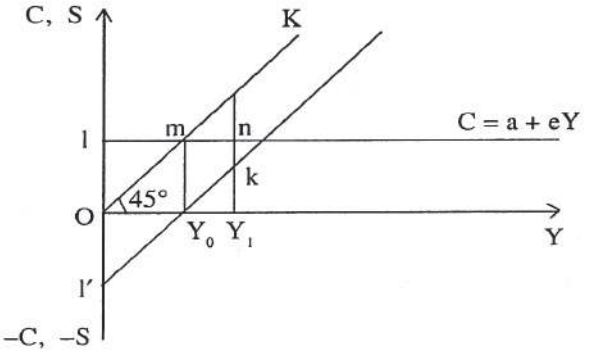

Fig. 3.7

of investment demand. Hence · the statement.

The point can also be made clear with reference to the result (3.8), which assumes a linear consumption function. The linear consumption function can be said to be known if the values of the parameters of the consumption function, *a* and *e* are known. Given the values of *a* and *e*, the value of equilibrium income is uniquely determined by the value of ($\bar{I}$) in (3.8).

Property 2 : Economic equilibrium in the SKM is obtained when planned amount of saving is equal to planned amount of investment.

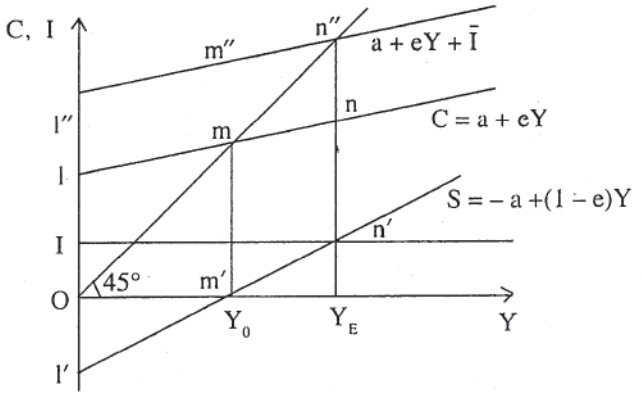

Fig. 3.8

In the SKM given by (M_1) and (M'_1) we would now assume that the given level of investment is the· planned amount of investment. To determine the planned amount of saving at any level of income, it should be noted that in the SKM, consumption expenditure is active and saving is passive in the sense that people take decisions with respect to consumption depending upon income and what is left out of income after consumption is saving. Saving is definec as

$$S = Y - C \qquad \text{..... (3.9)}$$

Substituting the consumption function ($C = a + eY$) in (3.9) we get

$$S = Y - (a + eY)$$
$$\text{or, } S = -a + (1 - e)Y \qquad \text{.....(3.10)}$$

The relation (3.10) shows that saving is a function of income. This is so because

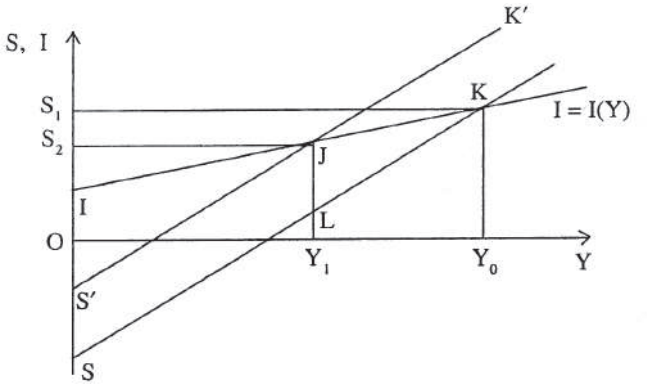

Fig. 3.9

consumption is a function of income and according to (3.9), what is not consumed out of income is saved.

The saving function can also be derived graphically from the consumption function of Fig. 3.3 and Fig. 3.4. In the following we derived the saving function (3.10) graphically from Fig. 3.3. The same procedure should be .followed to derive the saving function graphically from Fig. 3.4.

In Fig. 3.7, lmn is the consumption function ($C = a + eY$). When income is zero

($Y = 0$), consumption is equal to a, which is greater than zero. This is possible, if there is dis-saving of the same amount. This dissaving at $Y = 0_0$, is shown by the distance Ol' (= OI) in Fig. 3.7. If income is OY_0, consumption is $\frac{a}{1-e} = mY_0$ which is same as income (= OY_0). Hence, saving at income OY, is zero, for whatever is earned is consumed. The straight-line saving function (3 .10), starting at l' must pass through the point Y_0. So, l' Y_0k is the saving function (3.10). If income is OY_1, consumption is Y_1n, saving is $n'n$, which is the same as Y_1k.

Now we are in a position to prove property 2. Fig. 3.8 is obtained by superimposing the saving function ($S = -a + (1 - e)Y$) on Fig. 3.5. The equilibrium level of income Y_E is obtained as in Fig. 3.5. The given level of investment is OI, which is the same as ll'. The given level of investment, shown by the line In', is assumed to be the planned level of investment. It intersects the saving function, showing planned levels of saving at different levels of income at n', which corresponds to the same equilibrium level of income, Y_E.

Property 2 implies that saving can be regarded as supply of resources available for investment. If equal amount of planned investment is forthcoming, then supply matches demand to establish equilibrium.

Paradox of Saving :

Property 2 also leads to the paradoxical result that if all persons in a community want to save more, the they end up with saving less. This result is obtained when investment is a rising function of income. The paradox is shown in Fig. 3.9. The investment function $l = l(Y)$ is shown by the line lJK and the saving function is SLK. The equality of planned amount saving and planned amount of investment—both planned with respect to income—takes places at the point K, determining the equilibrium level of income Y_0. If people want to save more, the saving function shifts to the position $S'JK'$; at each. level of income people want to save. more. Now, the equilibrium level of income Y_1 corresponds to the intersection point, J, of the investment function and the new saving function. From Fig. 3.9 we see that while previously total saving was OS_1, now it has fallen to OS_2 The reason is that trying to save more reduces income, which in its turn reduces saving.

Property 3 : Equilibrium income in the *SKM* is determined by the level of antonomous expenditure, not related with income, and the multiplier.

If the level of antonomous expenditure is *A* and the value of the multiplier is *m*, then equilibrium income Y_E , is given by

$$Y_E = mA \qquad \text{....(3.11)}$$

In the model M'$_1$, the level of antonomous expenditure is (a + $\bar{I}$) and the value of the multiplier, *m*, is

$$m = \frac{1}{1-e}.$$

Hence, in that model equilibrium income is given by $Y_E = \frac{1}{1-e}(a + \bar{I})$. In the next section we discuss in detail the theory of the multiplier.

3.5 The Theory of the Multiplier

The theory of the multiplier states that if the level of investment changes and the new level of investment is maintained, then the equilibrium level of income changes in the same direction by some multiple of the change in the level of investment. If the change in the level of investment is ΔI and the change in equilibrium income is Δ*Y*, then the relevant multiplier is $\frac{\Delta Y}{\Delta I}$. The multiplier acts both ways and, if the level of investment decreases and the new level of investment is maintained, then the equi1ibrium level of income would decrease by some multiple of the decrease in investment. The multiplier is essentially dynamic in nature, for the new level of income takes time to be established. But the theory of the multiplier can be studied both statically and dynamically.

Static Multiplier :

In the static theory of the multiplier, the multiplier is calculated on the basis of static or equilibrium values of income. It can be studied algebraically and also in terms of a diagram.

Algebraically, the value of the multiplier can be determined from the model (M'_1). In

the model (M'_1), if the given level of investment is I_1, then the model becomes

$$Y = C + I$$
$$C = a + eY$$
$$I = I_1$$

The corresponding equilibrium level of income is given by $Y_1 = \frac{a + l_1}{1 - e}$ from relation (3.8).

If the level of investment increases to I_2, where

$$I_2 = I_1 + \Delta I$$

and the new level of investment is maintained, then the corresponding equilibrium level of income is

$$Y_2 = \frac{a + l_2}{1 - e}$$

If we define $\Delta Y = Y_2 - Y_1$, then the value of ΔY is

$$\Delta Y = Y_2 - Y_1 = \frac{a + l_2}{1 - e} - \frac{a + l_1}{1 - e}$$

$$= \frac{I_2 - l_1}{1 - e} = \frac{1}{1 - e}(\Delta I)$$

$$\text{or,} \quad \frac{\Delta Y}{\Delta I} = \frac{1}{1 - e} = m \qquad \text{..... (3.12)}$$

In the relation (3.12)e is the marginal propensity to consumer in the consumption function $C = a + eY$. In the general case in which the consumption function way not be a straight-line, the value of the multiplier is given by

$$m = \frac{1}{1 - mpe} = \frac{1}{mps} \qquad \text{..... (3.12a)}$$

where *mpc* and *mps* are the marginal propensity to consume and the marginal propensity to save, respectively, since

$$mpc + mps = 1$$

mpc and *mps* are positive fractions; higher the value of *mpc*, that is, the smaller the value

of *mps*, the higher is the value of the multiplier. Thus, in a community where people, on the average, consume more and save less, the value of the multiplier will be higher, and vice versa. If *mpc* is $\frac{3}{4}$, the value of the multiplier is 4 and if mpc is $\frac{9}{10}$, then the value of the multiplier is 10.

The static multiplier can also be studied graphically. It can be shown graphically that the change in income would be greater than the change in the level of investment. The student is advised to show this in a diagram.

Dynamic Multiplier :

The static multiplier arrives at the value of the multiplier by a consideration of static equilibrium values of income, Y_1, and Y_2, It does not tell us how the new equilibrium is reached, once the economy departs from the old value of equilibrium income. The dynamic multiplier, by contrast, shows the value of income at each stage of its increase from one equilibrium value of income to the next equilibrium income as the level of investment changes.

To show this, it is to be noted that dynamic analysis is one where time enters into the picture "in an essential way". For dynamic considerations, we change the model (M_1) in the following way

$$Yt = Ct + It$$

$$Ct = e(Y_{t-1}) \qquad (M_2)$$

$$It = \bar{I}$$

The first equation of model (M_2) says that income during the period t is the same as expenditure during the same period, which consists of consumption expenditure during t and investment expenditure during the same period. The consumption function of M_2 says that consumption during the period t is a function of income of the previous period (t – l), which may be a more realistic assumption. Investment during t is the same as the given value of investment.

In the consumption function is a linear one model M_2 becomes

$$Yt = Ct + It$$

$$Ct = a + eY_{t-1} \qquad (M'_2)$$
$$It = \bar{I}$$

Substituting the equations for Ct and It in the first equation of (M'_2) we get

$$Yt + a + eY_{t-1} + \bar{I}$$

And, since in equilibrium $Yt = Y_{t-1} = Y_E$, = Ye we have

$$Y_E = a + eY_E + \bar{I}$$

$$\text{or,} \qquad Y_E = \frac{a + \bar{I}}{1 - e}$$

which is the same as in relation (3.8).

Starting with this equilibrium situation, if we assume that the level of investment spending rises by ΔI, and the new level of investment is maintained, then the sequence of income can be shown as follows. For simplicity's sake we now omit the time subscripts, remembering the functional relationships.

Period 1 : $\quad Y + \Delta_0 Y = C + \bar{I} + \Delta I$

where $\quad \Delta_0 Y = \Delta I$

In Period 1, the level of investment spending rises from $\bar{I}$ to $(\bar{I} + \Delta I)$. Automatically, income rises by the same amount, so that $\Delta_0 Y = \Delta I$. It is to be noted that, since consumption in period t is related to income of Period (t_{-1}), there is no change in the consumption expenditure. But in Period 2 consumption changes since income in Period l has increased. We continue to assume that the new level of investment is maintained. Thus, we have

Period. 2 : $\quad Y + \Delta_0 Y + \Delta_1 Y = C + \Delta_1 C + (\bar{I} + \Delta I)$

where $\quad \Delta_1 Y = \Delta_1 C = e\Delta_0 Y = e\Delta I$

Again, income rises in Period 2, even though there has not been any change in the level of investment. The rise in income in Period 2 will induce consumption to rise in the next period. Hence, we have

Period 3 : $\quad Y + \Delta_0 Y + \Delta_1 Y + \Delta_2 Y = C + \Delta_1 C + \Delta_2 C + (\bar{I} + \Delta I)$

where $\Delta_2 Y = \Delta_2 C = e\Delta_1 Y = e^2 \Delta I$

In this way, income and, consequently, consumption continue to increase ad infinitum. If the total increase in income is ΔY, it is given by

$$\begin{aligned} \Delta Y &= \Delta_0 Y + \Delta_1 Y + \Delta_2 Y + \ldots\ldots\ldots\ldots \\ &= \Delta I + e\Delta l + e^2\, \Delta l + \ldots\ldots\ldots\ldots \\ &= \Delta l\,(l + e + e^2 + \ldots\ldots\ldots\ldots) \\ &= \Delta I = \left(\frac{1}{1-e}\right) \end{aligned}$$

since $0 \angle e \angle 1$.

There fore $\dfrac{\Delta Y}{\Delta l} = \dfrac{1}{1-e}$

Thus, the value of the dynamic multiplier is the same as that of the static multiplier of (3.12).

3.6 Introducing the Government Sector in the SKM

Introduction of the government sector implies taking into the income account the government expenditure on goods and services and transfer payments on the one hand, and government revenue from taxes on the other. National income (Y) which is equivalent to national expenditure (E) or aggregate effective demand (AD) is now given by

$$Y = C + I + G \qquad \ldots\ldots (3.13)$$

In the SKM, $\bar{I}$ = but consumption (C) IS now a function of disposable income (YD) which is related to Y as

$$YD = Y + TR - TA \qquad \ldots\ldots (3.14)$$

where TR stands for transfer payments and TA for taxes. If we assume that the consumption function is a linear one, it can be given by

$$C = a + eYD = a + e(DY + TR - TA) \qquad \ldots\ldots(3.15)$$

Let us assume that the government's fiscal policy is defined as

$$G = \bar{G} \quad TR = \overline{TR} \text{ and } TA = tY \qquad \text{.....(3.16)}$$

where $\bar{G}$ and $\overline{TR}$ are the given amounts of government expenditure and transfer payments and t is the rate of income taxation.

The consumption function now becomes

$$\begin{aligned} C &= a + e(Y + \overline{TR} - tY) \\ &= \text{a} + e\,\overline{TR} + e(1 - t)Y \end{aligned} \qquad \text{.....(3.17)}$$

Substituting (3.16) and (3.17) in (3.13) we get

$$\begin{aligned} Y &= a + e\overline{TR} + e(1 - t)Y + \bar{I} + \bar{G} \\ \text{or,} \quad Y\{1 - e(1 - t)\} &= a + e\overline{TR} + \bar{I} + \bar{G} \end{aligned} \qquad \text{..... (3.18)}$$

The right-hand side of (3.18) is the antimonious part of the SKM with the assumptions mode above. Let us call it $\overline{\text{A}}$, so that

$$\overline{\text{A}} = a + e\overline{TR} + \bar{I} + \bar{G}$$

(3.18) can now be written as

$$Y\{1 - e(1 - t)\} \cong \overline{\text{A}}$$

$$\text{or,} \quad Y = \frac{\overline{A}}{1 - e(1 - t)} = \overline{m}\,\overline{A}$$

where $\overline{m} = \dfrac{1}{\{1 - e(1 - t)\}}$ is the value of the multiplier. ..... (3.19)

Properties of the SKM with the Government Sector

Property 1 : Income taxes reduces the value of the multiplier. If the rate of income taxation is zero, the multiplier $\bar{m}$ becomes the same as m in (3.12). Thus, income taxation acts as an automatic stabilizer, which redness the magnitud of income fluctuations.

Property 2 : A change in the level of government spending changes th value of

equilibrium income in the same direction by same multiple ($\bar{m}$) of the change in government spending

$$\Delta Y_0 = \bar{m}\Delta\bar{G}$$

Property 3 : An increase in government transfer payments increase equ librium income, the. change in income being given by

$$\Delta Y_0 = \bar{m}\ e\Delta\overline{TR}$$

Property 4 : If the government reduces the rate of income taxation from t to t', so that the change in the tax rate is Δt, Ai, disposable income initially chang by $(-Y_0\Delta t)$ where Y_0 is the initial value of the equilibrium income. The chan in consumption due to this change in disposable income is $(-eY_0\Delta t)$.

When the tax rate is reduced, the increase in disposable income induces change in income equal to $e(1 - t')\Delta Y_0$, Hence the total change in income is :

$$\Delta Y_0 = -eY_0\ \Delta t + e(1 - t')\ \Delta Y_0$$

or, $$\Delta Y_0\ \{1 - e(1 - t')\} = -eY_0\Delta t$$

or, $$\Delta Y_0 = \frac{1}{1-e(1-t')}\ eY_0\Delta t.$$

Property 5 : The value of the Balanced Budget Multiplier is unity. The balanced budget multiplier refers. to the effects on income of an increase in government expenditure accompanied by an equal increase in taxes, so that $\Delta G = \Delta T$. To study the effects, let us note that when government expenditure rises, income rises by the same amount initially, but later on, income rises due to rises in consumption expenditure in subsequent periods. Hence, the changes in income due to a rise in government expenditure can be given by the series

$$^{\Delta Y}|_{\Delta G} = \Delta G + e\Delta G + e^2\Delta G + ...$$

$$= \Delta G + (1 + e + e^2 + ...) \qquad .....(3.20)$$

The rise in taxes, however, does not have an immediate· impact on ex-penditure and, hence, on income. But the consequent decrease in disposable income leads to a cut in consumption expenditure, which reduces income which, in its turn, reduces consumption expenditure again. This process goes on as above. Thus, the reduction in income due to a rise in taxes can be given by

$$^{\Delta Y}|_{\Delta G} = e\Delta T + e^2\Delta T + e^3\Delta T + ...$$

$$= \Delta T + (e + e^2 + e^3 + ...) \qquad .....(3.21)$$

Subtracting (3.21) from (3.20) we have

$$\Delta Y \ ^{\Delta Y}|_{\Delta G} - {}^{\Delta Y}|_{\Delta T} = \Delta G(1 + e + e^2 + ...)$$

$$- \Delta T(e + e^2 + e^3 + ...)$$

And since $\Delta G = \Delta T$, we have

$$\Delta Y = \Delta G(1 + e + e^2 + ...) - \Delta G(e + e^2 + e^3 + ...)$$

$$= \Delta G$$

Therefore, $\dfrac{\Delta Y}{\Delta G} = 1$

This value of the balanced budget multiplier critically depends upon then assumption that government expenditure has no impact on private investment through changes in the interest rate. But in most developed countries, operating near full employment, an increase in government expenditure raises the interest rate and, thereby, lowers private investment. This is called "crowding out" of investment. Under these conditions, the value of the balanced budget multiplier will be less than one. We will discuss crowding out effects in greater detail later on.

3.7 Exercises

a. Objective Type Questions :

1. If the consumption function is given by $C = a + bY$, and income increases what happens to average propensity to save (*aps*) :

   (a) it falls; (b) it remains the same;
   (c) it increases; (d) none of the above.

2. I the consumption function is $C = bY$, and income increases, which on of the following is true :

   (a) *apc* = *aps*; (b) *mpc* = *aps*;

(c) $aps = mps$; (d) none of the above

3. If the people of a community consume a fixed but a high percentag amount of income, the value of the multiplier is

(a) high; (b) low;

(c) $\frac{1}{1-aps}$; (d) none of the above.

4. The value of the balanced-budget multiplier in the SKM is unity becaus

(a) change in government expenditure adds to income while change i taxes does not;

(b) change is government expenditure is greater than the change in ta revenue;

(c) change in government expenditure immediately adds to income, b change in taxes affects income only by affecting consumption;

(d) none of the above.

b. Short-Answer Type Questions

5. In the SKM without the government sector we called the $C + I$ function the aggregate demand schedule for the national output. What is the aggregate supply schedule for national output?

6. Madhu Ghosh's consumption function is given by

$$C = \text{Rs. } 800 + 0.8\ y$$

where y and C represent his income and consumption respectively. What is the equation of his saving function? Calculate the break-even level of his income (Hint : At break-even level of income, consumption is equal to income).

7. Prove that for any consumption function

$ape + aps = 1$ and $mpc + mps = 1$

8. Jatin consumes all his income. Draw Jatin's consumption and saving chedules.

Long-Answer Type Question :

9. Suppose the consumption function is given by $C = 100 + 0.8Y$, while vestment is

given by $I = 50$.

(a) What is the equilibrium level of income?

(b) What is the amount of saving in equilibrium?

(c) If, for same reason, output were at the level of 800, what would e the amount of inventory accumulation?

(d) What is the value of the multiplier, m, here?

(e) If I were to rise to 100, what would the effect be on equilibrium come?

10. Suppose consumption behaviour were to change in problem 9 so that C 100 + 0.9Y, while I remained at 50.

(a) Would you expect the equilibrium level of income to be higher or ,wer than in 9a? Calculate the new equilibrium level, Y', to verify this.

(b) Now suppose investment increases to I = 100. What is the new quilibrium income?

(c) Does the change in investment spending have more or less of an effect on Y than in Problem 9? Why?

11. This problem relates to the so-called paradox of thrift. Suppose that I = JO and C = CO + eY, where CO is a constant.

(a) What is the saving function?

(b) Suppose individuals want to save more to every level of income . Show, using a figure, how the saving function is shifted.

(c) What effect does the increased desire to save have on the new equilibrium level of saving? Explain the paradox.

12. This model includes the government sector. Suppose consumption is give1 by C = 100 + 0.8 YD and that I = 50, while fiscal policy is summarized b

G = 200, TR = 62.5, and t = 0.25.

(a) What is the equilibrium level of income here?

(b) What is the value of the new multiplier? Why is this less than th multiplier in Problem 9d?

3.8 References

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Unit-4 ❑ Extensions of the Simple Keynesian Model

Structure

4.0 Objective

This unit will help you to understand

- The Classical Quantity Theory of Money
- The Keynesian Theory of the Demand for Money
- Equilibrium in the Goods and Money Markets
- Operation of Monetary and Fiscal Policies.

4.1 Introduction

The characteristic feature of the simple keynesian Model (SKM) discussed in unit 3 was that the level of investment expenditure was taken as given, determined exogenously to the model. But investment expenditure, like any other variable, is determined endogenously by factors which play important roles in the marking of the economy.

Investment is one of key factors determining not only national income as. shown in relation (2.16) above, but as we shall see, it also determines the rate at which the economy is likely to grow. Investment means additions to the physical stock of capital and does not include buying of bonds or securities. In particular, investment includes housing construction, building of machinery, construction of factories and offices, and additions to firms inventories of goods. In a wider sense, investment means any current activity that increases the economy's ability to produce output in the future-activity which includes expenditures to improve human capital as well. Buman capital is the knowledge and ability to produce that is embodied in the labour force. Thus, education can be regarded as investment in human capital.

By 'investment we generally mean private investment though there can be public investment undertaken by the government. Private investment is made with an aim of marking profits in the future by operating machines and factories. Most firms have to borrow to buy machines and factories that they use. If the interest rate is higher, the firms would have to pay more in interest each year from the earnings they receive from their investment. Thus, the higher the interest rate, the less the firms will want to invest. Conversely, the lower the interest rate, the higher is likely to be the level of investment. This idea is reflected in the investment demand schedule.

Investment Demand Schedule

The inverse relationship between the rate of interest and the demand for investment. can

be represented functionally as

$$I = l(r) \qquad I' < 0 \qquad \text{....(4.1)}$$

If the functional relationship is a linear one, (4.1) would be come

$$I = \bar{I} - br \qquad b > 0 \qquad \text{....(4.1a)}$$

where r is the rate of interest and b measures the interest responsiveness of investment. $\bar{I}$ is autonomous investment which is independent of the rate of interest.

Fig. 4.1(a) and Fig. 4.l(b) depict the investment demand functions (4.1) and (4.la) respectively. On the vertical axes we measure the market rate of interest, while the horizontal axes measure planned amount of ihvestment expenditure.

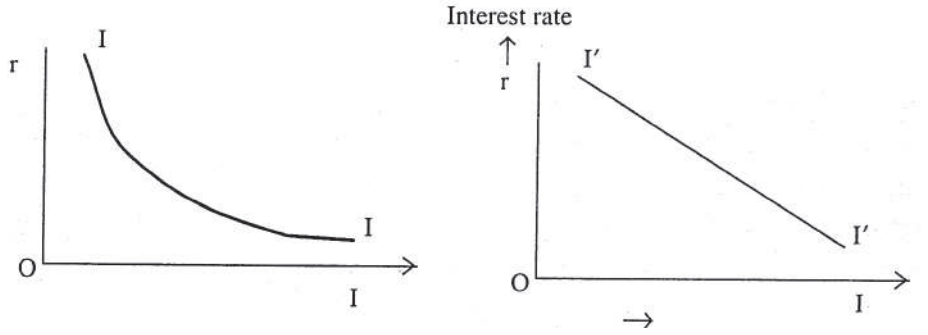

Fig. (4.1)

The position and slope of the *I'I'* schedule in Fig. 4.l (b) depend on the values of $\bar{I}$ and b in relation (4.la) respectively. In particular, the higher the value of b, the greater is the responsiveness of- investment to changes in the nterest rate and the steeper is the *I'I'* schedule, and vice-versa.

4.2 Interest Rate and Aggregate Demand

If we introduce the investment demand function (4.1) or (4.la) in the aggregate demand function, the simplicity of the SKM as depicted in models (M,) and (M'_1) is lost. The models no longer yield unique solutions of income.

The changes brought about can be studied as follows.

4.2.1. Investment Demand Function and the IS Curve

We now replace the third equation, $I=\bar{I}$, in the model (M,) by the relation (4.1). The model now becomes

$$\begin{aligned} Y &= C + I \\ C &= e(Y) \qquad (M_3) \\ I &= I(r) \end{aligned}$$

For simplicity, if we use linear functions, we replace $I = \bar{I}$ by (4. la) and use (M'_1), which now becomes

$$\begin{aligned} Y &= C + I \\ C &= a + eY \qquad (M'_3) \\ I &= \bar{I} - br \end{aligned}$$

What is to be noted is the fact that both (M_3) and (M'_3) consist of three equations in four unknowns (Y, C, I and r). As a result, the models are under determined; we do not get unique values of the variables involved. But, if th rate of interest, r, is known, then from (4.1) or (4.la) the level of investmen I is known. And once I is known, the levels of income. and consumption an determined from the first property of the SKM and the consumption functio1 respectively. Thus, starting with a given value of the rate of interest, we em up with an equilibrium value of income (and hence consumption). This rela tionship between the rate of interest (r) on the one hand, and the value o equilibrium income (Y) on the other, is an inverse one and is known as th IS curve. If we use model (M_3), the IS schedule would be a curve like l_1S as in Fig. 4.2(a). And if use the model (M'_3), the IS curve would be a straig' live like $I'_1S'_1$ of Fig. 4.2(b).

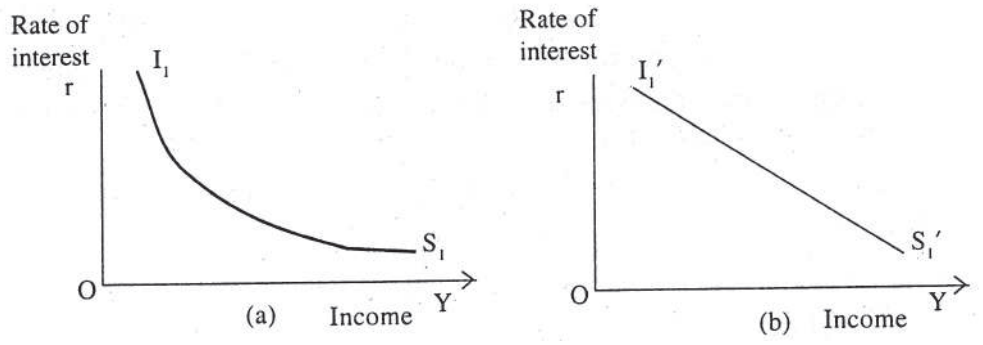

Fig. 4.2

4.2.2. Properties of the IS Curve

The position, shape and slope of the IS curves in Fig. 4.2 would depend on the nature of the equations and the values of their parameters in models (M_3) and (M'_3). To facilitate understanding and to derive the IS curve alge-braically, let us deal 'with the model (M'_3). From the three equations in (M'_3) we get

$$Y = a + eY + \bar{I} - br$$

or, $$r = \frac{a + \bar{I}}{b} - \frac{(1-e)Y}{b}$$

or, $$r = \frac{A}{b} - \frac{1}{mb}Y \qquad \text{..... (4.2)}$$

where A (= a + $\bar{I}$) stands for antimonious spending and $m\left(=\frac{1}{(1-e)}\right)$ for the multiplier.

Equation (4.2) is the equation of the IS curve when the income model is (M'_3). The equation specifies the slope and the position of the IS Curve. In particular, if there is any change in antimonious spending A, then the curve shifts parallel to itself withot any change in the slope of the IS curve. A change in the value of the multiplier (m) changes the slope of the IS curve. And a change in the responsiveness of aggregate demand to changes in the interest rate, (b), changes not only the. position, but also the slope of the IS curve.

4.2.3. The IS Curve and the Goods Market Equilibrium

The IS curve· stands for the goods market equilibrium positions. It shows combinations

of interest nates and levels of output (income) such that demand equals supply in the goods market. The goods market consists of consumption and investment goods in the aggregate. The rate of interest determines demand for resources for investment, while income via consumption generales resources through saving. Particular combinations of the rate of interest and income generate equilibrium in the goods market.

Any combination of the interest rate and income (output) not lying on the IS curve would indicate a situation of disequilibrium. A situation of dis-equilibrium in the goods market can be characterized either as a situation of excess demand in the goods market (EDG) or a situation of excess supply in the goods market (ESG).

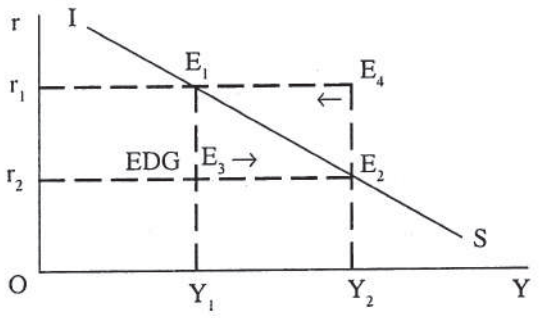

Fig. 4.3

These two types of situations are depicted in Fig. 4.3. The point E, on the IS curve shows that at the rate of interest r,, Y, is the equilibrium amount · of income (or output). If at the rate of interest r,, output (income) is greater than Y,, say Y,, then the level of investment demand depending or r, is too low to match the amount of resources released at income Y,. Thus, the com-bination (r,, K,), indicated by the point E, is a situation of excess supply in the goods market (ESG). Similarly, at the rate of interest r,, the equilibrium level of output (or income) is Y, If, for same reason, the level of output (or income) is Y,, then investment demand, together with consumption demand, exceeds the level of output. Thus, the combination (r,, Y,) indicated by the point E, in Fig. 4.3 is a situation of excess demand in the goods- market (EDG). In general, points above and to the right of the IS curve indicate situations of excess supply of goods (ESG), and points below and to the left of the IS curve indicate situations of excess demand for goods (EDG).

If there is excess supply of goods (ESG), inventories would accumulate, which mould force the output to fall till the equilibrium is reached on the IS curve. Conversely, if there is excess demand for goods (EDG), firms would run short of inventories, which they would try to replenish. This would force the output to rise till equilibrium is reached. The arrows in Fig. 4.3 indicate the direction of the forces that are generated in the goods market when it is not in equilibrium.

4.3 Determination of the Rate of Interest

In the models (M_3) and (M'_3), as new variable,.the rate of interest, r, has been introduced. Introduction of this variable has made the models incomplete. To make the models complete, we need theories and equations for the deter-mination of the rate of interest. Regarding the determination of the rate of interest we can distinguish between the classical and the keynesian theories. The classical economists thought that the rate of interest is a "real phenomenon" and is determined by the demand for and the supply of loans for investment. The rate of interest is a price for taking loans for investment on the one hand, and is a reward for abstaining from consumption on the other. Astinance from consumption implies saving which constitutes the supply of resources available for loans.

The rate of interest, being a price for taking loans for investment, is, like the price of any commodity, inversely related with the demand for investment. The higher the rate of interest, the lower is the demand for investment, and vice versa. Thus, the classical investment demand schedule cari be represented by the function (4.1) or (4.la) discussed above.

Since the supply of loans comes out of savings, the classical supply-of-loans for investment function is the classical saving function, where saving is a function of the rate of interest. The argument is that saving is painful because if implies an abstinence from consumption which provides utility. People will be encouraged to under take this painful act if they are rewarded for that. This reward is the rate of interest. The higher the rate of interest, the greater is the rate of saving.

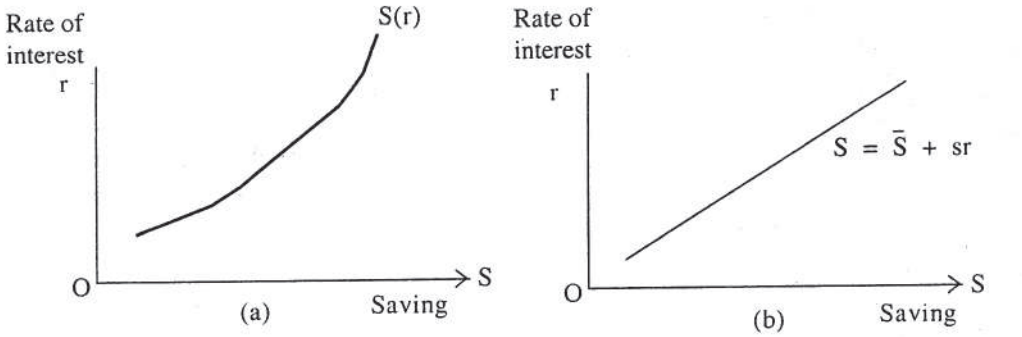

Fig. 4.4

The classical saving schedules are shown in Fig. 4.4(a) and Fig. 4.4(b), the corresponding functional forms being

$$S = S(r) \quad s' > 0 \qquad \text{..... (4.3)}$$

$$\text{and } S = \bar{S} + Sr \quad s > 0 \qquad \text{..... (4.3a)}$$

(4.3) and (4.3a) respectively.

In the classical system, the rate of interest is determined by the demand for investment function and the saving function. Using the functional forms (4.1) and (4.3), the algebraic formulation of the classical theory for the determination of the rate of interest can be given by the model (M_3) as follows :

$$\left.\begin{aligned} S &= S(r) \\ I &= I(r) \\ S &= I \end{aligned}\right\} \qquad \text{..... } (M_4)$$

The corresponding diagrammatic representation is shown in Fig. 4.5, where r_0, is the equilibrium rate of interest , the equilibrium amount of saving and investment.

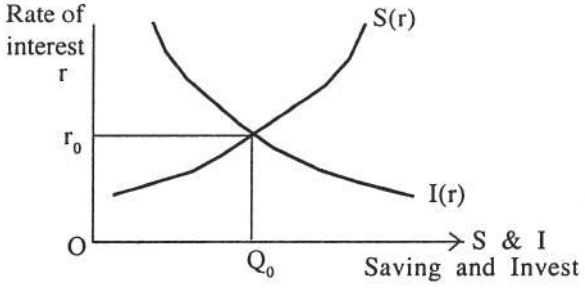

Fig. 4.5

4.4 The Classical Quantity Theory of Money

In the next section when we discuss the contrasting Keynesian views, we' will see that keynes treated the rate of interest as a "monetary phenomenon", by which it is meant that the rate of interest is determined in the money mare-But before we go into a discussion of the keynesian approach to the deter-mination of the rate of interest, it would be worth while to have· a look at the classical point of view regarding the role of money in the economy.

Money, as we all knew, is a generally accepted medium of exchange. Using money for exchange avoids all the difficulties of barter, that is the exchange of goods for goods. Acting as the medium of exchange is the primary and the most important function of money. But money has other functions too. Money is unit of account and is a standard of deferred payments. All prices are expressed in terms of money. Indeed, all current and future or deferred trans-actions are mode in terms of money (such as when I borrow Rs. 10,000 today and agree to pay bock Rs. 15,000 two years later). Money is a safer way of holding at least part of one's wealth, since wealth held in stocks, land, homes and bonds is subject to ups and downs in their values. Moreover, money holding is a necessary precaution again unforeseen contingencies like a sudden need to spend money or an unexpected delay in some receipt.

Classical economists emphasized the medium-of-exchanges function of money and tended to ignore the other functions of money· mentioned above. They thought that people hold money only to buy goods and services; the more money they need for such transactions, the more money they hold. Thus, the quantity of money in the economy is closely related to the amount of money exchanged in transactions. The classical theory of money is popularly known as the quantity theory of money. It has two versions.

The Fisherian Version

Irving Fisher began with a simple identity. In every transaction there is both a buyer and a scaler, and hence for the aggregate economy the value of sales must equal the value of receipts. Now the value of sales must be equal to the number of transactions undertaken over any time period multiplied by the average price at which they take place. On the other hand, the value of purchases must be equal to the amount of money in circulation in the economy times the average number of times it changes hands over the

same period. The identity is known as the "Equation of Exchange" and is given by

$$MV = PT \quad \text{..... (4.4)}$$

or, $$MV = PY \quad \text{..... (4.4a)}$$

where M is the quantity of money, that is, the amount of ordinary, hand-to-hand enrrency. V is called the transactions velocity of money and measures the rate at which money circulates in the economy, that is, the average number of times that this M actually changes hands during the period under consideration. If the period under consideration is one year, then V represents the total number of transactions during a given year, which is closely related to the total amount of output of goods and services (Y). In other words, V is the number of times in a year that goods and services are exchanged for money. P is the average price level which can be taken as the price of a typically transacted goods & services. The product of the price of a transacted goods & services and quantity T of goods & services in a year PT, equals the number of rupees exchanged in a year. Let us illustrate the idea. Let total amount of money at any time is (M) Rs. 100.00. It is used to times (V) in a year to make payment for goods and service. So total amount of payment is made in a year is MV = Rs. 100.00 × 10 = Rs. 1000.00. This must be. paid against a value of commodity of same amount rupees and this must be equal to price (P) multiplied by the total quantity of goods and services (T). Thus with say price Rs. 5.00 (P) and total quantity exchanged 200 units (T) in a year, it is Rs. 5.00 × 200 = PT i.e. $MV = PT$.

The classical economists assumed that T and V can be· taken as constants In a given economy during a given period, say one year. The total amount of goods transacted, T, as we have already pointed out, is very closely related to the total amount of output of the economy (Y). And, as the classical economists assumed, the economy has its only equilibrium at full employment levels of output. Moreover, fisher argued that, in equilibrium, the velocity of money, V, was determined by the payment habits and payment technology of the society, and could be regarded as fixed for the start run.

If V and T or Y are constants, the price level, according to the quantity theorists, changes in the same direction as M changes and changes proportion-ately. In this sense, the quantity theory of money is a theory of the rate of inflation, because the inflation rate is the percentage change in the price level. In percentage form the quantity equation (4.4a) can be written as. Percentage change in M + percentage change in V = percentage

change in P + Percentage change in Y And if V and Y are constants, we would have percentage change in M = Percentage change in P since percentage change in V and that in Y would both be equal to zero.

The Cambridge Version

The Cambridge economists (Alfred Marshall, A. CZ. Pigon and others) did not ask, as did Fisher, what determined the amount of money needed to carry out a given volume of transactions, but rather what would determine the amount of money an individual would wish to hold given that the desire to undertake transactions mode money holding desirable at all. Thus the question was put in macroeconomic terms and laid emphasis on the choice-waking behaviour of individuals. Marshall began by focusing on the individual's decision on the optimal amount of money to hold. Some money will be held because of the. comerenience that money provides in teransections compared with other stores of valve. Money also provides security by lessening the possibility of inconvenience or bankruptey from failing to be able to meet unexpected obligations. But as pigon voted, "currency held in the band yields no income", so money will be held only insofar as its yield in tering of comvenience and security outweighs the income lost from not invsting in productive activity or solisfoction lost by not simplyusing the money to purchase goods for consumption.

Marshall and other Combridge economists argued that, other things being equal, the demand for money in vomival terms would be propartional to the vouminal level of income for each individval, and bence for the aggregate economy as well. Thus they wrate the demand equation for money :

$$Md = kPY \qquad \text{.....(4.5)}$$

which, combined with, an equilibrimn condition for the money market ($Md = M$) as gives us

$$M = kPY \qquad \text{..... (4.5a)}$$

The formal equivalence of the Cambridge equation and Fisher's of the equation of exchange can be seen by rewriting (4.5a) as

$$M \frac{1}{k} = PY \qquad \text{..... (4.5b)}$$

when $\frac{1}{k}$ equals V.

4.5 The Keynesion Theory of the Demand for Money

The Keynesian theory of the demand for money is a development of the Cambridge Version of the quantity theory of money, which started with the question why people demand money.

According to Keynes, people have three different motives for holding money :

(1) The teransoctions motive, which is the demand for money arising from the use of money in walking regular payments;

(2) The preeantionory motive, which is the demand for money to meel unforseen contingencies; and

(3) The speculative moeive, which arises from uncertainties about the money value of other assets that an individual can hold.

Although we examine the demand for money by looking at the three motives for holding it, we cannot separate a particular person's money holdings say Rs. 10,000, into three neat piles of, say Rs. 5000, Rs. 2000 and Rs. 3000 each being held for a different motive. Money being held to satisfy one motive is always available for other use. The person helding unusually large balances for speculative reasons also has those balances available to meet an unexpectecd energency, so that they serve, too, as precantionary balances. All three motives influence an individual's holdings of money, and as we shall see, each leads to the prediction that the. demand for money should fall as the interest rate on other assets increases.

The Transactions and Precantionary Demands for Money (M_1)

The transactions demand for money arises from the use of money, which is a medium of exchange, in making regular payments fro goods and services. If receipts and expenditures were always perfectly synchronired, there would be no need from such balances. Since, howevber, the typical person is paid once a month or once a weak and makes disbursement throughout the period, he must maintion some idle folonces for transactions.

The amount of money held by an individual for the transaction purpose would vary positively with the volume of his tranactions. Income was assumed to be a good measure. of this volume of transactions, and thus the transactions demand for money was assumed to depend positively on the level of income.

The use of the term "transactions motive" was confined to describing the necessity of holding cash to bridge the gap between receipts and planned regular payments. Keynes also believed that, beyond money hold for planned trans-actions, additional money balances were held by individuals for those classes of payments that cannot be considered regular and planned, such as paying unexpected bills, making purchases at unexpectedly favourable prices, meeting sndden encergencies cansed perhaps by accidents or ill heldth. To meet these unexpected situations people find it prudent to hold some cash in case trey were not able to realise other assets quickly enongh to be of use. to them. this he called the "precantonary motive" for holding money, and suggested that the demand for money arising from it also depends, by and large, on the level of income.

Since both the tramsactions demand and the precantioary demand for money can be assumed to vary positively with the level of income, we can integrate these two demands for money into one, and call it M,, which can be given by

$$M_1 = \alpha Y \qquad \text{..... (4.6)}$$

where α a is a positive constant. The relation (4.6) can be represented by the line OD in Fig. 4.6.

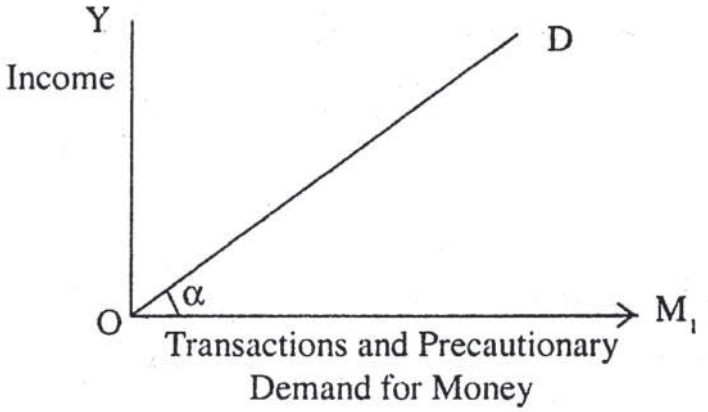

Fig. 4.6

Keynes, however, saw it clearly that the convenience to be had from holding cash for transactions and precautionary purposes could be traded off against the amount of interest that can be earned from holding other assets. But he did not stress the role of the rate of interest in this part of his analysis, for he considered that the chief role of the rate of interest lies in determining the so-called "speculative demand" for money.

Speculative Demand for Money (M_2)

The transactions and precautionary demands for money emphasize the medium-of-exchange function of money, for each refers to the need to have money on hand to make payments. But, according to keynes, people also demand money for speculative purposes. Speculative demand for money arises out of' people's demand to hold financial assets and make capital gains. This can be done only be buying bonds and other financial assets when their prices are low and. selling them when their prices are high. Such a demand for money involves uncertainties, and may even lead to capital losses. Capital gains and losses are intimately connected with the market rate of interest. This can be explained as follows.

Let us assume that bonds are the only form of financial assets available in the market. The analysis for bonds would be applicable to the case of all other financial assets. A bond is an asset that carries with it the promise to pay its owner a certain income per annum, fixed in money terms. The decision to buy a bond is a decision to buy a claim to such a future stream of income. How much a person will be willing to pay for a bond, 'and hence the market value of the bond, depends critically upon the rate of interest, for the person will wish to earn at least the going rate of interest on the amount of money spent in braying the bond. Thus, if the rate of interest is 5 percent, the person would be willing to pay up to, but not exceeding Rs. 100 for a bond that offered an income of Rs. 5 per annum in perpetuity. If the rate of interest were 10 percent, however, no one would be willing to pay more than Rs. 50 for the same bond. In general, if can be said that a rise in the interest rate means that the market prices of bonds fall, and a fall in the interest rate means a rise in the prices of bonds. Thus, changes in the rate of interest involve capital gains and losses for bond holders. Moreover, when the market rate of interest is expected· to fall, holding of bonds becomes particularly attractive because the prospect of capital gains brightens.

Keynes thought that, at any time, there would be a value of the rate of interest that could be regarded as "normal", so that if the rate of interest were above this "normal" level there would be a tendency for people to expect it to fall, and if it were below this level, to expect it to rise. Thus, at a high rate of interest, when they expect the interest rate to fall, the speculative demand for money would be small, for people would want to hold bonds in the expectation of making capital gains. As the rate-of interest falls and bond prices rise, some bond holders sell bonds, make capital gains and decide to hold money, so that the speculative demand for money rises. Thus, the relationship between the rate

of interest and the speculative demand for money (M_2) is an inverse are and is shown by the so-called liquidity preference schedule $L(r)$ in Fig. 4.7, where

$$M_2 = \alpha(r) \qquad \text{.... (4.7)}$$

$$\alpha < 0$$

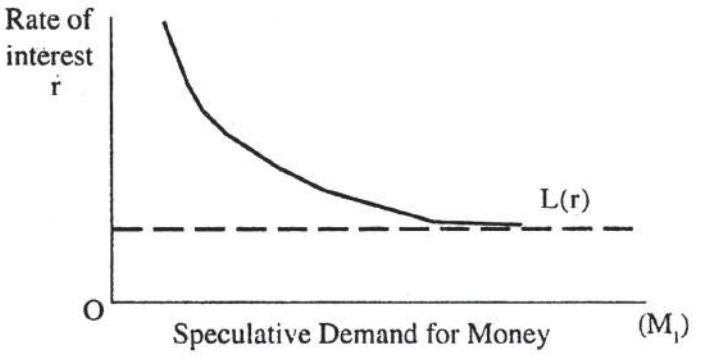

Fig. 4.7

Keynes also maintained that at some low level of the rate of interest everyone in the economy will expect the rate to rise rapidly enough to make them annulling to hold any bond and to prefer money instead. At this point the demand for money in the aggregate becomes perfectly elastic with respect to the rate of interest. The latter· variable can fall no further and any increase in the quantity of money will simply be absorbed without any fall in interest rates. This is the doctrine of "liquidity trap". In Fig. 4.7, the liquidity trap occurs at the rate of interest $r0$, at which $L(r)$ curve becomes perfectly horizontal.

4.5.1. The Keynesian Theory of the Money Market Equilibrium

As we have already pointed out, keynes thought that the rate of interest is a "monetary phenomenon" and is determined in the money market-by the demand for and the supply of money. Given the supply of money ($\overline{M}$), de-termined by the monetary authorities, total demand for money (Md) determines the rate of interest. Thus, the keynesian model for the determination of the rate of interest can be given by the following set of equations :

$$M_1 = \alpha Y$$

$$M_2 = \alpha(r) \qquad (M_5)$$

$$Md = M_1 + M_2 = M_S = \overline{M}$$

Again, we have three equations in four unknowns, and so the model (M_5) in under-determined. However, it yields combinations of r and Y which ensure equilibrium in the money market. These combinations of r and Y, which ensure money market equilibrium, define a curve known as the *LM* curve. To derive the *LM* curve diagrammatically we reproduce Fig. 4.6 in Fig. 4.8 and Fig. 4.7 in Fig. 4.9 respectively.

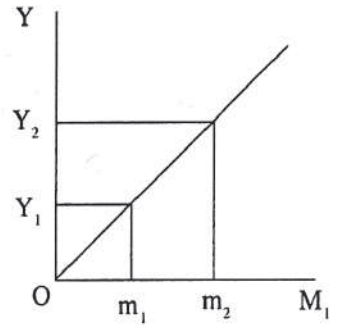

Fig. 4.8

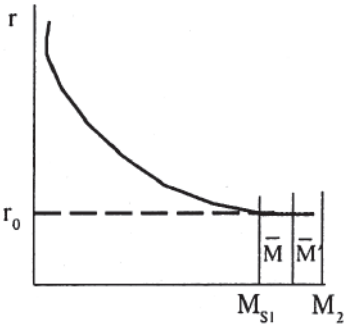

Fig. 4.9

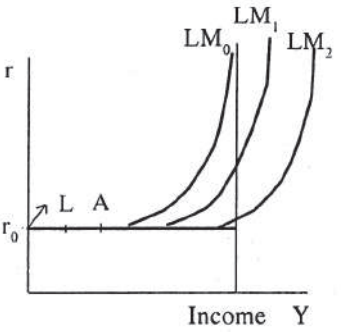

Fig. 4.10

Now if $Y = 0$, M_1 in model (M_5) and also in Fig. 4.8 is zero, and all noney is held as speculative balances. Hence, if the supply of money is $\overline{M}$ in Fig. 4.9, the equilibrium rate of interest is (r_0), which is in the liquidity crap. We plot these values of Y and r in Fig. 4.10. We get the point L on the vertical anis. If income rises to Y_1 (say), M_1 rises to Om_1 in Fig. 4.8. We dednet this value of M_1 from $\overline{M}$ in Fig. 4.9 to get the supply of money available for speculative purposes. This value is M_{S1}, which is held for speculative balances only if the rate of interest is r_0, So, even now the economy is in the liquidity trap. This combination of r_0 and Y_i is indicated by the point A in Fig. 4.10. In this way if can be presumed that the rate of interest would continue to remain in the liquidity tramp as income increases up to a certain level. So the line LA in Fig. 4.10 would continue. to grow in length. But eventually, as income and, hence M_1, continue to. rise, a time will come when M_2 would fall to such a low level that it would be held at a rate of interest higher than r_0, Thenceforward, as income would rise, the rate of interest would rise too. In this may we get the *LM* curve in Fig. 4.10., showing the relationship between the rate of interest on the one hand and equilibrium income on the other. It is to be noted that, as the supply of money increases, $\overline{M}$ point on the M_2 axis in Fig. 4.9 shifts to $\overline{M}$ point. As a result, the *LM* curve in Fig. 4.10 shifts gram LM_0 to LM_1 curve. In this way, we can visualize different *LM* curves corresponding-to different amounts of the supply

of money, all starting with the same value of the rate of interest in the liquidity trap (r_0) as in Fig. 4.10.

4.5.2. Properties of the LM Curve

From the above discussion it is clear that the *LM* curve shows combinations of the rate of interest and income such that the money market is in equilibrium. To study the properties of the *LM* curve we, for the time being, ignore the liquidity trap and assume that the liquidity preference function is a straight line. As a result, the model (M_5) changes to the model (M'_5) given by

$$M_1 = \alpha Y$$

$$M_2 = \beta - \gamma r$$

$$M_1 + M_2 = \overline{M}$$

Substituting the first two equations in the third, we get

$$\overline{M} = \alpha Y + \beta - \gamma r$$

$$\text{or, } r = \frac{1}{Y}(\alpha Y + \beta - \overline{M}) \qquad \text{..... (4.8)}$$

where (4.8) is the equation of the *LM* curve. From the equation of the *LM* curve (4.8) we can note the following properties of the *LM* curve.

- The *LM* curve is positively sloped. Given the supply of money ($\overline{M}$), an increase in income increase the rate of interest, and vice versa.
- The larger the responsiveness of the transactions and precautionary demand for money to income, as measured' by α, and the lower the responsiveness of speculative demand for money to the rate of interest, γ, the steeper the *LM* curve will be
- The position of the *LM* curve depends upon the supply of money ($\overline{M}$) and the value of β. If $\overline{M}$ increases the *LM* curve shifts to the right. (The keynesian *LM* curve of Fig. 4.10 also shows this).

For some particular values of α, β and γ, equation (4.8) can be represented by the line *LM* of Fig. 4.11. Any combination of *r* and *Y* lying on the line *LM* curve would indicate a situation of equilibrium in the money market.

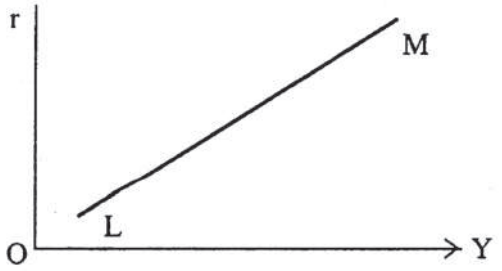

Fig. 4.11

To discuss how the economy behaves if the money market is. not in equilibrium, let us start with the position E, on the LM curve (Fig. 4.12), when

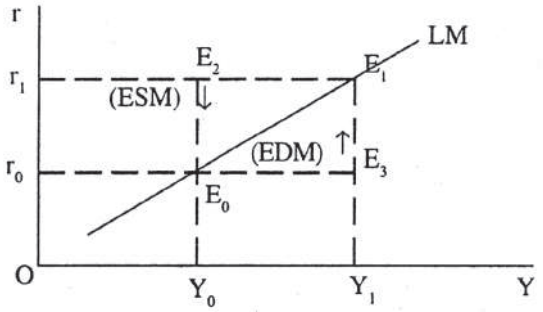

Fig. 4.12

the money market equilibrium is established with the rate of interest r_0 and the level of income Y_0. If income rises to Y_1, M_1 rises and, at the rate of interest r_0 demand for money exceeds the supply of money. Thus, at E_3 we have a situation of excess demand in the money market (EDM). We assume that in a situation of excess demand in the money market the rate of interest will rise and tend to choke off the extra demand. If the rate of interest rises to r_1 and the economy moves to the position E_1 on the *LM* curve, equilibrium in the money market is reestablished.

Starting with the money market equilibrium at E_1, if income now drops to Y_0, transactions and precautionary demand for money, M_1, falls and if the rate of interest remains at r_1, we move to the position E_2, where, the supply of money remaining the same, an excess supply of money develops which, we will assume, will tend to depress the rate of interest. The arrows in Fig. 4.12 show the directions in which the rate of interest moves in situations of dis-equilibrium in the money market.

4.5.3. Equilibrium in the goods and Money Markets

With our above discussion of the IS and LM curves we are now in a position to combine both the markets together. Since both the goods market equilibrium curve (IS) and the money market equilibrium curve (LM) show combinations of the rate of interest and national income (Y), the two curves can be superimposed one upon the other to study the combination of r and Y which would establish equilibrium in both the markets. In Fig. 4.13 the IS and the LM curves intersect one another at the point E to establish that. If the rate of interest is r_0 and the level of income Y_0, then there would be equilibrium both in the goods market and the money market.

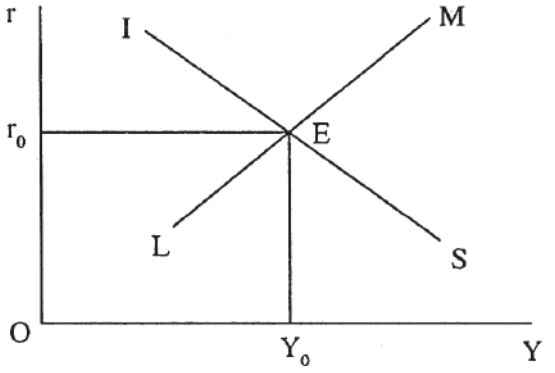

Fig. 4.13

Moreover, it can be shown that this equilibrium is a stable equilibrium in the sense that if the economy is not at E, then forces would be generated to bring the economy to E. This can be showri quite distinctly with the assumptions that we have mode regarding the positions that are not on the IS and LM curves. The assumptions can now be restated as follows :

1. Output increases whenever there is an excess demand in the goods market and declines whenever there is an excess supply of goods.
2. The interest rate rises whenever there is an excess demand for money and falls whenever there is an excess supply of money.

With these assumptions we can study how the economy adjusts to situations of disequilibrium. If the economy is placed in Region I, above both the IS and the LM curves, then it implies a situation of excess supply of goods (ESG) and of excess supply

of money (ESM). In such a situation output (Y) will fall because of excess supply of goods and the rate of interest (r) will also fall because of excess supply of money. The forces operating to reduce Y and r in Region I are indicated by the arrows in that region. The situations of excess demand and excess supply in the two markets and the corresponding arrows showing the direction of the forces operating there are indicated in different regions. The vertical arrows in different regions indicate that the rate of interest will lither rise or full and the horizontal arrows indicate that the level of output will either rise or fall. The assumptions mode above ensure that the equilibrium in the goods and the money markets, as indicated by the point E in Fig. 4.14, is a stable one. And if the economy is, for some reason or another, is not at E, then the disequilibrium will set in forces which will bring the economy back to E. Fig. 4.14 shows how the economy will behave if it is at E_1.

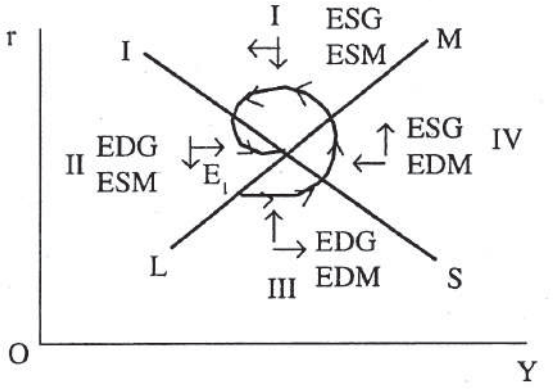

Fig. 4.14

4.6 Effects of Monetary and Fiscal Policies

The above discussion about the goods market and the money market equilibrium and disequilibrium situations will enable us to study the effects of government's monetary and fiscal policies. Government's monetary and fiscal policies bring out distnbauces in the economy which can studied in terms of disequilibrium situations. The government's monetary policies have their impact on the money supply in the economy and the market rate of interest. These policies include the central bank operations to control the money market, particularly its open market operations, variable reserve ratio operations, bank rate policy, and so on. The government's fiscal policies include public expen-diture,

taxation, borrowing and lending policies. It is to be noted that public expenditure and taxation policies directly affect demand, while monetary policy affects aggregate demand only by influencing the rate of interest. Hence, fiscal policy is more of an activist-type of intervention into an otherwise privately governed economy than monetary policy, and tries to influence employment and output directly. The difference will be apparent when. We discuss monetary and fiscal policies separately.

4.6.1. Monetary Policy

The chief instrument of monetary policy is open market operations. In an open market operation, the central bank can increase the stock of money by buying bonds in exchange for money, or can reduce the stock of money by selling bonds in exchange for money paid by the purchasers of the bonds.

When the central bank buys bones, it pays for them with money that it can create and it purchases reduce the supply of bonds available in the market, which tends to increase their prices. As a result their yield and, consequently, the market rate of interest falls. Only at this lower interest rate will the public be prepared to hold a larger faction of its given wealth in the form of money and a lower fraction in the form of bonds. As the rate of interest falls, it encourages investment, employment and output. Thus, in terms of the trans-mission mechanism, the effects of an open market purchase of bonds cam be summarized as :

$$\text{M up} \rightarrow r \text{ down } I \text{ up } Y \text{ up.}$$

In Fig. 4.15, an increase in the supply of money shifts the *LM* curve to the *L'M'* position which, with an uncharged IS curve, generates a new equilibrium at E_1. As a result, the rate of interest falls from r_0 to r_1 and income increases from Y_0 to Y_1.

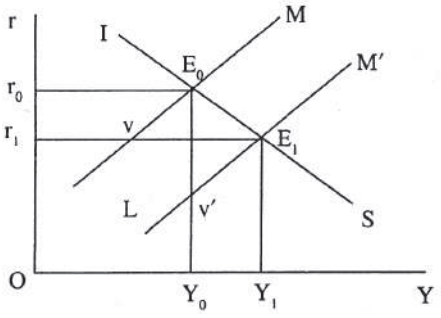

Fig. 4.15

When the government follows a contractionary monetary policy and sells government bonds in the open market, it reduces the money stock in the hands of the public and increases the supply of bonds in the market which tends to reduce their price. As the prices of bonds full, their yields rise tending to increase the market rate of interest. As the rate of interest rises 'investment is discoveraged which, through the multiplier, depresses income by a multiple amount. The transmission mechanism can be given by

$$M \text{ down} \rightarrow r \text{ up} \rightarrow I \text{ down} \rightarrow Y \text{ down.}$$

The changes in the rate of interest and income can also be studied in the IS-LM framework of Fig. 4.15. If *L'M'* is the initial *LM* curve, then the initial equilibrium position is E_1, with the rate of interest r_1 and income Y_1. If the supply of money falls, the *LM* curve shifts from *L'M'* to *LM* in Fig. 4.15. Equilibrium is established at the point E_0, where the rate of interest rises to r_0 and income falls to Y_0.

Effectiveness of Monetary Policy

From Fig. 4.15 it is obvious that the changes in the rate of interest and income following from the government's monetary policies depend on the steepness of the *LM* and *IS* curves : the steeper the *LM* curve, the larger are the changes in the rate of interest and income. With reference to the equation of the *LM* schedule (4.8) we see that it will be steeper if the demand for money is not much sensitive to changes in the rate of interest. In that case, if the money supply rises, little of it is absorbed in speculative demand and most of it is demanded in transactions and precautionary purposes, which is possible only if income rises considerably. Monetary policy would be most effective in the classical case where the demand for money is totally insensitive to changes in the rate of interest and the *LM* curve is vertical.

The polar opposite is the keynesian liquidity trap case where the demand for money is infinitely elastic with respect to the rate of interest. A given change in the supply of money is absorbed in the money market with no change in the rate of interest. Hence, there is no changes in output.

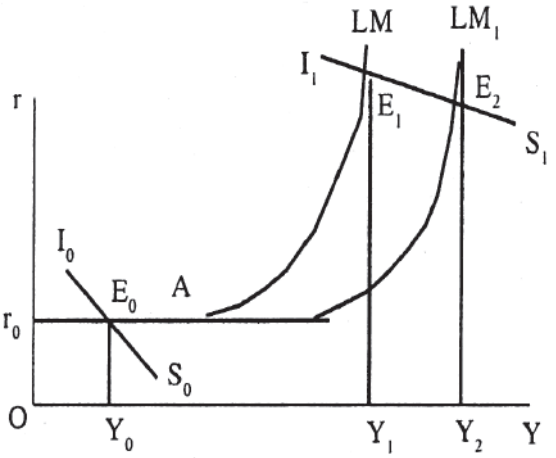

Fig. 4.16

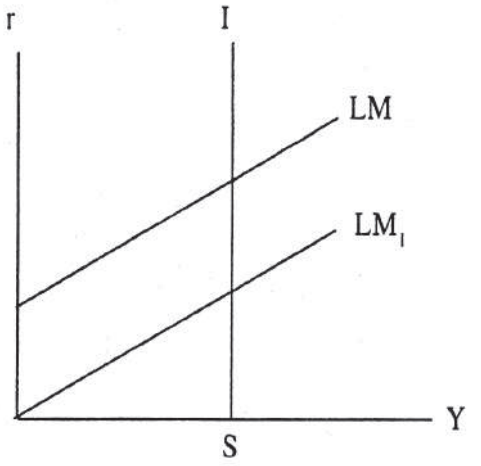

Fig. 4.16A

Both the classical and the keynesian liquidity trap cases can be illustrated with reference to Fig. 4.16. An increase in the supply of money shifts the LM curve to the *L'M'* position. If the economy is in the liquidity trap with the *IS* curve given by I_0S_0, the increase in the money supply has no influence an the economy : The rate of interest remains at r_0 and income at Y_0. But if the IS curve is higher up and cuts the LM curve at E_1, an increase in the money supply brings about a large increase in income. The equilibrium shifts from E_1 to E_2.

Steepness of *IS* curve. indicates interst sensitivity of investment and so income, with completely inelastic investment function monetary policy will have no effect on income see Fig. 4.16A.

4.6.2. Fiscal Policy

According to keynes, high unemployment during the great Depression years was due to a deficiency in aggregate demand. To stimulate demand he suggested fiscal policy measures, particularly government spending on public works projects. Fiscal policy measures. also include taxation policies to affect consumption and investment.

To study the effects of government's fiscal policies, we need to consider taxes and government expenditure in the equation of the IS curve. If we introduce government expenditure (G) and taxes ($T = tY$) in the (M'_3) model, it becomes

$$Y \equiv C + I + G$$

$$C = a + e.YD \qquad (M_2)$$

$$\mathrm{I} = \bar{I} - br$$

$$\mathrm{G} = \bar{\mathrm{G}}$$

where YD stands for disposable income given by

$$YD = Y - T = Y - tY$$

$$= (1 - t)Y$$

The consumption function now becomes

$$C = a + e(1 - t)T$$

Thus, from the model (M_6) we have

$$Y = a + e(1 - t)Y + \bar{I} - pr + \tfrac{1}{\mathrm{k}}\mathrm{M}$$

or, $$Y\,[1 - e(1 - t)] = a + \bar{I} + \bar{G} - br$$

or, $$\mathrm{Y} = \frac{\mathrm{a} + \bar{I} + \bar{G}}{[1 - e(1 - t)]} - \frac{\mathrm{br}}{[1 - e(1 - t)]}$$

$$= \bar{\mathrm{m}}(\bar{\mathrm{A}} - br) \qquad \text{..... (4.9)}$$

where $\bar{\mathrm{A}} = \mathrm{a} + \bar{I} + \bar{G}$ and $\mathrm{m} = \dfrac{1}{[1 - e(1 - t)]}$

(4.9) can be expressed as

$$\mathrm{r} = \frac{\bar{\mathrm{A}}}{b} - \frac{\mathrm{Y}}{\bar{m}b} \qquad \text{..... (4.9a)}$$

Equation (4.9a) is the equation of the IS curve, which shows that the level of government expenditure, $\bar{G}$, is a component of autonomous expenditure, $\bar{A}$ and that the income tax rate, t, is part of the multiplier ($\bar{m}$).Thus, both government expenditure and the income tax rate af.fect the IS schedule.

Crowding-Out Effect

We can study the effects of changes in government expenditure and the rate of income taxation with reference to the model (M_6) in an IS - LM framework. If the government increases its expenditure by $\Delta\bar{G}$, the IS curve shifts from $I_0 S_0$ to $I_1 S_1$ in Fig. 4.17. With a horizontal shift equal to $\bar{m}\Delta\bar{G}$. If the rate of interest remains at its initial equilibrium value, r_0, income would rise to Y_1, from Y_0, at E_1,. But the increase in income raises the demand for money which, with unchanged stock of money, raises the rate of interest. The rise in the rate of interest discourages private investment spending. This is called the crowding-out effect, which occurs when expansionary fiscal policy causes interest rates to rise, thereby reducing private spending, particularly investment. We can also notice that at E_1, the goods market is in equilibrium, but not the money market. As the rate of interest rises from r_0, aggregate spending falls and, as we. have seen in Fig. 4.14, the economy eventually moves to the goods-market-money-market equilibrium at E_2, where the rate of interest is r_2, and income Y_2,

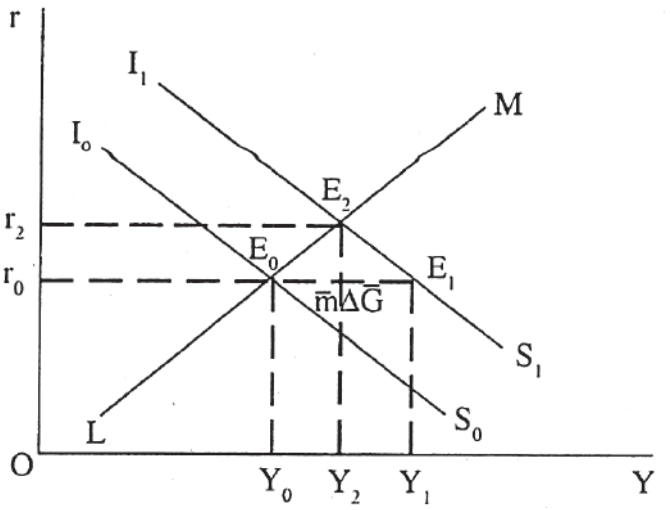

Fig. 4.17

A reduction in the income tax rate, t, will have similar effects. If will increase the value of the multiplier which, all other relevant factors remaining· the same, will shift the IS curve to the right. The rise in the rate of interest will have crowding-out effects. As a result income will rise, but the rise will depend on the value of the crowding-out-effect.

Effectiveness of Fiscal Policy

It is apparent from the above discussion that effectiveness of fiscal policy depends on the strength of the crowding-out effect. Fig. 4.18 shows that if the economy is in the liquidity trap, an increase in government expenditure does not increase the rate of interest. Hence, there is no crowding-and, out as the IS curve shifts from I_0S_0 to I_1S_1, income increases by the full amount of the multiplier from Y_0 to Y_0.

If, on the other hand, the economy operates at full employment, the LM curve is vertical and a rise in government expenditure is completely crowded out through a steep rise in the rate of interest. This rise in the rate of interest discourages private spending by the full amount of government expenditure. Consequently, there is no increment in income, which is already at the level of full employment.

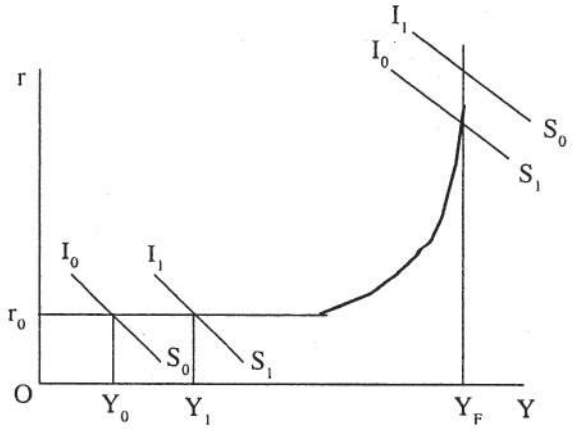

Fig . 4.18

Thus, fiscal policy is likely to be very effective in a less developed country like India, where full employment is a far cry and government investment spending discourages, rather than discourages, private spending.

4.7 The Policy Mix

Liquidity trap condition and full-employment level of income are special situations which are quite rare. Usually the economy may be in equilibrium at E_0 where income Y_0 is less than the full-employment level of income YF (Fig. 4.19). In order to achieve full employment, the government may adopt a monetary expansion, shifting the LM

curve from L_0M_0 to L_1M_1. This will lead to the achievement of full-employment level of output at E, with a lowering of the rate of interest. The government may also adapt a fiscal expansion shifting the IS curve from I_0S_0 to I_1S_1 and reaching full employment with a rise in the rate of interest at E_1.

Such a rise in government spending may involve a large amount of budget deficit. To avoid a big budget deficit the government may decide to have· a policy mix and monetize the budget deficit through a policy of monetary accommodation. Monetary policy is said to be accommodating when, in course of a fiscal expansion, the money supply is increased in order to prevent interest rates from rising. Through a policy mix the government may need a smaller budget deficit and same monetary expansion to reach the full-employment level of output. As Fig. 4.19 shows, in a policy mix both the IS and the LM curves shift to a position like I_2S_2 and L_2M_2 to reach full employment at E_3

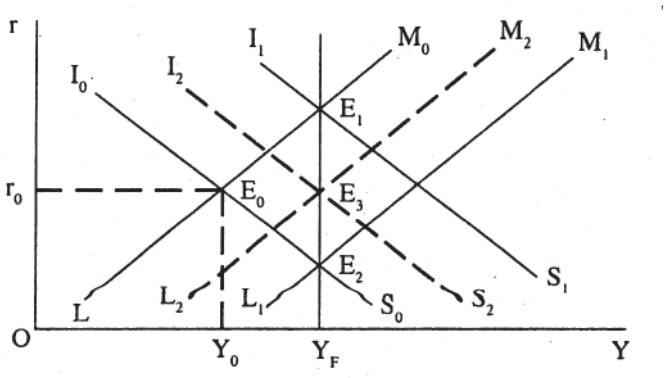

Fig. 4.19

4.8 Exercises

4.8a. Objective Type Questions :

1. If the government increases its spending

(a) the IS curve shifts to the left; (b) the IS curve shifts to the right; (c) the LM curve shifts to the left; (d) the rate of interest rises.

2. If the central bank increases the money supply

(a) the rate of interest falls; (b) the IS curve shifts to the left; (c) the LM curve shifts to the right; (d) the LM curve shifts to the left.

3. It there is excess demand in the goods market

(a) the rate of interest will rise; (b) crowding out will take place; (c) output will rise; (d) none of the above will take place.

4. If there is excess supply in the money market

(a) the output will fall; (b) the output will rise; (c) the rate of interest will fall; (d) None of the above will take place.

4.8b. Short-answer Type· Questions :

5. Suppose· that

C = 60 + 0.8YD	I =150- lOr
G = 250	T = 200
M = 100	M^d = 40 + 0.1Y– lOr

a. Write the equations for the IS and LM schedules.

b. Find the equilibrium values for income (O,) and the rate of interest 0r).

6. Within the IS- LM model, show how income and the interest rate are

affected by each of the following changes.

(a) an increase in government spending; (b) an autonowous decline in investment spending; (c) an increase in taxes; and (d) an increase in the money stock.

7. What would be the effect within the IS-LM model of. an autonomous increase in saving that was matched by a drop in consumption, that is, a fall in a in the consumption' function?

$$C = \alpha + \beta (Y - T)$$

Which curve would shift? How would income and 'the interest rate be affected?

8. Discuss the circumstances under which fiscal expansion leads to full crowding out.

4.8c Long-answer Type Questions :

9. The economy is at full employment. Now the government wants to change the composition of demand toward investment and away from consumption without, however, allowing aggregate demand to go beyond full employment. What is the required policy-mix? Use the IS-LM diagram to show your policy proposal.

10. Discuss the role of parameters h, }, a, and b in the transmission mechanism linking an increase in government spending to the resulting change in equi-librium income. In developing the analysis ·use the following table

(1)	(2)	(3)
Increase in G raises aggregate demand and output.	The increase in income raises money demand and hence interest rates.	The increase in interest rates reduces investment spending and hence dampens output expansion.

11. Suppose the government cuts income taxes. Show in the IS-LM model the impact of the tax cut under two assumptions : One, the government keeps interest rates constant through an accommodating monetary policy; two, the money stock remains unchanged. Explain the difference in results.

12. Consider an economy in which the government consider two alternative programmes for contraction. One is the removal of an investment subsidy,; the other is arise in income tax rates. Use the IS-LM schedule and the investment schedule to discuss the impact of these alternative policies on income, interest
rates and investment.

4.9 References

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Unit-5 ❑ Aggregate Demand, Monetarism and the Sophisticated Demand- for- Money

Structure

5.0 Objectives

This unit will help you to understand

- How aggregate demand in the economy is determined
- How monetary and fiscal policies affect aggregate demand
- The main tenets of the counterrevolution launched by Milton Friedmar
- The restatement of the quantity theory of money

5.1 Introduction

In the last. two units we discussed the determination of income assuming that the price level and money wages were fixed. These assumptions were made in order to high light the. role of aggregate demand, which is the foundation of the Keynesian analysis. It is to be noted that this emphasis on demand, as being the principal determinant of output, stands in sharp contrast to the supplydetermined nature of the classical system. But, as we shall see, when prices and wages are not held constant, both demand and supply factors become important in the determination of output. In this sense the analysis to be made in the following units would incorporate elements

of both the classical and the Keynesian systems. In the following section of the present unit, however, WC will explore the implications of relaxing the assumption of fixed prices, keeping wages fixed for the time being. This would enable us to deduce the aggregate demand curve, and to remain within the keynesian system.

5.2 From the IS-LM Model to the Aggregate De mand Curve

To study the· effects of changes in the price level in the Keynesian framework of analysis, we continue with our Model (M,) which assumes a closed economy where there is no government expenditure. To facilitate understanding, we reproduce the model here as follows :

$$Y = C + I$$

$$C = e(Y) \quad (M_3)$$

$$I = I(r)$$

which yields the IS curve equation.

$$Y = e(Y) + I(r)$$

IS : or, $Y - e(Y) = S(Y) = I(r)$ ..... (5. 1)

Given the consumption and the investment functions. of (M_3), a rate of interest determines a particular value of investment expenditure which, in· its turn, determines the equilibrium value of income. Or; in other words, economic equilibrium obtains when savings planned according to income is equal to investment planned according to the rate of interest, as shown in (5.1).

If we introduce government expenditure into the picture, there would be no essential change in the model; the only change would be in the consumption function, which would now be a function of disposable income (Y- T), and the rs· curve would be given- by

IS : $S(YD) + T = l(r) + G$ .....(5.2)

where YD stands for disposable income, T for taxes and G for government expenditure. The student is advised to derive the IS curve (5.2) by making necessary changes in the model (M_3). The left-hand side of the IS curve (5.2) stands for supply of resources available by way of private saving and government saving, while the right-hand side shows the demand for resources other than consumption demand.

It is to be noted that the IS curves of (5.1) and (5.2) would be appropriate if we

assume that the price level is given. If this assumption is dropped, we need to reformulate Model (M_3) in terms of real values, which change with changing prices. We woul.d use lowercase letters to indicate real values, so that IS curves of (5.1) and (5.2) would now become

$$s(y) = i(r) \qquad \text{.....(5.1a)}$$

and $$s(yd) + x = i(r) + g \qquad \text{.....(5.2a)}$$

respectively.

We would, however, assume that the level of government spending (g) and that of taxes (x) are constant in real terms, so that the IS equation (5.la) would be appropriate for our subsequent discussion. Moreover, we would assume. that changes in the price level do not affect the rate of interest and real income. As a result, real saving ·and real investment do not change with changes in prices.

The assumption of variability in the price level also requires a reformu

lation of the LM curve of the model (M_5), which was

$M_1 = \alpha Y$

$M_2 = \alpha(r)$

$M_d = M_1 + M_2 = M_8 = \bar{M}$

The money demand functions for M, and M, of Model (M,) can be combined into one single function as

$M_d = M_1 + M_2 = \alpha\ (Y,\ r)$

so that the LM curve can be given by

$$\text{LM} : \alpha\ (Y,\ r) = \bar{M} \qquad \text{.....(5.3)}$$

But, when we want to discuss the impact of price level- changes, we need to reformulate (5.3) to take account of what happens to the real demand for money and real supply of money. So, in real terms (5.3) becomes

$$\text{LM} : \alpha\ (\text{y, r}) = \frac{\bar{M}}{P} = \bar{m} \qquad \text{..... (5.3a)}$$

where P is the price level and m is the real stock of money. The LM curve equation

(5.3a) equates the real demand for money with the real stock of money

$$\left(\bar{m}=\frac{\bar{M}}{P}\right)$$

It is to be noted that, since the price level (P) is part of the LM curve (5.3a), every change in the price level changes, unlike the IS curve (5.1a), the position of the LM curve. This is illustrated in Fig. 5.1.

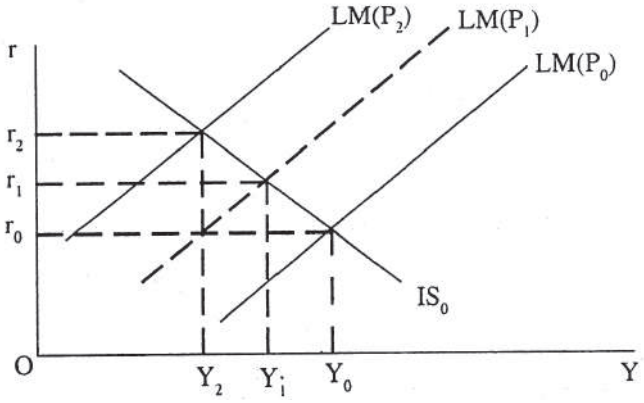

Fig. 5.1

Fig. 5.1 shows that as the price level increases from P_0 to P_1, the real stock of money supply falls, and the LM curve shifts from $LM(P_0)$ to $LM(P_1)$. If the price level rises still further to P_2, the LM curve shifts further up to $LM(P_2)$. But the IS. curve remains unaffected by these price changes, since the IS relationship is independent of the price level changes. As a result, the equilibrium rate of interest rises reducing the level of real investment demand and, hence, aggregate demand, which, in the keynesian model, is equal to aggregate real income (y).

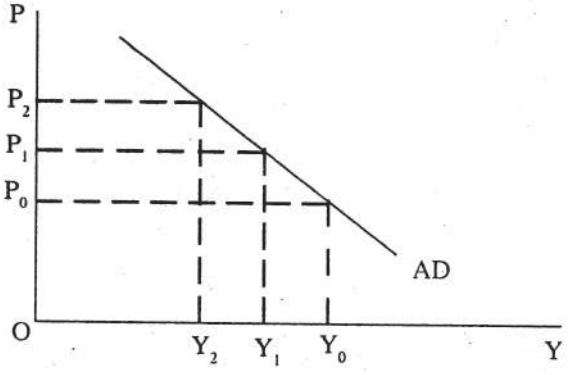

Fig. 5.2

Thus, in Fig. 5.2, if we draw the price level on the vertical axis and real income on the horizontal axis, we get a downward sloping relationship between the price level P and real income y. This is called the aggregate demand curve (AD), which shows equilibrium levels of aggregate demand or real income at different values of the price level.

Properties of the AD curve

A. The AD curve is downward-sloping :

It is so because, the higher the price level, the smaller the real balances, and, hence, the higher is the value of the market rate of interest (r). At high interest rates, investment is low and, hence, income is low. This can be shown more clearly if we derive the AD curve from the IS equation (4.9) and the LM equation (4.8). To facilitate understanding they are reproduced here

IS: $Y = \bar{m}(\bar{A} - br)$

LM : $r = \frac{1}{y}(\alpha Y + \beta - \bar{M})$

Since we are here interested in the real values we changes then as follows:

IS : $y = \bar{m}(\bar{A} - br)$

LM : $r = \frac{1}{y}\left(\alpha y + \beta - \frac{\bar{M}}{p}\right)$

Substituting for r from the LM equation m the IS equation, we get

$$y = \bar{m}\left\{\bar{A} - \frac{b}{y}\left(\alpha y + \beta - \frac{\bar{M}}{p}\right)\right\}$$

$$= \bar{m}\bar{A} - \frac{\bar{m}b\alpha}{Y}y - \frac{\bar{m}b\beta}{Y} + \frac{\bar{m}b}{Y}.\frac{\bar{M}}{P}$$

$$\text{or,} \quad y\left(1 + \frac{\bar{m}b\alpha}{Y}\right) = \bar{m}\left(\bar{A} - \frac{b\beta}{Y}\right) + \frac{\bar{m}b}{Y}.\frac{\bar{M}}{P}$$

$$\text{or,} \quad y = \frac{\bar{m}(y\bar{A} - b\beta)}{y + \bar{m}b\alpha} \cdot \frac{\bar{M}}{P}$$

$$= \eta B + \xi \frac{\bar{M}}{P} \qquad \text{.....(5.4)}$$

$$\text{where } \eta B = \frac{\bar{m}(y\bar{A} - b\beta}{y + \bar{m}b\alpha}. \ \xi = \frac{\bar{m}b}{y + \bar{m}b\alpha}$$

where the terms ηB and ξ depend on all the parameters of the functions involved. Rearranging the terms of (5.4), the *AD* curve can be written as

$$AD : P = \xi \frac{\bar{M}}{y - \eta B} \qquad \text{.....(5.5)}$$

where is the given value of nominal money supply and ηB is primarily determined by antimonious spending. The equation (5.5) clearly indicates the inverse relationship between P and y,

B. The Slope of the AD curve

Since the AD curve has been derived from the interacti6n of the IS and LM curves, Fig. 5.1 and equation (5.4) help us to specify that the slope (absolute)

of AD $= \left|\frac{dP}{dy}\right| = \left|-\frac{p^2}{\xi M}\right|$ and as $\xi = \frac{\bar{m}b}{y + \bar{m}b\alpha}$ The AD curve is falter larger is ξ This means

l. (a) smaller is the value of yi.e. the smaller the interest responsiveness of demand for money; (b) larger is interest responsiveness of investment demand that is larger is b.

2. The AD curve is flatter is the multiplier ($\bar{m}$), and smaller is income responsiveness of the demand for money (0).

C. Effects of Fiscal Policy on the *AD* curve

Since the *AD* curve has been derived from the IS and LM curves, the factors which

determine the positions of the IS and LM schedules also determine the position of the *AD* curve.

In Fig. 5.3(a), the initial LM and I_0 schedules correspond to a given nominal quantity of money and the price level P_0 Equilibrium is obtained at point E_0, and there in a corresponding point on the *AD* curve in Fig. 5.3(b).

An increase in government spending shifts the IS curve from IS_0 to IS_1. At the initial price level there is a new equilibrium at E_1, with higher interest rates and a higher level of income and spending.

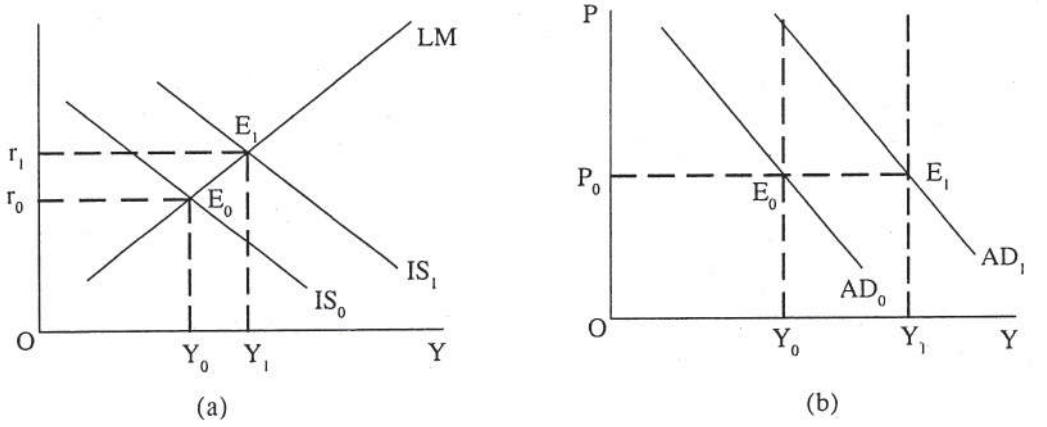

Fig. 5.3

At the same prices, E, of Fig. 5.3(a) corresponds to point E_1 in Fig. 5.3b), defining a new *AD* curve AD_1 Indeed it can be said that at each level of prices, and hence real balances, the *AD* schedule shifts to the right by an amount indicated by the fiscal policy multiplier.

D. Effects of Monetary Policy on the AD curve

When the government resorts to a monetary policy and, say, increases the stock of money supply, real money supply increases at each level of. prices. The resulting decline in interest rates stimulates aggregate demand and thus raises the equilibrium level of income and spending. The AD curve shifts to the right, which is shown in Fig. 5.4.

When the stock of money increases LM curve shifts- parallel to itself from LM_0 to LM_1

and the equilibrium point shifts from E_0 to E_1. The rise in income from Y_0 to Y_1 in Fig. 5.4(a) corresponds to the rise in real income from y_0 to y_1 in Fig. 5.4(b). The *AD* curve shifts from AD_0 to AD_1.

Since $\frac{\bar{M}}{P}$ remains unchanged when *P* rises proportionately to a rise in, $\bar{M}$ the *AD* curve in Fig. 5.4(b) shifts to the right proportionately as the money supply rises. Hence, the AD_1 curve is proportionately higher up than the AD_0 curve.

5.3 Monetarism and the Sophisticated Demand for Money

We have seen in the Unit 4 that the effectiveness of monetary and fiscal policies depends upon the relative slopes of the IS and LM curves. Keynesians believed that the demand for money is quite sensitive to changes in the rate of interest and, hence, the **LM** curve is quite flat. On the other hand, they thought that the demand for investment is not much responsive to changes in the interest rate and, so, the IS curve is relatively steep. Under such circumstances, as we have seen in Fig. 4.16, monetary policies are not much effective in bringing about changes in income. On the other hand, as Fig. 4.18 shows, fiscal polices can quite adequately serve the purpose of achieving desired changes in income. Indeed, the keynesians placed a tremendous amount of importance to the efficacy of fiscal policies in correcting economic disturbances in the economy, particu-larly depression and unemployment. In fact, Keynesian fiscal policies were effectively utilized by different countries to bail their economies out of depres-sion even after · the l 930's.

But Milton Friedman in the late l 950's pointed out that the keynesian views about the efficacy of fiscal and monetary policies were based on a wrong notion about the role of money in the economy on the one hand and that of the rate of interest on the other. He and his colleagues launched a movement, which has been called "monetarism" and- which Friedman himself regarded as a counterrevolution in monetary theory.

Basic to the monetarist position is the belief that money is perhaps the most important determinant of economic activity. Friedman has said, "I regard the description of our position as "money is all that matters for changes in nominal income and for short-run changes in real income" as an exaggeration but one that gives the right flavor of our conclusions". He regards that the demand for many is a more stable function than the Keynesian consumption function. He points out that "there is no other empirical relation in economics that has

been observed to recur so uniformly under so wide· a.variety of circumstances as the relation between substantial changes over short periods in the stock of money and in ·prices; the one is invariably linked with the other and is in the same direction; this uniformity is, I suspect, of the same order as many of the uniformities that from the basis of the physical sciences".

5.3.1 Friedman's Restatement of the Quantity Theory of Money: the Weak Version

With this conviction in the role of money Friedman tried to resurrect the old quantity theory of money, dismissed in section 4.4 above, from "the at-rophied and rigid caricature that is so frequently described" by the Keynesians. He pointed out that the quantity theory of money is "not a theory of output, or of money, or of the price level". It is "in the first instance a theory of the demand for money" and money is one kind of asset, as emphasized by keynes. But, unlike keynes, Friedman takes, into consideration the yields on not only bonds, but also those on equities and durable goods. Moreover, he does not segment out the demand for money into components representing transactions balances, speculative demand and a precautionary demand. Friedman's money demand function can be written as

$$M^d = L(P, y, r_B, r_E, r_D) \quad \text{.....(5.6)}$$

where P is price level, y real income, r_B nominal interest rate on bonds, r_E nominal return on equities, and r_D, is the nominal return on durable goods.

In Friedman's view, the demand for money depends on nominal income *(P.y),* which is very similar to keynes's transactions demand for money. Like keynes, Friedman also assumed that the demand for money depends on the rates of return offered on alternative assets. But the assets include not only bonds, as emphasized by keynes, but also equities and durable goods like land and houses. Though the durable goods do not yield on explicit interest, their return is the expected increase in the prices of these goods over the period for which they are held. Thus, the· expected rate of inflation is also a determinant of the demand for money. An increase in the rate of return on any of these alternative assets causes the demand for money to fall.

The Strong Version

Friedman's money demand function (5.6) can be used to restate the Cambridge version of the quantity theory of money, discussed in section 4.4 above, as

$$M^d = k(r_B, r_E, r_D,)Py \quad \text{.....(5.7)}$$

where, unlike the Cambridge version, where *k* is a constant, *k* here indicates a functional relationship involving the rates of return on the assets· that are alternatives to holding money. A rise in the rate of return on any one of these assets would cause *k* to fall, indicating a fall in the demand for money and, consequently, an increased desirability of the alternative asset.

Friedman points out that the variables r_b r_E and r_D, are not very important in determining the demand for money, so that *k* can be regarded as a constant in most cases. As a result, Friedman's demand for money function, given in (5.7), can be written in a stranger form as

$$\mathrm{P.y} = \frac{1}{\mathrm{k}}\mathrm{M}^{\mathrm{d}} \quad \text{..... (5.8)}$$

And in equilibrium when the supply of money, *M,* is equal to the demand for money, M^d, we have

$$P.y = \frac{1}{\mathrm{k}}\mathrm{M} \quad \text{.... (5.8a)}$$

This stronger form asserts that money income is proportional to the stock of money in the economy–a position which is identical with the Cambridge version of the quantity theory of money. Relying on this stronger version of his own restatement of the quantity theory, Friedman maintains that appreciable changes in the rate of growth of the stock of money are a necessary and sufficient condition for appreciable changes in the rate of growth of money income.

5.3.2. Fiscal and Monetary Policies Keynesians

We have pointed out above that, according to Friedman, r_B r_E and r_D, are not very important in determining the demand for money. Hence, the monetarists believe that the LM curve is quite steep. On the other hand they maintain that the rate of interest is for more influential then what keynes thought in deter-mining aggregate demand. They point out that a change in the interest rate implies a change not only in the return on bonds, but a change in. the prices of corporate stock, the prospective return on real estate, and holding durable goods as well. These changes are likely to affect investment demand to a considerable extent, making the IS curve quite flat. As a result, the monetarists maintain

that fiscal policy is quite ineffective to bring about considerable changes in income. In Fig. 5.5 an increase in government spending shifts the relatively flat IS schedule from IS_0 to IS_1. The LM_0 curve being quite steep, the change in the fiscal policy would increase income by a very small amount" from Y_0 to Y_1, as the considerably higher rise in the rate of interest would crowd out investment demand and, hence, income. Thus Friedman pointed out "I come to the main point-in my opinion, the state of the budget by itself has no significant effect on the course of nominal income, on deflation, and on cyclical fhuctnatious". In reality, a tax cut or an increase in government spending is financed by printing new money and we have both a monetary policy action (M increases) and a fiscal policy action (g increases or T falls). Thus, not only the IS curve shifts to the right, but the LM curve also shifts to the right. And the resulting change in income comes primarily from the shift of the LM curve since, as we have seen above, a shift in the IS curve is not likely to change income much.

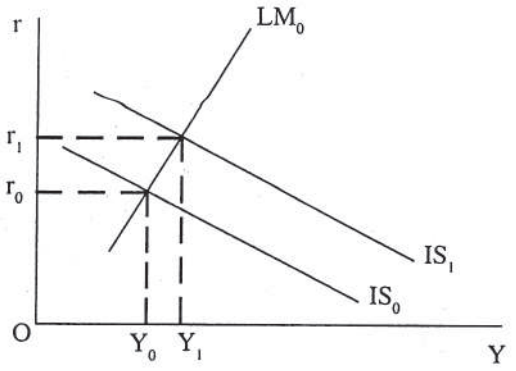

Fig. 5.5

The monetarist's position can better be illustrated by means of aggregate demand and aggregate supply curves. The aggregate supply curve will be discussed in the next unit. But when changes in the supply of money is considered, the aggregate supply curve (y^s) can be regarded as fixed.

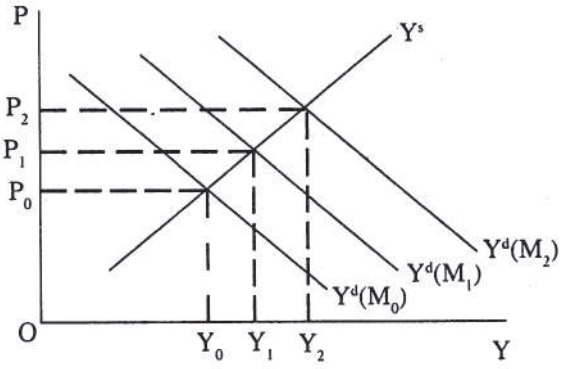

Fig. 5.6

Since, as we have seen above, changes in the supply of money plays a more important role than the fiscal policy to bring about shifts in the aggregate demand curves from $y^d(M_0)$ to $y^d(M_1)$ or to $y^d(M_1)$, when money supply rises from M_0 to M_1 and then to M_2 Now, given the shifts in the aggregate demand curve, the changes in income depends upon the steepness of the aggregate supply curve (y^s) to be discussed in the next unit.

5.4 Exercises

a. Objective Type Questions :

1. The aggregate demand curve shifts to the right if
   (a) the propensity to save increases;
   (b) the· investment demand curve shifts to the rights;
   (c) the price level increases;
   (d) none of the above.
2. The aggregate. demand curve shifts to the left if
   (a) the government increases its purchases of goods and services;
   (b) the government increases the rate of taxation;
   (c) the government decreases its borrowing;
   (d) all of the above.
3. The aggregate demand curve shifts to the right if

(a) the central bank increases the money supply;

(b) the government buys back same government bonds;

(c) the central bank lower, the discount rate;

(d) all of the above.

4. Fiscal policy will have. little effect if

(a) if the rate of interest rises;

(b) if there is no accompanying increase in the supply of money;

(c) if people do not correctly anticipate the government's intensions;

(d) all of the above.

b. Small-answer Type Questions

5. Show that the aggregate demand curve is flatter, the smaller is the interest responsiveness of the demand for money.

6. Show diagrammatically that the aggregate demand curve is. steeper, the smaller the multiplier and the larger the interest responsiveness of the demand for money.

7. Suppose that the government reduces the personal income tax rate from *t* to *t'*.

(a) What is the effect on the *AD* schedule?

(b) What is the effect on the equilibrium interest rate?

(c) What happens to- investment?

8. Suppose full-employment output increases from *Y** to Y*'. What does the quantity theory predict will happen to the price level?

c. Long-answer Type Questions :

9. Suppose there is a decline in the demand for money. At each output level and interest rate the public now wants to hold lower real balances.

(a) In the keynesian case, what· happens to equilibrium output and to prices?

(b) In the classical case, what is the effect on output and on prices?

10. Repeat question 9, using the quantity theory of money to explain the effect of the

money demand shift on prices.

11. Suppose the government undertakes a balanced budget increase in spend-ing. Government spending rises from G to G', and there is an accompanying increase in tax rates so that at the initial level of output the budget remains balanced.

(a) Show the effect on the *AD* schedule.

(b) Discuss the effects of the balanced budget policy on output and interest of the balanced budget policy on output and interest rates in the Keynesian case.

(c) Discuss the the effects in the classical case.

12.

(a) Define the strict quantity theory.

(b) Define monetarism.

(c) What type of statistical evidence would you need to collect in order to support or refute the major argument of monetarism'?

5.5 References

1. Rudigar Darnbusch and Stanley Fischer, *Macroeconomics,* Fight Edition, 1990.
2. Richond T. Froyen, *Macroceonomies : Theories and Policies,* Sixth Edition, 1999.

Unit-6 ❑ Aggregate. Supply : Wages, Prices and. Unemployment

Structure

6.0 Objectives

This unit will help you to understand

- the classical view regarding how aggregate supply in the economy is determined
- the contrasting Keynesian view emphasizing unemployment in the economy
- the phillips curve : an empirical finding
- modern theories of aggregate supply

6.1 Introduction

In the last three units we have carefully developed Keynes's ideas regard-ing macroeconomic analysis. It is clear from the above discussion that the present ideas about aggregate demand are developments based on Keynes's theory. Indeed, the theory of ·aggregate demand is Keynes's central contribution to macroeconomic analysis. He believed that deficiencies in aggregate demand were the principal cause of persistently high unemployment during the years of great Depression. And he was in favour of demand management policies to tackle any economic disturbances.

Before Keynes's time determinants of supply were the principal concern of the economists, and demand, as such, was taken for granted. It was believed that supply creates its own demand and that economic flnctnatious are temporary in character and tend to get corrected over time. Thus, ideas about supply were quite developed even before Keynes's time. Yet, even today the theory of aggregate supply is one of the least settled areas in macroeconomics. So, we start our discussion in this unit with a review of the classical ideas about aggregate supply.

6.2 The Classical Theory of Aggregate Supply

Classical economies developed by attacking the earlier othodoxy of mercantilism which held that money is wealth. It emphasized the importance of real factors in determining the "wealth of nations" and stressed the optimizing tendencies of the free market in the absence of state control. .

Classical economies envisaged the whale economy as a giant firm and whatever is produced by this firm finds sufficient demand in the market. This firm always operates at full employment, when employment is determined by the demand for and the supply of labour.

Demand for Labour

The demand for labour arises out of production conditions given by the production conditions given by the production function

$$y = F(\bar{K}.N)$$

where *y* is real output, *K* the stock of capital (plant and equipment), and *N* the quantity of homogeneous labour input. For the short run the stock of capital is assumed to be fixed, as indicated by the bar over *K.* The state of technology and population are also assumed to be constant over the period considered. In the short. run, output is varied solely by changing the labour input *(N)* drawn from the fixed population, so that choice of; the level of output and quantity of the labour input are one decision. The perfectly competitive firm will increase output until the marginal cost of producing a unit of output is equal to the marginal revenue received from its sale. For the perfectly competitive firm, marginal revenue is equal to product price *(Pi).* Because labour is the only variable factor of production, the marginal cost of each additional unit of output is the marginal

labour cost. Marginal labour cost equals the money wage, divided by the number of units of output produced by the additional unit of labour, that is, the marginal product of labour *(MPN).* Thus, the marginal cost far the *i-th* firm *(MCi)* is equal to the money wage *(W)* divided by the marginal product of labour for that firm *(MPNi).* That is

$$MCi = \frac{W}{MPNi} \qquad \text{..... (6.2)}$$

A profit-maximizing firm under perfect competition equates marginal cost of production with the price of the commodity. Hence, the condition for profit maximization is

$$Pi = MCi = \frac{W}{MPNi}$$

$$\text{or,} \qquad \frac{W}{Pi} = MPNi \qquad \text{..... (6.3)}$$

Generalizing from the case of a single firm, the demand for labour in the whole economy can be given by

$$\frac{W}{P} = MPN \qquad \text{.....(6.3a)}$$

Equation (6.3a) says that since all firms are profit and there in. perfect competition on every market the real wage paid by firms must equal the marginal product of labour in the economy as a whole.

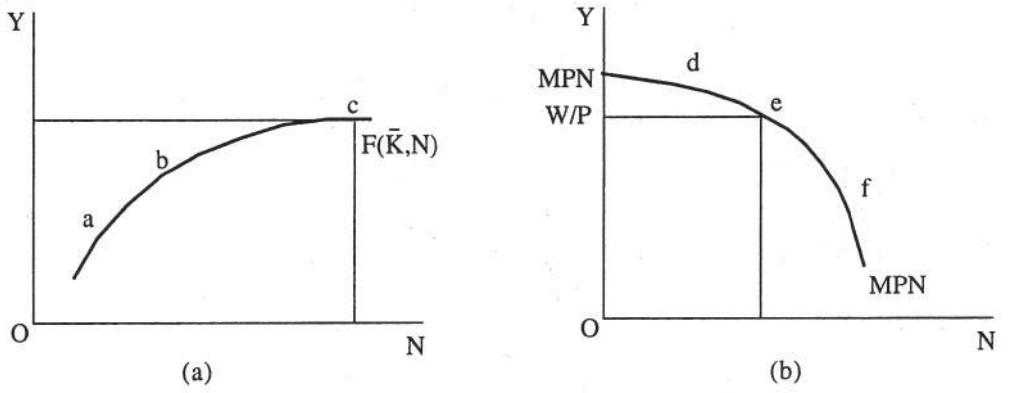

Fig. 6.1

Thus, given the production function *abc* in Fig. 6.1(a), the marginal product curve *def* of Fig. 6. l(b) is the demand curve for labour. This is true not only for a single firm, but also for the economy as a whole where the total demand for labour is the sum of all the firms' demands for labour. We can write this aggregate labour demand function (N^d) as

$$N^d = f\left(\frac{W}{P}\right) \qquad \text{..... (6.4)}$$

where an increase in real wage $\left(\frac{W}{P}\right)$ lowers labour demand (N^d) .

Supply of Labour

Labour services are supplied by individual workers in the economy. Classical economists assumed that, like every individual, a marker tries to maximize utility (or satisfaction) which depends on real income which can be obtained as real wages on the one hand and. on leisure on the other. Since both income and leisure are desirable, there is a trade-off between the two, and every individual marker can be assumed to have his own indifference map for them. Thus, if we measure leisure on the horizontal axis and real income (wage) on the vertical anis as in Fig. 6.2, then we can show. a· typical markers indifference curves u_1, u_2, u_3,.....etc. between leisure and income. On the same diagram we darw the budget lines LA, LB, LC for different real wage rates $\left(\frac{W}{P_0}\right), \left(\frac{W}{P}\right)_1, \left(\frac{W}{P_2}\right)$ .....etc. for a typical marker. Each budget line starts at *L* on the horizontal axis showing the maximum amount of leisure (24 house) that a worker can enjoy if he works for zero hours. The slope of each budget line is the real wage rate. The higher the real wage rate, the steeper the budget line. Since each marker can be assumed to maximize his utility given the budget constraint, at the real wage $\left(\frac{W}{P}\right)_0$ the worker chooses the point *A,* working *LD* hours and enjoying *OD* hours of leisure. As the wage, rate rises to $\left(\frac{W}{P}\right)_1$, the worker chooses the point *B,* working for *LE* hours and enjoying *OE* hours· of leisure. Similarly,

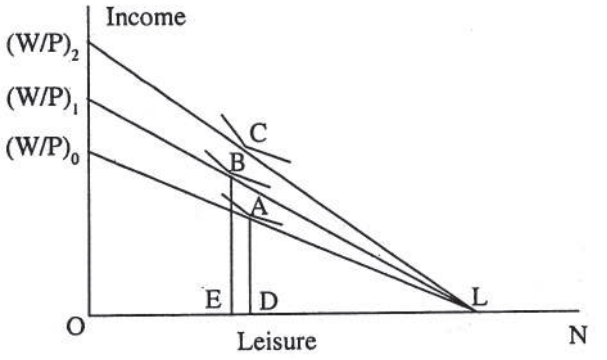

Fig. 6.2

for the wage rate $\left(\frac{W}{P}\right)_2$, we can measure the worker's choice of work and leisure from his equilibrium at point C. The number of hours for which a labourer works can be regarded as the labourer's supply of labour for a given real. wage rate. In Fig. 6.3 we draw the supply curve of labour against different real wage rates. The. supply curve *slb* in Fig. 6.3 in usually an upward-rising curve showing that the supply of labour increases as the real wage rate increases. But after the point *l* the curve bends backward, showing that as the wage-rate increases beyond the rate $\left(\frac{W}{P}\right)_M$, the supply of labour falls. This would be so if labour becomes an inferior thing beyond the wage rate $\left(\frac{W}{P}\right)_M$, A rise in the wage rate gives rise to two kinds of effect, the substitution effect and the income effect. The substitution effect of a rise in the real wage rate always induces the worker to work more, since leisure becomes more expensive and it becomes worth while to. substitute leisure for more income implying more work. But the income effect of a rise in the real wage way make leisure more desirable relative to further increments in income. Thus, with successive increments in the real wage rate, a point way be reached when the labourer may choose to supply less labour as the real wage increases and consume more leisure. At this point the supply curve of labour curve of the worker would become backward-bending.

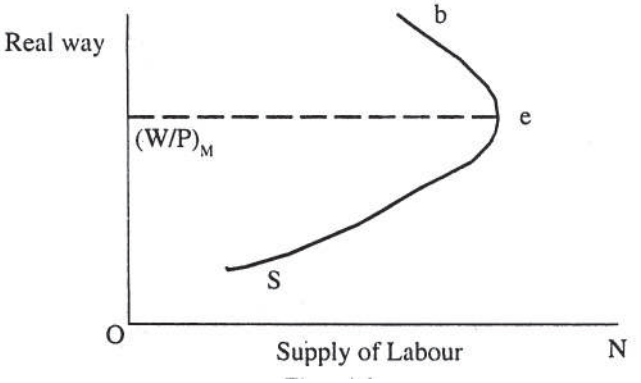

Fig. 6.3

The individual supply of labour curve being determined in this way, the market supply curve is the summation of individual supply curves at different wage rates. This aggregate labour supply curve can be written as

$$N^S = g\left(\frac{W}{P}\right) \qquad \text{..... (6.5)}$$

Labour Market Equilibrium and the Classical Aggregate Supply Curve

The special feature of the classical and also of the neoclassical labour market is the assumption that there are no frictions in the labour market and it clears continuously and immediately in response· to changes in the demand for and the supply of labour. So, from the above discussion we can describe the classical and neoclassical theory of the labour market by the demand for labour. equation of (6.4) and the supply of labour equation of (6.5). The equilibrium in the labour market is established at the point where the demand for labour is equal to the supply of labour. Thus, the classical and neoclassical labour market equilibrium can be described by the model (M,) as follows :

$$N^d = f\left(\frac{W}{F}\right)$$

$$N^s = g\left(\frac{W}{P}\right) \qquad (M_7)$$

$$N^d = N^s$$

The labour market equilibrium is shown in panel (a) of Fig. 6.4, where the. intersection of the labour demand curve and the labour supply curve determines the real wage rate according to Model (M_7). The special feature of the classical labour market is the absence of money Illinoisan implying that both the demand for labour and the supply of labour are functions of real wage only. If the price level changes, the demand for labour and the supply of labour curves as function of money wage shift proportionately to determine the same level of employment as shown in panel (b) of Fig. 6.4.

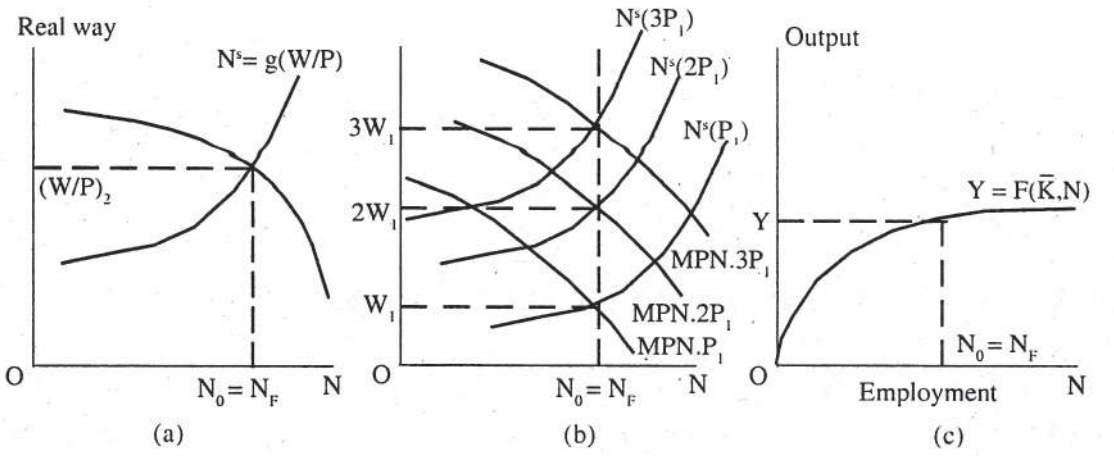

Fig. 6.4

Another facture of the classical theory of the labour market is that equilibrium is always achieved at the full-employment level. This is so because at the equilibrium wage rate the amount of labour supplied is equal to the amount of labour demanded, and at that wage rate there is no excess supply of labour owing to flexibility of wages and prices.

Now, since there is always full employment in the labour market and since changes in the price level. do not bring about any· change in the volume of employment, but change in proportionate wage rate keeping real wage rate same the amount of output determined by the production function in panel (C) of Fig: 6.4 is always a constant amount unless supply and demand curve shifts for change of real factors like technology or workers preference respectively. Change in prices of course are matched by proportionate change in money wage, as wage price are flexible in classical system for a clearing of a

market. Thus, the economy's aggregate supply remains invariant with changes in the price level and the aggregate supply curve, showing a relationship between the price lend and output, is a vertical line, as *SS* of Fig. 6.5.

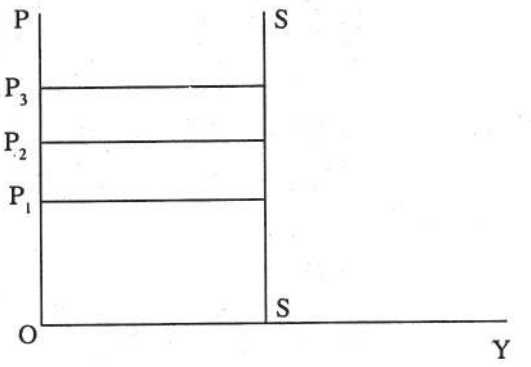

Fig. 6.5

6.3 The Keynesian Aggregate Supply Curve

The classical vertical aggregate supply curve is totally incompatible with the Keynesion system, for it means no role for aggregate demand. So long as prices are positive, the level of output in the classical system always remains the same whatever be the level of demand. But in the Keynesian system aggregate demand plays the central role in the determination of output and employment.

Keynes believed that the labour market is for from being perfectly flexible and that money wage would not adjust sufficiently in the short. run to keep the economy at full employment : The Keynesian theory offers a number of reasons why the money wage will not quickly adjust, especially in the downward direction, to maintain equilibrium in the labour market. In the first place, keynes argued that much of wage bargaining in the labour market takes place because both labour and management want to arrive at a wage structure consisting of wage differentials between workers with different trades and skills. And workers in one firm or industry would see changes in money wages as changes in relative wages, because they would have no assurance that if they accepted a cut in money wages, workers in other sectors of the labour market would do the same. Thus, keynes believed that declines in real wages caused by price level increases would meet much less resistance from labour than an equivalent full in the real wage from a

money wage cut. Secondly, wage rigidity in the labour market is also due to the fact that wages are set by labour contracts between labour unions and management for the duration of two or three years. Money wages fixed by such contracts would not respond to events, such as a decline in labour demand, over the life of the contract. Provisions for changes in the money wage correspond to those in the price level-the so-called "indexation" of money wages-provide some flexibility in the wage rate which is otherwise fixed over the length of the contract. Moreover, money wages are rigid because, even in the absence of any wage contracts, employers usually want to maintain a reputation as a "good employer" and refrain from attempting wage cuts.

Keynes believed that contractual arrangements are central to an understand-mg of low modern labour markets function. He pointed out that "Wages are not set to clear markets in the short run, but rather are strongly conditioned by longer-term considerations ..... (which)..... insulate wages..... to a significant degree from the impact of shifts in demand .....".

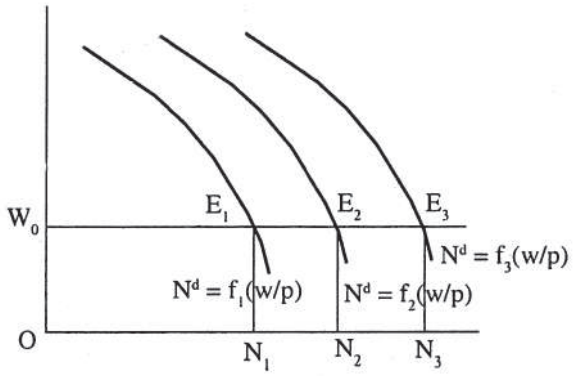

Fig. 6.6

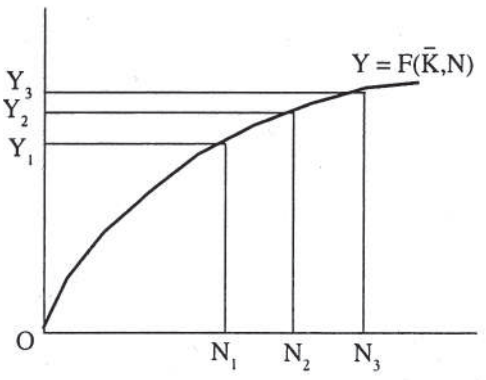

Fig. 6.7

Even with all these qualifications, keynes did not object to the classical theory of labour demand. He retained the classical labour demand function of Model (M_1). But since money wages are not flexible, be substituted an autono-mously determined money wage as the labour supply function. Thus, he assumed labour supply to be infinitely elastic at the autonomously determined money wage rate (W_0). Thus, the keynesian model for the labour market can be given by the following set of equations :

$$N^d = f\left(\frac{W}{P}\right)$$

(i) $$N^s = g\left(\frac{W}{P}\right) \text{ for } W > W_0$$

$$N^d = N^s$$

(ii) $$\text{for } W = W_0, 0 < N_s \leq g\left(\frac{W^0}{P}\right)$$

(iii) for $W < W_0$, $N_s = 0$

For a given price level *p,* supply and demand for labour becomes function of money wage rate. Supply function of labour becomes perfectly elastic at money wage rate W_0

The labour marker working in terms of money wage in keynesian model can be represented in Fig. 6.7A

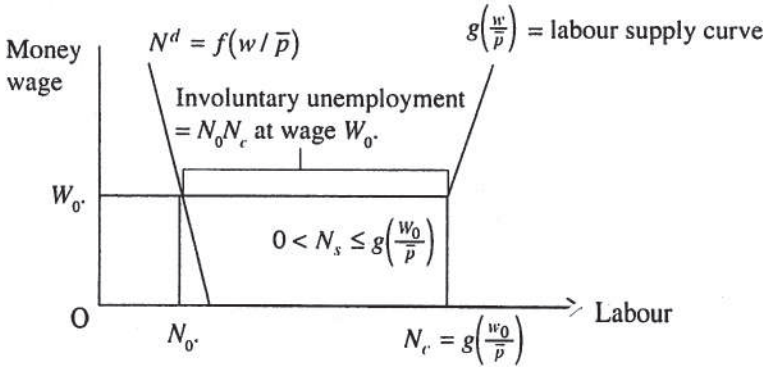

Fig. 6.7A

For a change of prices through change in aggreate demand or other resource use $N^d = f(w/\bar{p})$ curve will shift as in Fig. 6.6.

Model (M,) shows involuntary unemployment. The model, as depicted in Fig. 6.6, shows that. if the labour· demand curve $N^d = f_1\left(\frac{W}{P}\right)$ cuts the W_0 line at E_1, there are more labourers who are ready to work at the wage rate W_0 Since demand is lacking,

there is unemployment. Shifts in demand and equi-librium points to E_2 and E_3 do not imply any change in the money wage rate, even though employment rises. As employment rises output rises as shown by the production function of Fig. 6.7. And since wage costs are the principal determinant of prices, prices can be taken as fixed when wages are unchanged. Hence, the Keynesian aggregate supply curve can be taken as a horizontal straight line like *PS* of Fig. 6.8. The horizontal aggregate supply curve implies that firms will supply whatever amount of goods is demanded at the existing price level.

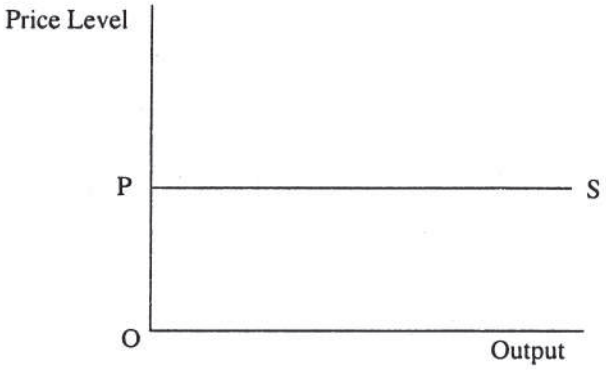

Fig. 6.8

6.4 The Phillips Curve and the Natural Rate of Unemployment

The classical and the Keynesion economics were developed under widely different economic and social situations, and it was natural for them to respond to the prevailing conditions in different ways. While the classical economics grew mostly under optimistic situations when unemployment was not a big problem, the keynesian economics ,flourished under the great depression of the 1930s. And so, as we have seen they had opposing views about the two most important aspects of the macroeconomic phenomena, namely, unemployment on the one bond and inflation on the other.

Keynes ded in 1946 and his successors took up the task of refining his theories and applying them to the policy questions facing western societies as they converted to peacetime economies in the aftermath of world war II. In this respect some empirical findings were especially of help, the chief among them being the phillips curve.

The Phillips Curve

In 1958 A. W. Phillips published a comprehensive study of wage behaviour in the United kingdom for the years 1861 to 1957. On the basis of his findings he pointed out that there is an inverse relationship between the rate of unem-ployment and the rate of increase in money wages. The higher the rate of unemployment, the lower is the rate of wage inflation, as shown in Fig. 6.9.

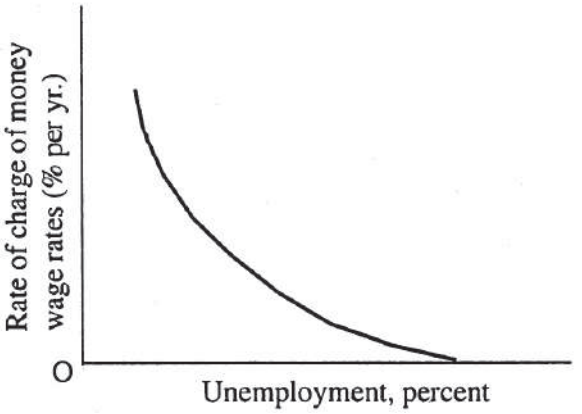

Fig. 6.9.

Now the rate of unemployment is measured with respect to the natural rate of unemployment, *u*,* which is defined as the rate of unemployment arising from labour market frictions that exist when the labour rriarket is in equilibrium. This kind of frictional unemployment exists as a result of individual's shifting between jobs and looking for new jobs. With this definition of the natural rate of unemployment, the phillips curve can be mathematically expressed as

$$gw = \frac{W - W-1}{W-1} = -\varepsilon(u - u^*) \qquad \text{..... (6.6)}$$

where *gw* is the rate of wage inflation, *W* the wage this period and W_{-1}, the wage last period and • measures the responsiveness of wages to unemployment. Equation (6.6) states that wages fall if the rate of unemployment exceeds the natural rate, that in, when. $u > h^*$, and rise when unemployment is below the natural rate ($u < u^*$).

Now since wage are the main component of the total cost, it can be presumed that prices changed by different firms bear a constant proportion with wage costs. Thus, if each unit of labour produces *"a"* units of output, the labour cost of production per unit

is $\frac{W}{a}$, and if firms set prices as a markup, *z,* on labour costs, we have

$$P = \frac{(1+Z)W}{a} \qquad \text{..... (6.7)}$$

Substituting (6.7) in (6.6), the Phillips curve becomes

$$\frac{P - P-1}{P-1} = \pi = - \ \varepsilon(u - u^*) \qquad \text{..... (6.8)}$$

where π stands for price inflation.

The Sacrifice Ratio

The simple Phillips curve in the formulation (6.8) rapidly became a cornerstone of macroeconomic policy analysis. It suggested a trade-off between rates of inflation and rates of unemployment, and policy makers could choose different combinations of unemployment rates and rates of inflation.

But lowering inflation requires a period of high unemployment and reduced output. Therefore, before deciding whether to reduce inflation or not, policy makers must know_ the costs involved in terms of output lost. This cost can then be compared with the benefits of lowering inflation.

Much research has used the available data to examine the phillips curve quantitatively. The results of these studies are often summarized in a number called the Sacrifice Ratio, the parentage of a year's real *GDP* that must be foregone to reduce inflation by 1 per centage point. Although estimates of the sacrifice ratio vary substantially, a typical estimate is about 5 : 1 for every percentage point that inflation is to fall, 5 per cent of one year's *GDP* must be sacrificed.

Since there is a trade-off between inflation and unemployment, the sacrifice ratio can also be computed in terms of unemployment. Okun's law says that a drop in 1 percentage point in the unemployment rate would require a sacrific of 2 percentage points of *GDP.* Specifically, if y^* stands for the natural rate of output and u* for the natural rate of unemployment, Okun's Law according to this version, can be written as

$$y - y^* = - \omega(u - u^*) \qquad \text{.....(6.9)}$$

where $\omega = 2$.

Theories based on the simple Phillips curve, however, soon became un-fashionable, as Friedman and Phelps pointed out in the 1960s that long-run trade-off between inflation and unemployment was illusory. They proposed that in the long run the economy would move to the natural rate *of* unemployment whatever the rate of change of wages and the inflation rate. As we shall see, this long-run characteristic of the economy figures prominently in all modern macroeconomic analysis.

6.5 Post-Keynesian Theories of Aggregate Supply

Economic Thinking in the post-keynesian era maintains that, since prices are flexible in the long run, the long-run aggregate supply curve is vertical, as the· classical economists suggested. But it also believes that in the short run, shifts in the aggregate demand curve do cause flnctnatious in output. On the other land, present-day economists. cannot accept that all prices are fixed in the short run, as is implied by the keynesian horizontal aggregate supply curve. In the post-Keynesian era four different theories of aggregate supply have appeared which try to explain the phenomenon that while the short-run aggregate supply curve is upward-rising, the long-run aggregate supply curve is vertical. They all end up with the same aggregate supply equation given by

$$y = y^* + \alpha(P - P^e)\ \alpha > 0 \qquad \text{..... (6.10)}$$

where y is output and y^* the natural rate of output, P is the price level and P^e is the expected price Ievei. We will however, discuss only the worker-Misperception Model.

The Worker-Misperception Model

The model assumes that the quantity of labour demanded by firms (N^d) depends on he rest wage $\left(\frac{W}{P}\right)$, when the labour demand function is given by

$$N^d = N^d\left(\frac{W}{P}\right) \qquad \text{..... (6.11)}$$

But workers do not know the correct overall price level (P); they have only expectations about it. And the quantity of labour supplied *(N^s)* depends on the real wage that workers expect to earn $\left(\frac{W}{P^e}\right)$. The labour supply curve is given by

$$N^s = N^s\left(\frac{W}{P^e}\right)$$

Now $\frac{W}{P^e}$ can be written as

$$\frac{W}{P^e} = \frac{W}{P} \times \frac{P}{P^e} \qquad \text{.....(6.13)}$$

where $\frac{P}{P^e}$ measures markers' misperception about the price level. If $\frac{P}{P^e}$ is greater than one, the price level is greater than what markers expected, and if $\frac{P}{P^e}$ is less than one, the price level is less than expected.

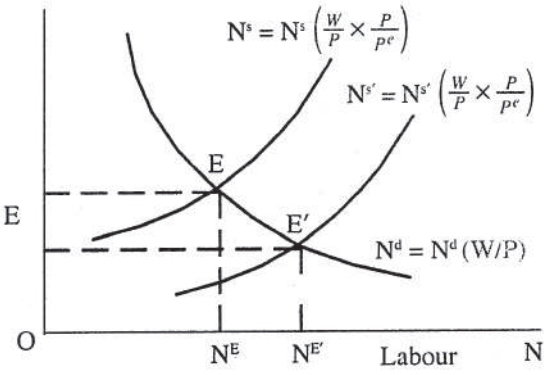

Fig. 6.10

Substituting (6.13) in (6.12) we get the labour supply curve as

$$N^s = N^s\left[\left(\frac{W}{P}\right) \times \left(\frac{P}{P^e}\right)\right] \qquad \text{..... (6.14)}$$

which says that the quantity of labour supplied depends on the real wage and on worker-misperception of the price level.

The labour market equilibrium is shown in Fig. 6.10 in which the labour demand curve intersects the labour supply curve at point *E* to determine the equilibrium level of

employment (N^E) and the equilibrium real wage rate $\left(\frac{W}{P}\right)_E$.

It the price level ***P*** rises and markers correctly anticipate the change, so that $\left(\frac{P}{P^e}\right)$ remains as it was before, then there would be no shift in the labour supply curve. With no change in the labour–demand curve, the labour market equilibrium will remain at *E* with no change in employment.

If, however, the rise in the price level is not anticipated, so that *Pe* remains the same when prices, then $\left(\frac{P}{P^e}\right)$ rises, shifting the labour supply curve to the *Ns'* position lowering the equilibrium real wage and raising the level of employment. In essence, workers believe that the price level is lower, and the real wage in higher, than actually is the case. This misperception induces than to supply more labour. Firms are assumed to be better informed than workers and to recognize the fall in the real wage, so they hire more labour.

Since output depends on employment, we see that in misperception model output depends on the value of the expected pric. If the expected price level is the same as the actual price level, then there no changes in the equilibrium value of employment and, hence, output. This equilibrium value of output is the full-employment level of output (y*). If the· price level is above its expected value, employment rises temporarily above the full-employment level and output is about the natural output. If, however, the actual price level is below the expected value, employment and output fall below their respective natural values. Hence, the short-rum aggregate supply curve is given by

$$y = y^* + \alpha(P - P^e)\ \alpha > 0 \qquad \text{..... (6.15)}$$

which is the same as the relation (6.10).

6.6 Relation Between the Phillips Curve and the Aggregate Supply Curve

The aggregate supply equation (6.15) can be written as

$$P = P^e + \frac{1}{\alpha}(y - y^*) \quad \text{..... (6.16)}$$

Subtracting last year's price level P_1 from both sides of the equation we have

$$(P - P_{-1}) = (P^e - P_{-1}) + \frac{1}{\alpha}(y - y^*) \quad \text{.....(6.17)}$$

In (6.17) $P - P_{-1}$ is the difference between the current price level and last year's price level, which is inflation (π). The term $(P^e - P_{-1})$on the right-bond side of (6.17) is the expected rate of inflation $(\pi.)$. Thus, by substituting π and π for $(P - P_{-1})$ and $(P^e - P_{-1})$ respectively in (6.17) we get

$$\pi = \pi^e + \frac{1}{\alpha}(y - y^*) \quad \text{..... (6.18)}$$

If we now substitute Oknn's Low of equation (6.9) in (6.18), we get

$$\pi = \pi^e - y(u - u^*) \quad \text{..... (6.19)}$$

which is the expectation augment Phillips curve equation based on Friedman-Phelps amendment. It was pointed out above that the empirical law of the phillips curve was designed to explain the *U.K.* data for unemployment and wage rate relationship for the period from 1861 to 1957. But the data for the 1970s and later periods did not fit the simple Phillips curve, so that there was little scope for policy prescription with respect to the trade-off between un-employment and inflation.

To explain the phenomenon Friedman and Phelps suggested that the simple phillips curve would shift over time depending upon the rate of inflation expected by workers and firms and that, in the long run, the economy would move to the natural rate of unemployment whatever the rate of change of wages and the inflation rate.

They argued that as long as unemployment is above the natural rate, the excess unemployment should cause the real wage to fall and employment to approach to the natural rate. Similarly, when unemployment is below the natural rate, there are too few people available to firms to fill jobs as rapidly as they do normally. The real wage should rise, increasing the rate of unemployment to its natural level. Thus, according to them, while there way be a short-run trade-off between inflation and unemployment, there is no long-run trade-off.

To formalize this view, the expectation-augmented phillips curve can be written as

$$\pi = \pi^e - y(u - u^*) \qquad \text{.....(6.20)}$$

where π^e is the expected rate of inflation. Equation (6.20) is the same as (6.19) and tells us that if unemployment is equal to the natural rate of unemployment, then expected inflation is the same as· the actual rate of inflation. On the other hand, if the expected rate of inflation is the same as the actual rate of inflation, the rate of unemployment would be the same as the natural rate of unemploy-ment.

In a similar way, it is easy to show that starting with the Phillips curve equation, we can go back to the aggregate supply equation by an analogously reverse procedure. Thus, we can say that the Phillips curve equation and the short-run aggregate supply equation represent essentially the same macroeco-nomic ideas. According to the short-run aggregate supply equation, output is related to unexpected movements in the price level. According to the Phillips curve equations, on the other hand, unemployment is related to unexpected movements in the inflation rate. The aggregate supply curve is more convenient when we study output and the price level, whereas the Phillips curve is more convenient when we study unemployment and inflation. Thus, the Phillips curve and the aggregate supply curve are merely two sides of the same com.

With our discussion of the aggregate demand of the previous unit and of the aggregate supply of the present unit, we are now in a better position to study not only the functioning of the economy in a better way, but also to compare and contrast the different theories-of macroeconomic policy. This will be the subject matter of the next unit.

6. 7 Exercises

a. Objective Type Questions :

1. The demand for labour curve is downward sloping because

   (a) there are diminishing returns to more and more employment

   (b) the marginal productivity of labour falls;

   (c) the price of the output falls as output rises;

   (d) all of the above.

2. The supply of labour curve, is backward-bending because

   (a) the substitution effect of rising wage rates outweighs the income effect;

   (b) the income effect out weighs the substitution effect;

   (c) worker's expectation changes;

   (d) none of the above.

3. The classical AS curve is vertical because as the pnce level rises

   (a) the supply of labour curve shifts upward;

   (b) the demand for labour curve shifts to the right;

   (c) there is no voluntary unemployment;

   (d) None of the above.

4. The Keynesian AS curve is horizontal because

   (a) the economy is in the liquidity trap;

   (b) there is involuntary unemployment;

   (c) the demand for labour curve shifts to the right as prices changes;

   (d) none of the above.

b. Short-answer Type Questions :

5. In the frictionless classical and neoclassical model, assume· that labour becomes more productive, with the labour demand curve shifting upward and to the right.

   (a) What in the effect of this change on the full-employment levels of employment and output?

   (b) What is the effect on the full-employment real wage?

   (c) How would your answers to (a) and (b) be affected if the labour supply curve were vertical.

6. In the frictionless model, what is the effect of an increase in the pro- ductivity of labour on the equilibrium level' of prices?

7. Analyses the effects of a reduction in the money stock on the price level and on

output when the aggregate supply curve is positively sloped and wages adjusts slowly over time.

8. If the government increases its spending, discuss the short-run and the long-run adjustments in the economy.

c. Long-answer Type Questions :

9. Explain the concept of the natural rate of unemployment. What are the implications of Mitton Friedman's theory of the natural rate of unemployment for the effectiveness of economic stabilization policies'?

10. Explain why monetarists believe that monetary policy affects output and employment in the short run, but not in the long run. What is the crucial difference between the short run and the long run?

11. Consider the following changes in the sticky-wage model $\left(\frac{W}{P} = \omega \times \frac{P}{P^e}\right)$ where ω is the target real wage)

(a) Suppose that labour contracts specify that the nominal wage be fully indexed for inflation. That is, the nominal wage is to be adjusted to fully compensate for changes in the consumer price index. How does fulJ indexation alter the aggregate supply curve in this model?

(b) Suppose now that indexation is only partial. That is, for every increase in the *CPI,* the nominal wage rises, but by a smaller percentage. How does partial indexation alter the aggregate supply curve in this model?

12. Suppose that an economy has the Phillips curve

$$\pi = \pi_{-1} - 0.5(u - 0.06)$$

(a) What is the natural rate of unemployment?

(b) Graph the short-run and long-run relationships between inflation and unemployment.

(c) How much cyclical unemployment is necessary to reduce inflation by 5 percentage points? Using Okun's law, compute the sacrifice ratio.

(d) Inflation is running at 10 percent. The central bank wants to reduce it to 5 percent.

Give two scenarios that will achieve this goal.

6.8 References

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2. Richard T. Froyen, *Macroceonomies : Theories and Policies,* Sixth Edition, First Indian Reprint 2001.
3. N. Gregory Mankinv, *Macroceonomies,* Fourth Edition, 2000.

Unit-7 ❑ The Supply of Money, Inflation and Macro economic Controversy

Structure

7.0 Objectives

This unit will help you to understand

- How money supply is determined in the economy
- The Theories of Inflation
- Macroeconomic Controversies
- Problems of Stabilization

7.1 Introduction

In Unit 5 we have discussed the counterrevolution launched by Milton Friedman and

his colleagues which challenged many of the theoretical premises of the so-called Keynesian revolution. In Unit 6 we have studied the empirical law of the Phillips Curve in connection with the theory of the aggregate supply curve. This empirical finding together with the line of thinking introduced by Friedman led to the emergence of several schools of-thought which made macroeconomics an area of economic controversy. We will discuss this controversy very briefly, but before we go into it let us discuss how the supply of money ts determined in the economy and the phenomenon of inflation.

7.2 Supply of Money

Money is a means of payment or medium of exchange. It does away with the difficulties of barter, that is, the exchange of goods, for goods, and facilitates transactions. In order to serve as a medium of exchange money should be generally accepted and, in order to be generally accepted, money should have some desirable qualities like durability, portability, recognizability, and so on. Today all types of money have these qualities in different degrees .

Serving as a medium of exchange, money stands as a general purchasing power. And by dint of this power, it functions· as a store of value, a unit of account and as a standard of deferred payments. Because of these different functions of money, the nature of money has changed over time. With changes in the nature and volume of transactions, many different things are included in different definitions of the money supply. The most widely used definition of the stock of money includes currency in the hands of the public on the one hand and deposits at banks that households can use on demand such as checking accounts on the other. Thus, if *M* denotes the stock of money, C currency, and *D* demand deposits, we can write

Stock of money	=	Currency	+	Demand Deposits	
M	=	C	+	D	..... (7.1)

Fractional-Reserve Banking

If there were no banks, all money would consist of currency only. On the other hand, if banks hold 100 percent of deposits in reserve and do not make any loans, the banking system would not affect the supply of moneY all money would again consist of the total amount of currency held by the public.

But in reality we have fractional-reserve banking where banks do not hole 100 percent

of their deposits as reserves; but loans out money to earn interest If the banks maintain a reserve-deposit ratio of 20 percent, then the balanc sheet of First Bank receiving a deposit of Rs. 10,000 from households woul look as fallows :

First bank's Balance Sheet

Assets		Liabilities	
Reserves	Rs. 2,000	Deposits	Rs. 10,000
Loans	Rs. 8,000		

In the process of earning interest First bank increases the money supp by Rs. 8000, when it makes a loan of this amount. Before the loan is mad the money supply is Rs. 10,000. Now, it is Rs. 18,000 : the depositors st have a demand deposits of Rs. 10,000, but now the borrower holds Rs. 80 in currency. Thus, in a system of fractional-reserve banking, banks create mom

The creation of money does not stop with First bank. If the harrow deposits the Rs. 8,000 in Second bank (or if the borrower uses the Rs. 8,0 to pay someone who then deposits it), the process of money creation continu

The balance sheet of Second bank would be :

Second bank's Balance Sheet

Assets		Liabilities	
Reserves	Rs. 1600	Deposits	Rs. 8000
Loans	Rs. 6400		

Second bank receives the Rs. 8000 in deposits, keeps 20 percent, or 1600, in reserve, and then loans out Rs. 6400. Thus, Second bank creates 6400 of new money. The loans of Rs. 6400 may be deposited in a Third hank,

which may create money in the same may, and so on. If *rr* stands for the reserve ratio, then the total amount of money created in this way can be calculated as follows :

Original Deposit	=	Rs. 10,000
First bank Lending	=	Rs. $(1 - rr) \times 10{,}000$
Second bank Lending	=	Rs. $(1 - rr)^2 \times 10{,}000$
Third bank Lending	=	Rs. $(1 - rr)^3 \times 10.000$
.....		

Therefore, the total money created

$$= [1 + (1 - rr) + (1 - rr)^2 + (I- rr)^2 + ...] \times \text{Rs. } 10,000$$

$$= \left(\frac{1}{rr}\right) \times \text{Rs.}10,000$$

In our example, *rr* = 0.2, so the original deposit of Rs. 10,000 generates Rs. 50,000 of money.

A Model of the Money Supply

Under fractional-reserve banking, the total supply of money in the economy can be described in terms of a model which has three exogenous variables :

- The monetary base *B,* standing for the total amount of money held by the public in notes and coins, C, and as reserves, *R,* by the banks. The central bank directly controls this amount.
- The reserve-ratio *rr* is the fraction of deposits that banks· hold as legal reserve. It is determined by the business policies of banks and the laws regulating banks.
- The currency-deposit ratio *cr* is the amount of currency *C* people hold as· a fraction of their holdings of demand or checking deposits *D*. It reflects the preferences of households about the form of money they wish to hold.

The first component defines the monetary base as

$$B = C + R \qquad \text{..... (7 .2)}$$

And we already know from (7.1) that the money supply is given by

$$M = C + D \qquad \text{..... (7.1)}$$

Dividing (7.1) by (7.2) we get

$$\frac{M}{R} = \frac{C + D}{C + R} \qquad \text{..... (7.3)}$$

If we now divide the top and the bottom of the right-hand expression of (7.3) by *D,* we have

$$\frac{M}{B} = \frac{\frac{C}{D} + 1}{\frac{C}{D} + \frac{R}{D}} = \frac{cr + 1}{cr + rr} \qquad \text{..... (7.4)}$$

where *er* is the currency-deposit ratio and *rr* rs the reserve ratio: From (7.4) we obtain

$$M = \frac{cr + 1}{cr + rr} \times B$$

or, $M = m \times B$ ..... (7.5)

where *m* is called the money multip1ier.

Each rupee of the monetary base produces *m* rupees of money. Since the · monetary base has a multiplied effect on. the money supply, the monetary base is also called high-powered money.

The central bank can control the money supply by influencing *B, er* and *rr;* but it does not have full control over the· money supply. It can influence . the monetary base *(B)* by its open-market operations. When the monetary base and, hence, the n:ioney supply. When, on the other hand, the central bank sells bonds to the public, the money supply is reduced through a contraction' of the monetary base. The central bank's decision to change the required reserve ratio has an important influence on the reserve ratio maintained by banks. But in deciding how much to keep in reserves the banks take into account not only the required reserve ratio stipulated by the central bank but also the variability of cash -inflows and outflows, the cost of borrowing in case they run short of reserves and the market rate of interest. Similarly, the currency-deposit ratio is determined primarily by the payment habits of the public. It is affected by the convenience and accessibility of banks. Moreover, the currency-deposit ratio increases when the ratio of consumption to *GNP* increases and, so, has a strong seasonal pattern.

This being how the supply of money in the economy is determined, it has an intimate relationship with the phenomenon of inflation which is discussed in the next section.

7.3 The Phenomenon of Inflation

Inflation is the phenomenon of rising prices; it is measured as the percentage rate of increases of the level of prices during a given period. The price level is an average of all

prices. This average rises when the prices of most commodities and most important commodities rise. There may be some commodities, whose prices may be going down, but they may not be important enough to check the rise in the general price level. Thus, the phenomenon of inflation concerns the whole economy and should be studied in terms of aggregate demand and aggregate. supply. Like the price of an ordinary commodity, the price level can rise because of a shift of the aggregate demand curve to the right or of a shift of the aggregate supply curve to the left or of both. The theories of inflation which emphasise the shift in. aggregate demand are called demand-pull or, simply, demand inflation and those that emphases the shift in aggregate supply are called cost-push or, simply, cost inflation.

7.3.1. Demand Inflation

The Classical Theory

The classical theory of inflation is essentially a theory of demand inflation and is leased on the quantity theory of money. It postulates that the price level depends directly and proportionately on the quantity of money in the economy. Inflation occurs when the supply (quantity) of money in the economy increases, and comes to a stop when the quantity of money is stabilized. The rate of inflation presumably depends on the rate of new money creation; if the supply of money increases by x percent per year, then the rate of inflation would be x percent per year.

According to Wicksell, this increase in the supply of money constitutes a net increase in aggregate demand, for new money flows into the economy when businessmen finance investment in excess of the current rate of saving by taking loans from banks. With the total supply of goods remaining unchanged (since the economy always operates at full employment), the net increase in aggregate demand bids up prices of goods and services; and at the same time attract "forced saving" from consumers, who spend according to their incomes of the previous year. This rise in prices will not, however, reduce aggregate demand since, after a brief log, money incomes would rise in proportion to prices. Hence, a tussle goes on between consumers and investors for the limited supply of goods. If the banks supply the investors with further new loans, the process would continue. If, on the other band, the banks cease to expand the money supply, the market rate of interest would rise to the "natural rate chocking off the extra investment demand and reducing consumption, and thus halting the inflation.

The keynesian Theory

Keynes did not think that aggregate demand is determined by the quantity of money. According to Keynes, an economy might experience some inflation even with a constant money supply. If the supply of money is constant and the level of investment demand rises, the level of prices would raise, it would raise the transactions demand for maney and thus push up interest rates. This would tend to choke off the extra investment demand and to moderate the inflationary pressure. But it would not eliminate it. The reason is that the rise in interest rates would free some cash from speculative balances to supply the added transactions needs. Only if there were zero speculative balances would the result correspond to the classical quantity theory.

The Keynesian theory of inflation proceeds in terms of the concept of the "inflationary gap, which is measured by the excess of aggregate demand over the full-employment level of output. The concept is illustrated in Fig. 7.I. Assuming that the level of spending. is independent of the level of prices, the .total desired real expenditures at each level of real income are shown by the solid line (c + *i* + *g).* If there were no limit on real output, income would rise to y_s, where real expenditure would equal real output. But suppose there exists a full-employment limit or real income, y_F. Real income cannot be y_s At y_F, aggregate demand (c + *i* + *g)* exceeds total output, leaving an "inflationary· gap" equal to *AB* in Fig. 7.1. The inflationary gap would cause prices to rise, but since, on our assumption, real spending is independent of the price level, the rise in prices does not eliminate the gap. Inflation proceeds without limit, unless and until there are indirect effects of rising prices either on *c, i,* or *g,* sufficient to eliminate the gap.

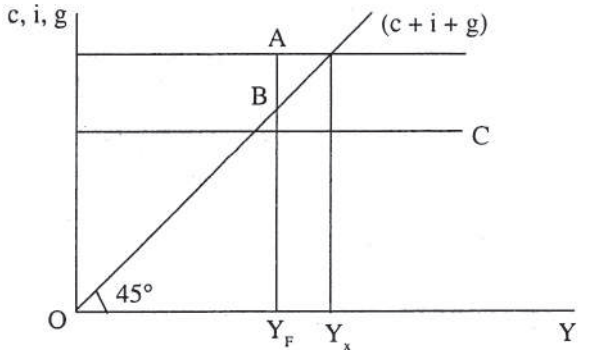

Fig. 7.1

7.3.2. Cost Inflation

From Wicksell's formulation of the classical approach to inflation and keynes's theory of the inflationary" gap it is clear that they both emphasized the fact that the rise in prices would not, by themselves, reduce aggregate demand. For the rise in prices would bad to a rise in costs which, in its turn, would work to increase prices still further, Thus, the demand inflation theory needs a theory of cost inflation to explain the inflationary process. In fact, these two theories of inflation are complementary to one another.

But the advocates of cost inflation theory maintain that wage-costs can initiate a process of inflation on its own. They emphasize the fact that wage rates in the modern economy are not strictly market-determined. They do not adjust automatically to clear the labour market. They are "administered prices" and, as such, do not rise only when the demand for labour exceeds the supply. Thus, 'the wage rate may rise, even when there is an excess supply of labour, if the cost-of-living rises and wages are tied to it. The wage rate may rise as a reflection of some presumed (or even measured) rise in productivity, or if wages elsewhere rise, or, simply because, employers want their workers to be happy. The crucial difference from the demand inflation case is that, here, rising wages are not, for each and every type of labour, and in each and every labour market or even in the typical case, confined to the situation in which there is an actual, experienced market scarcity of labour, which forces employers to compete for workers by bidding wages upward.

It the wage rates rise, prices will continue to rise till the previous ratio of wages to prices is restored.

Thus, this is spontaneous inflation. It requires no excess demand; it can even occur when there is same or perhaps considerable unemployment. It arises because wage rates increase even with no excess demand for labour.

7.3.3. Inflation as a Disequilibrium Phenomenon

From the above discussion, particularly from Keynes's analysis of inflation, if in clear that inflation was regarded as essentially a disequilibrium phenomenon. Thus, according to Keynes, inflationary price rises do not, by themselves, eliminate inflation and, if the inflationary gap is not eliminated through aggregate demand management policies, inflation would continue. But there may be indirect effects of rising prices on

consumption, investment and government spending which way work to reduce the inflationary gap, bringing a halt to inflationary price rises.

The best portrayal of the inflationary situation as a disequilibrium phenomenon is provided by the Bent Hansen model discussed below

Bent Hansen's. Model of Inflation

The model can best be illustrated in terms of Fig. 7.2, in which the vertical axis measures the price-wage ratio. The *SS* curve indicates the amounts of aggregate output that firms would want to supply at each price-wage ratio. The vertical line *S'S'* stands for the full-employment level of output. The horizontal distance between the *SS* and *S'S'* lines can be taken as an index of the "inflationary gap in the factor market".

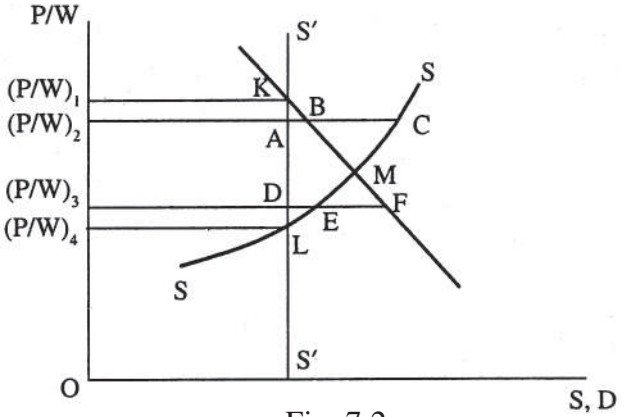

Fig. 7.2

The aggregate demand curve *DD* is also a function of the price-wage ratio; as the latter falls the aggregate demand increases. The horizontal distance between the *DD* and *S'S'* curves can be taken as a measure of the "inflationary gap in the goods market".

Hansen assumes the following dynamic relation :

$$\text{(a)} \qquad \frac{dp}{dt} = f_1(D - S')$$

$$\text{and} \quad \text{(b)} \qquad \frac{dw}{dt} = f_2(S - S') \qquad \text{.....(7.6)}$$

The relation (7.6a) states that the time rate of change of the price level in a function of the size of the inflationary gap in the goods market *(D*- S) and the relation (7 .1 b)

states that the time rate of change of the wage rate depends on the size of the inflationary gap in the factor market (S - S').

The marking of these relationships in (7.6) can be described as fallows. If the economy happens to be at K in Fig. 7.2, then there is no inflationary gap in the goods market, and, so, goods prices do not rise. But at k there is a large gap in the factor market leading to rises in the wage rate. As the wage rate -rises, $\frac{P}{W}$ falls, and an inflationary gap in the goods market develops. Similarly, at L there is no gap in factor market, but there is a large gap in the goods market forcing goods prices to rise.

So we see that at K there is a downward movement, while at L there is an upward movement in the economy. Moreover, so long as the rate of increase. of goods prices is greater than that of the wage rate, the economy would move further up from L and so long as the rate of increase of the wage rate is greater than the rate of increase in goods prices the economy would move further down from K. Only at the quasi-equilibrium at M, where both the gaps are the same, would prices and wages would rise at the same rate and the inflation would continue unabated. Thus, the inflationary gap developing in either of the two markets would. impinge on the other leading to cumulative price increases, which is the main characteristic of the process of inflation.

7.4 Modern Theories of Inflation, Economic Fluctnatious, and Macroeconomic Controversy

Modern theories of inflation regard inflation as one aspect of economic fluctuations and, so, try to explain them in therms of interactions of aggregate demand and aggregate supply. According to them, inflation is not essentially a full-employment phenomenon-it can occur even when there is unemployment. Indeed, the empirical law of the phillips curve, which implies a trade-off between the rate of inflation and the rate of unemployment, is part and parcel of the modern theory of inflation. Moreover, inflation is looked up as an equilibrating phenomenon, which may work to bring about equilibrium in the economy.

One important feature of the modern theory of economic fhnctratioris is the fact the long-run is always a part of the analysis, so that the short-run horizontal Keynesian aggregate· supply curve has no place in it. As we have seen in the last units, the modern theories of aggregate supply regard that aggregate supply is an upward-rising function

of prices and that in the long- run the aggregate supply curve is vertical.

To see how the model of aggregate demand and aggregate supply provides a framework to analyse economic Fluctnatious including inflation, let us assume that the economy is initially in full-employment equilibrium at point E_0 as ir Fig. 7.3. Suppose now that the nominal money stock increases so that at eacl pnce level real balances are higher and interest rates are lower. As a resul the· demand for output as a· whale. rises and the aggregate demand schedules shifts from AD_0 to AD_0. But there is no change in the aggregate supply curve AS_0 which is drawn for a given past price level P_{-1}. It passes through the full-employment level of output when $P = P_{-1}$. When output is at the full-employment level, there is no tendency Ior wages to changes and, hence, costs and prices are also constant from period to period.

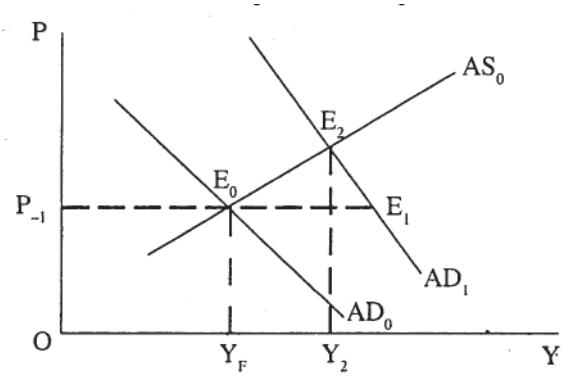

Fig. 7.3

The Keynesian and the Monetarist Views Compared

As the aggregate demand curve shifts to the Position AD_1, according to the Keynesian analysis, an inflationary gap in .the form of an excess demand develops at the price level $P = P_{-1}$. Firms find the their inventories are running down and, to maintain the same level of inventories, they try to produce more by hiring more labour. As wages rise prices, too, rise leading to further rise in wages. Hence, the inflationary gap continues to persist. Inflation is, thus, essentially a disequilibrium phenomenon in, the Keynesian analysis.

Short-run Effects

But the monetarists point out that equilibrium is not incompatible with short-run over-

full employment level of output, the equilibrating force being the price rise-a fact which the new Keynesians also agree. Thus, as . the aggregate demand curve shifts to the position AD_1, both output and prices rise in the short-run reaching the new equilibrium at E_2•

Medium and Long-term Adjustments

But this is not the end of the story. At E_2 output is above normal and the wage rise induces the aggregate supply curve to shift upward to the position AS_1 in Fig. 7.4. This happens because this new supply curve passes through the full-employment level of output at $P= P_2$ At the new equilibrium point E_3 (Fig. 7.4) output has fall en com pared to E_2, but prices are s ti II higher.

But as Jong as the economy is to the right of y_F output and employment are above normal. Wages would continue· to rise leading to further increases in prices. The aggregate supp I y curve · w ou Id continue to shift upward till eq ui librium is reached at the point E_4 (Fig. 7. 4) when the economy returns to the full-employment level of output and prices cease to rise further.

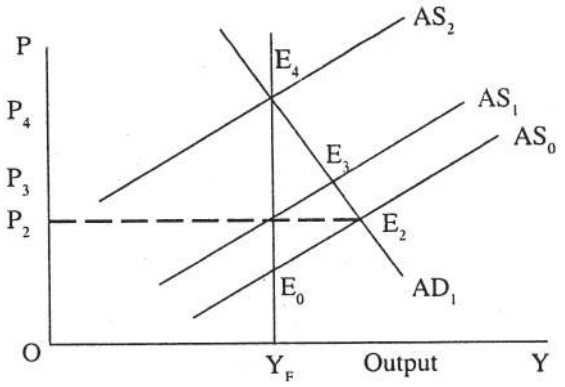

Fig. 7.4

At E_4, prices have rises in the same proportion as the nominal money stock; so the real money stock $\frac{M}{P}$ is again at the initial level. When real balances and, therefore, interest rates are again at the initial level, excess deman is eliminated, and output and employment return to their normal level. Thus, in the Jong run, when wages and prices have had time to adjust fully, the mod has the sallle predictions as the classical case.

The difference is only in tiadjustment process. In the classical case a monetary expansion leads immediate to an eqnipropartionate rise in prices with no real expansion. Here, both outr and prices rise in the short and medium terms, and only in the Jong rim we reach the classical case. By assumption, though, the real wage rema constant in the adjustment process. In the short run, the predictions of the mo, resemble more-closely to the Keynesian case, and the more Slowly wages adj to changes in employment, the greater the resemblance.

It should, however, be noted that short and medium-term adjustments slow; hence, the adjustments of wages and prices are quite important for macroeconomic analysis.

Rational. Expectations and the New Classical Economies

The new classical economists do not make a distinction between the short-run results as the Keynesians and the monetarists do. On the contrary, on the basis of their hypothesis of rational expectations, they put forward their policy ineffectiyeness postulate. The postulate says that stabilization of teal variables, such as output and employment, cannot be achieved by aggregate demand management. The values of these variables both in the short run and in· the long run are insensitive to aggregate demand management policies.

Rational Expectations

The rational expectations school pioneered by Rabert Lncas and Thomas Sargent criticized the Keynesian assumption regarding the formation of price expectations. The Keynesian formulation assumes that labour suppliers from an expectation of the current aggregate price level (or future inflation rate) on the basis of past behaviour of prices. In practice, Keynesians and monetarists have assumed that such price expectations adjust slowly and can be taken- to be fixed for the analysis of policy effects over relatively short periods. Thus, the short run, according to the views, can precisely be defined as the period over which such expectations are fixed.

New classical economists criticize such formulations regarding the formation of price expectations as “naive in the extreme”. They ask : why would rational economic agents rely only on past values of the price level in forming an . expectation regarding the price level, particularly when they find that such behaviour results in their being systematically wrong? The new classical economists maintain that people do not make systematic mistakes. In order to predict the value of a particular variables, they not only

utilize all past and present relevant information regarding the variable, but also all relevant variables that may affect the future value of the variable. Thus, for instance, in forming a price expectation, people not only take past behaviour of prices, but also the variables like the level of. money stock *(M^e),* government spending *(g^e),* tax collection *(t^e),* autonomous investment (i^e) and so on. Moreover, people use all this information intelligently. Since the rational expectations hypothesis is that people do not make systematic mistakes, the economy will always remain at the long-run equilibrium with the natural rate of output and employment. And what may lead to deviations from them is unexpected price rises and unexpected policy changes. Thus, let us suppose that the economy is at the long-run equilibrium at *A* in Fig. 7.5. If there is unexpected monetary expansion by the government the aggregate demand curve shift's to the position AD_1 from AD_0 and the price level rises from P_0 to P_1. Since this price level is above the expected price level (P_0^e), output rises temporarily above the natural rate, as the economy moves along the short-run aggregate supply curve from paint *A* to point *B.* People, however, correctly anticipate the long-run price level which is P_2, and the aggregate supply curve moves to the position AS_1. The economy returns to a new long-run equilibrium at C, where output is back at its natural rate.

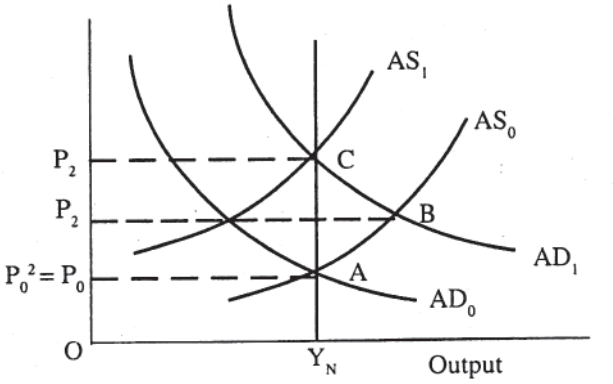

Fig. 7.5

As regards the relationship between inflation, unemployment and output the advocates of rational expectations believe that people optimally utilize. all available information regarding the government's monetary and fiscal policies which may affect inflation. And if policy makers are credibly committed to reducing inflation, rational people will understand the commitment and will quickly. lower their expectations of inflation. Inflation can then came down without a rise in unemployment and a fall in output. According to

the theory of rational expectations, traditional estimates of the sacrifice ratio calculated with respect to the short-run Phillips curve. are not useful for evaluating the impact of alternative policies. Under a credible policy, the cost of reducing inflation may be much lower than what estimates of the sacrifice ratio suggest.

7 .5 Stabilization Policy

Differences in opinion among different schools of thought come to the fore in the context of stabilization policies. Stabilization policies are monetary and fiscal policies designed to moderate fluctuations in rates of growth, inflation, unemployment' and so on. Monetary policies in a country are controlled by the central bank of that countxy and they include policies to change the stock of money and the market rates of interest. The chief instruments of monetary policy, as we have already pointed out, are open market operations, variable reserve ratio, the bank rate policy, and soon. Fiscal policies are under the control of the executive branch of the government and include policies like changing tax rates, government spending, and soon.

The classical economists, as we have seen, thought that the invisible hand of the price system works for the welfare of the society and Say's Law operates to bring about macroeconomic equilibrium at full employment. Government intervention into the economy would be detrimental to . the working of the economy, and macroeconomic disturbances can be adequately tackled by means of wage cuts and money supply policies.

Keynes, on the ot-her bond, maintained that flucnatious in the economy arise out of fluctnations in aggregate demand. Hence, aggregate demand management in the key to reducing economic fluctnations, and fiscal policies, rather than monetary policies, are more effective to achieve desired objectives.

Monetarists, led by Milton Friedman, do not re_gard fiscal policy as an effective stabilization tool, for instability in the economy is primarily the result of government policies. According to them, the private sector is inherently stable and since the supply of money is the dominantly influence on nominal income, stability in the growth of the money supply is crucial for stability in the economy. Monetarists believe that such stability is best achieved by adopting a rule for the growth rate in the money stock.

The new classical economists are even more skeptical than the monetarists about the usefulness of activist stabilization policies. The central policy tenet of their economies

is that stabilization of real variables such as output and employment cannot be achieved by aggregate demand management policies.

They maintain that economic agents form. rational expectations on the basis of all available relevant information and, so, they do not make systematic mistakes. Only unanticipated policy changes can bring about temporary cha_nges in output and employment. Otherwise systematic. monetary and fiscal policy actions that change aggregate demand will not affect output and employment even in the short run.

7 .6 Exercises

a. Objective Type Questions :

1. The value of the money multiplier depends upon-
   (a) the value of the currency-deposit ratio;
   (b) the value of the reserve ratio;
   (c) the value of the monetary base;
   (d) the values of all the above:
2. Inflation is defined as –
   (a) a situation of too much money chasing too few goods;
   (b) a disequilibrium situation;
   (c) a phenomenon of rising prices;
   (d) none of the above.
3. In inflationary gap develops because of –
   (a) a rise in demand;
   (b) a rise in the supply of money;
   (c) an increase in demand in a situation of full-employment;
   (d) none of the above.
4. A cost-inflation occurs because of –
   (a) a rise in price of some important item of production, like oil or naturl gas;

(b) a rise in wage-cost;

(c) a rise in administered pnces;

(d) all of the above.

b. Short-answer Type Questions

5. What is the maximum amount of the increase in checkable deposits that can result from a Rs. 10,000 increase in legal reserves if the required reserve ratio for checkable deposits is 10 percent?

Explain how this increase comes about in the banking system? Give two reasons why the actual increase may fall short of the theoretical maximum.

6. Explain the concept of the money multiplier: What factors determine the size of the money multiplier?

7. Within the IS-LM curve model show how income and the interest rate will be affected by each· of the following strategies.

(a) An increase in the required reserve ratio for checkable deposits. (b) An open-market sale of securities by the central bank.

(c) A decrease in the central. bank discount rate.

8. (a) What are the economic costs of inflation? Distinguish between anticipated and unanticipated inflation.

(b) Do you think anything is missing from the list of costs of inflation that economists present? If so, why?

c. Long-answer Type Questions :

9. Suppose the economy is initially at an unemployment rate of 7 percent and that the aim is to get the rate down to 5 percent. Suppose that expectations are adaptive, with $\pi^e = \pi_{-1}$, and that the inflation rate last period was 7 percent. Using Okun's law combined with the extended Phillips curve equation $\pi = \pi^e - \varepsilon(u - u^*) - \beta(u - u_{-1})$, where $\beta = 0.5$:

(a) Compare the inflationary effects of reducing the unemployment rate to 5 percent within a year to· those of aiming to bring it down to 5 percent. within · 3 years

(b) Show the paths of output growth corresponding to the two paths in part(a).

10. Within the IS-LM framework, illustrate the nature' of the conflict that the central bank faces between trying to hold the money stock and trying to achieve "desirable" level of the interest rate.

11. Explain the implications of the rational expectations assumptions for the effectiveness of economic stabilization policy.

12. Contrast the new classical and Keynesian views of the way in which labour markets function.

7.8 References

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Unit 8 ❑ The Open Economy

Structure

8.0 Objectives

This unit will help you to understand

- The basic problems of an open economy with fixed exchange rates
- The basic problems of an open economy with floating exchange rates
- Macroeconomic policy in an open economy
- Should the government intervene to achieve desired results?

8.1 Introduction

We started our macroeconomic analysis with Unit 3 and it has so far been conducted in terms of a closed economy where there is neither any export nor any import. But in reality all countries today have open economies, where consumers, producers and the

government of each country carry on a wide range of economic transactions with the rest of the world. So, it is time that we extend our analysis to take account of open economies. International transactions have been growing rapidly over time and have become so important that almost every country maintains, over its its national income accounts, its own balance of payments accounts.

8.2 The Balance of International Payments

The balance of payments is a summary statement of the economic transactions of the residents of a country with the rest of the world. The balance of international payments is usually listed in. three sections, namely, the current accounts, the capital account, and the official reserve transactions.

The current account records trade in goods and services, as we11 as transfers. Thus, a typical current account in the balance of payments accounts of a country would include the following categories of items :

Current Account

Private :

Merchandise (or "trade balance"); and Invisibles :

Travel (tourists, etc.) and transportation (shipping services, etc.), Income on investments (interest, royalties, dividends, foreign bond earnings), other services.

Governmental :

Government transactions of military goods allies with government grants, etc.

Merchandise or "trade balance" includes exports to and imports of goods· from the rest of the world. Other services include transfer payments consisting of remittances, gifts and grants. Adding all these items, we arrive at the current account balance. We talk of a current account surplus if net exports of goods (exports mimes imports) plus net income from services and net transfers is positive, that is; if receipts from trade in goods and services and transfers exceeds payments on this account.

The capital account records purchases and sales of assets, such as bonds, and land. The capital account may- be subdivided into short-term and long-term asset transactions:

Capital Account

Long-term

Private

Government

Short-term

Private

Government

Errors and Omissions

A surplus in the capital account implies that the receipts from the sale of stocks, bonds, land, bank deposits, and other assets exceed the expenditure due to purchases of foreign assets. When there is a surplus in the capital account, there is a net inflow of capital into the country, and a deficit in the capital account implies that there is a net. outflow of capital from the country.

The sum of the current account balance and the capital account balance gives a country's overall balance of payments. A country's overall balance of payments would be in a surplus if the current and capital account balances add up to a positive value. Similarly, a country's overall balance of payments would be in a deficit if the sum of its current and capital account balances is a negative amount.

The overall balance of payments is recorded in the official reserve transactions, as it will be clear in the following Table. Table 8-1 shows that the United states had on the average balance of payments deficits during the years from 1960 to 1988.

Table 8-1

The United States Balance of Payments (billions of dollars, annual averages)

	1960-1969	1970-1979	1980-1984	1985-1988
Current account	33	- O2	- 284	- 1361
Capital account	- 46	- 14O	262	105'7
Balance of Payments = Official reserve transactions	1'3	142	- 22	- 30 4

Source : Dornbusch v Fischer, p.178

In 1999 the United. States revised its international accounts to conform to new

guidelines. Former “Capital account’; become “financial account”. A newly defined “capital account” consists of capital transfers and the acquisition and disposed of non-produced non-financial assets.

The U.S. balance of payments deficits imply that the U.S. citizens had to pay more currency to foreigners than was received by that country. The Fed (the U.S. central bank) and foreign central banks provided the foreign currency to make payments to foreigners, and the net amount supplied was “official reserve transactions”. Thus, official reserve transactions are equal to the overall balance of payments, the last row in Table 8-1.

In a fixed exchange rate system, the central banks. have to finance any balance of payments surplus or deficit at the official exchange rate. They do that simply by buying or selling all the foreign currency that is not supplied in private transactions. Fixed exchange rates thus operate like any other price support scheme, such as those in agricultural markets. Given market demand and supply, the price fixer has to make up the excess demand or take up the excess supply. In order to be able to ensure that the price (exchange rate) stays fixed, it is obviously necessary to hold an inventory of foreign currencies, or’ foreign exchange, that can be provided in exchange for the domestic currency. So long as the central bank has the necessary reserves, it can continue to intervene in the foreign exchange workers and buy or sell foreign exchange, to keep the exchange rate constant. However, if a country persistently runs deficits in the balance of payments, the central bank will eventually run out of reserves of foreign exchange and will not be able to continue its intervention.

In the flexible or floating exchange rate systems, by contrast, the central banks allow the exchange rate to adjust to equate supply and demand for foreign exchange. Now, the supply and demand for foreign exchange is generated out of internal demand for and supply of both home and foreign goods and services. And, as it will be discussed later, ensuring equilibrium in the balance of payments both in the fixed and floating exchange rate systems, requires wide changes in the internal economic situations. Hence, to understand how situations with regard to the balance of payments can be improved, we need to extend our analysis from that of closed-economy macroeconomics to open-economy macroeconomics.

8.3 Open-Economy Macroeconomic Identities

The term open-economy macroeconomics reflects an attempt to integrate **closed-economy** macroeconomic problems with those arising out of foreign trade and payments. The key macroeconomic difference between open and closed economies is the fact 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 a closed economy, all output is sold domestically, and expenditure is divided into three components : consumption of domestic goods and services *(C^d),* investment with domestic goods and services *(I^d),* and government purchases of domestic goods and services *(G^d).* Hence, for a closed economy, the national income identity is given by

$$Y = C^d + I^d + G^d \quad \text{.....(8.1)}$$

where *Y* stands for domestic output.

But in an open economy, the economy exports part of its output. Hence, for an open economy, the national income identity becomes

$$Y = C^d + I^d + G^d + X \quad \text{.....(8.2)}$$

where *X* is domestic output exported abroad.

But in an open economy, consumers consume goods and services which may be produced abroad. Similarly, the government and producers may purchase goods and services which may include those produced abroad: Thus, if *C, I* and *G* stand for total· consumption, investment and government purchases, we can write

$$\begin{aligned} C &= C^d + C^f \\ I &= I^d + I^f \\ G &= G^d + G^f \end{aligned} \quad \text{.....(8.3)}$$

where the superscripts *d* and *f* indicate domestic and foreign goods and services respectively

By substituting (8.3) in (8.2) we have

$$Y = (C — C^f) + (I - I^f) + (G - G^f) + X$$

or, $$Y = C + I + G + X - (C^f + I^f + G^f) \quad \text{.....(8.4)}$$

The sum of domestic spending on foreign on foreign goods and services *($C^f + I^f + G^f$)* is expenditure on imports *(M).* Thus, we can write the national income identity for

an open economy given in (8.2) as

$$Y = C + I + G + X - M$$

or, $$Y = C + I + G + NX \quad \text{.....(8.5)}$$

where *NX* stands for net exports, defined as exports minus imports *(NX = X* - M).

The identity (8.5) shows how the domestic economy is related with the rest of the world. In particular,

$$NX = Y - (C + I + G)$$

Net exports = Output - Domestic Spending ..... (8.6)

The identity (8.6) shows that in an open economy, domestic spending need not equal output of goods and services. If output exceeds domestic spending, the home econorriy exports the difference : net exports are positive. If, on the other hand, output falls short of domestic spending, the home economy imparts the difference : net exports are negative.

8.3.1. Open-Economy Macroeconomic Problems

So far the discussion of the open economy has proceeded on the basis of accounting identities. Identities take account of things which have happened, but they do not try to explain why they have happened to be what they are. In order to do this, we need to explain the behaviour of the variables involved.

In (8.6) net exports *(NX)* has been defined as exports minus imparts, or,

$$NX = X - M \quad \text{..... (8.7)}$$

Now, a country's exports depends primarily on foreign income *(Yf)* and the country's real exchange rate *(R).* Hence, we can write

$$X = X(Y_f, R) \quad \text{..... (8.8)}$$

In (8.8) *Yf* stands for the affluence of foreigners and *R* stands for the home country's competitiveness in the international market. The real exchange rate is the ratio of prices abroad, measured in home currency, relative to prices at home. Hence, it is given by

$$R = \frac{eP_f}{P} \quad \text{.....(8.10)}$$

where *P* and P_f are home and foreign pnces respectively, and *e* is the home currency price of foreign exchange. *A* rise in *R* indicates a real depreciation of home currency and implies that goods abroad become more expensive relative to domestic goods. As Y_f and *R* rise, exports increase.

If we now look at imports of a country, we see that it depends on domestic income *(Y)* and also on the real exchange rate *(R).* Hence, *M* is a function of *Y* and *R* given by

$$M = M(Y, R) \qquad \text{.....(8.10)}$$

As *R* in (8.10) increases *M* falls and as *Y* rises *M* nses.

Substituting (8.8) and (8.10) in (8. 7) we get

$$NX = X(Y_f\ R) - M(Y, R) = NX(Y, Y_f\ R) \qquad \text{.....(8.11)}$$

From (8.11) we can say that an increase in our income, other things remaining the same, increases our imports and worsens our trade balance. To have trade balance equilibrium (NX = 0), domestic prices would have to be lower, which will-increase *R.* This would make the home country more competitive, raise exports, and reduce imports. Thus, the trade balance equilibrium schedule (NX = 0) is downward-sloping. In Fig. 8.1 the schedule is drawn for a given level of foreign prices *(P_f).*

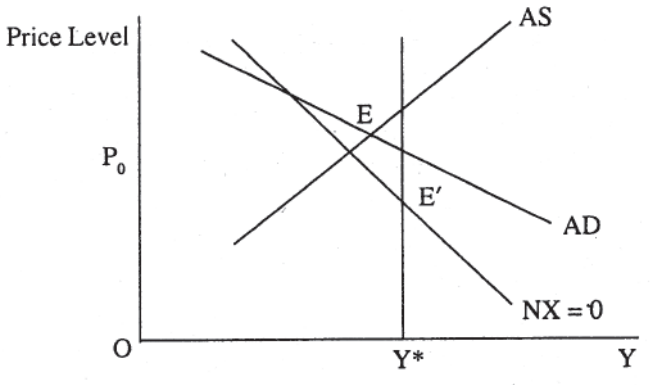

Fig. 8.1

Domestic equilibrium is achieved at point *E,* where the aggregate demand curve *AD* intersects the aggregate supply curve *AS.* The *AD* curve is drawn for a given level of foreign prices, a given nominal supply of money, given fiscal· policy and a fixed exchange rate *e.* An increase in the nominal money stock shifts the *AD* schedule upward, as does an expansionary fiscal policy.

Internal equilibrium at *E* (Fig. 8.1) falls short of the full-employment level of output (Y*). Moreover, at *E* the home country has a trade deficit, which implies that our prices are too high or our income too high to have exports balance imports.

Policy Dilemma

The equilibrium at point *E* highlights a policy dilemma that a country may face. In order

to understand the nature of this problem, let us note that internal balance obtains when output is at full employment level *(Y*),* and external balance occurs when the trade balance is zero *(NX* = 0). So with the *NX* = 0 line and the vertical line *Y*,* we divide the possible situations into four regions as in Fig. 8.2, corresponding to booms and recessions, surpluses and deficits. Regions I and III do not present problems : corrective policies bring us closer to both internal and external balance. In region I, for example, we have unemployment and surplus. Expansionary fiscal. policy would reduce both unemployment and the surplus. Similarly, in region III a coutractionory monetary or fiscal policy will help correct the problem of over employment and external deficit. But in regions II and IV there is a policy dilemma in the sense that policies to improve the external balance will worsen internal balance. Take, for example, the point *A* in region II where the economy is in· a position of recession and deficit. Here we have to choose whether we want to use tight policies to achieve trade balance equilibrium or expansionary policies to achieve full employment. Not only are we unable to reach both targets simultaneously by manipulating aggregate demand, but any attempt to reach one target gets us further away from the other. Such a situation, as we have already pointed out, in called a policy dilemma, and it can always arise when there are more targets of policy than instruments with which to move the economy toward its · targets. In our case we have only one policy instrument-aggregate demand policies-but we have two independent targets-external and internal balance.

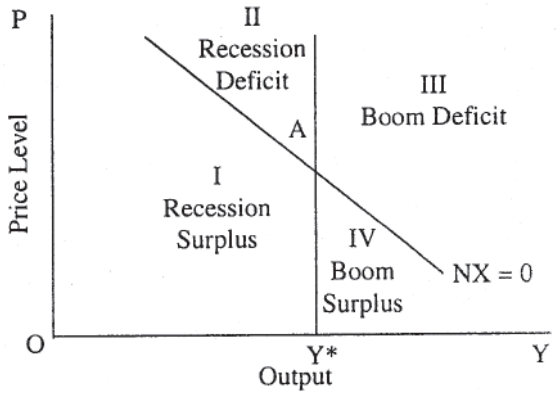

Fig. 8.2

8.4 Open-Economy Macroeconomic Policies

To solve macroeconomic problems in an open economy, particularly when there is a policy dilemma, it is necessary to combine both expenditure-switching policies and expenditure-reducing or expenditure-increasing policies. Expenditure switching policies aim at shifting demand between domestic and imported goods. Imposition of tariffs is one example of an expenditure-switching policy, which by raising prices of imported goods, shifts demand from imported goods to domestic goods through the substitution effect.

Expenditure-reducing or expenditure-increasing policies, on the other hand, aim at improving the trade balance by operating on the total expenditure within the economy. For example, if there is a trade deficit, we know from the identity (8.6) that domestic spending exceeds outp.ut, so that net exports *(NX)* is negative. Expenditure-reducing policies aim at reducing expenditure by domestic residents and the government ($C + I +$ G). As a result *NX* given by

$$NX = Y - (C + I + G) \quad \text{..... (8.6)}$$

will improve.

Devaluation

Expenditure-reducing policies or adjustments through recession are often accompanied by retrenchment of labour. On the other hand, use of tariffs clashes with the principle of free trade. The major alternative policy instrument for dealing with payments deficits in a dilemma situation is devaluation, that is, an official increase in the currency price of foreign exchange. Under the floating! exchange rate system the value of a currency in relation to other currencies may fall through the operation of demand and supply forces in the foreign exchange market. Such a market reduction of the value of a currency is called depreciation of the currency. Devaluation is official depreciation of a currency which occurs only under fixed exchange rates.

Devaluation is primarily an expenditure-switching policy. It increases the relative prices of imported goods in the devolving country and reduces the relative prices of exports from the devolving country, As a result, the balance of payments position of the devaluing country is likely to improve. But, whethe or not a devaluation will be able to achieve the desired objectives depends upon what happens to the real exchange rate

$R\left(=\frac{eP_t}{P}\right)$ Devolnation implies that the price of foreign currencies, *e,* rises. But, assuming that foreign prices, *Pf,* remains the same, domestic prices, *P,* may rise because the prices of imported inputs rise because of devaluation. Moreover, it can be shown that a devaluation· will improve the current account of the devaluing country only if the sum of elasticities of domestic and foreign demands for imports is greater than unity.

Interest Rate Policy

Another policy, which a country facing a policy dilemma can follow, is base? on the notion of the overall balance of payments and international capita) mobility.

The overall balance of payments consists of current account and capital account, and the balance of payments surplus *(BP)* can, be given by the sum of the trade surplus *(NX)* which can be taken as equivalent' to the current account surplus and the capital account surplus (CF) as follows

$$BP = NX(Y, Y_f, R) + CF(i - i_f) \quad \text{..... (8.12)}$$

In equation (8.12) we have shown that the trade balance is a function of domestic and foreign incomes and the real exchange rate. Any policy to increase income is likely to worsen the trade balance, foreign income and the real exchange rate remaining the same.

The capital account depends on the interest rate differential between the domestic interest rate *(i)* and the world interest rate (i_f) An· increase in the domestic interest rate above the world level draws capital inflows and thus improves the capital account. Since international capital is highly mobile, it follows that when income increases, even the tiniest increase in interest rates is enough to maintain on overall balance of payments equilibrium. The trade deficit would be financed by a capital inflow.

The implication of perfect capital mobility is that a country suffering from recession or unemployment can afford to increase its domestic income and import spending, provided the increases are accompanied by an increase in nterest rates so as to attract capital inflow. These twin objectives can be achieved by using fiscal policy to increase aggregate demand to the full-employment level and monetary policy to get the right amount of capital flows.

8.4.1. The Fixed Exchange Rate System

In the later nineteenth century, in part of the period between the two worl1 wars, and after world war II until 1973, exchange rates among currencies were fixed. The Bretton Woods system that operated from the end of World war II to 1973 and the gold standard of the nineteenth and the first third of the twentietH century were examples of fixed exchange rate systems. Under the gold standard each nation defined the gold content of its currency and passively stood read~ to buy or sell any amount of gold at that price. Since the gold content in on unit of each currency was fixed, exchange rates were also fixed. The gol standard worked with considerable stabilily during the period from 1880 to i?141 But, even in the nineteenth century, governments went on and off the gol standard, back and forth between pegged and flexible exchange rates. With th I outbreak of World War I, the classical gold standard came to an end.

The interwar period saw wide fluctuations in the exchange rates, economi instability and competitive devaluations. The prevalence of destabilizin speculations and the instability of flexible exchange rates convinced man economists of the desirability of the fixed exchange rates and, so, at the en of World War II, the Bretton Woods system was established. Under this systen the United States was to maintain the price· of gold fixed at $35 per ounc and be ready to exchange on demand dollars for gold at that price withou restrictions or limitations. Other nations were to fix the price of their currencie in terms of dollars (and thus implicitly in terms of gold) and intervene in foreig exchange markets to keep exchange rates from moving by more than 1 percen above or below - the par value. Within the allowed band of fluctuations, th exchange rate was determined by the forces of demand and supply.

Under the Bretton Woods system from 1945 to 1949 the United State ran huge balance of payments surpluses with Europe and extended Marsha Plan aid to European· reconstruction. With European recovery more or Jes complete by 1950, the U.S. balance of payments turned into deficits. Up t 1957, U.S. deficits were rather small, averaging about $ 1 billion each yea But starting in 1958, U.S. balance of payments deficits increased sharply an aver $ 3 billion per year. As the U.S. deficits persisted and rose over times, U.S. gold reserves declined while foreign-held dollar reserves grew to the point where in the early 1960s they began to exceed the U.S. gold reserves. In the late 1970 and early 1971 expectations ran high that United States would soon devalue the dollar in the face of huge balance of payments deficits, and a massive flight of liquid capital from

the United States took place. President Nixon suspended the convertibility of the dollar into gold on August 15, 1971 and imposed a temporary import surcharge of I0 percent.

When expectations against the dollar flared up again in March· 1973, monetary authorities in the major industrial nations decided to let their currencies float either independently or jointly. The present managed floating exchange rate system was born. And the drastic oil-price increases of 197374 dashed all hopes of resurrection of the system of adjustable pegs under the Bretton Woods system. It collapsed.

8.4.2. The Floating Exchange Rate System

As pointed out above since the last two decades of the twentieth century capital has. became highly mobile, largely because international controls were tiffed, but also because of improved communications· technology. This new capital mobility has made adjustable peg regimes extremely vulnerable *to* speculations, since capital would flee a currency on the slightest hint that it might be devalued. An expected devaluation lowers the expected rate of interest. On the other hand, devaluation increases the stock of high-powered money and, hence, the stock of money which leads to a reduction in the rate of interest. Any expectation that the interest rate may fall will lead to capital outflow. Hence, we have the Mundell-Flaming theory postulates.

The Mundell-Flaming Postulate

Under fixed exchange rates and perfect capital mobility, a country cannot pursue an independent monetary policy. Interest rates cannot move out of line with those prevailing in the world market. Any attempt at independent monetary policy leads to capital flows and a need to intervene until interests are back in line with those the world market.

Indeed, the arguments against fixed exchange rates and in favour ‘of floating exchange rates during the last years of the Bretton Woods system rested on three major claims :

1. Monetary policy autonomy. If-central banks were no longer obliged to intervene in currency markets to fix exchange rates, governments would be able to use monetary policy to reach internal and external balance. Furthermore, no country would be forced to import inflation (or deflation) from abroad.

2. **Symmetry.** Under a system of floating rates the inherent asymmetries of Bretton Woods would disappear and the United States would no longer be able to set world monetary conditions all by itself. At the same time, the United States would have the

same opportunity as other countries to influence its exchange rate against foreign currencies.

3. **Exchange rates as automatic stabilizers.** Even in the absence of an active monetary policy, the swift adjustment of market-determined exchange rates would help countries maintain internal and external balance in the face of changes in aggregate demand. The long and agonizing periods of speculation preceding exchange rate realignments under the bretton Woods rules would not occur under floating.

In a system of clean floating central banks stand aside completely and allow exchange rates to be freely determined in the foreign exchange markets. As a result, the economy has an inherent tendency to move towards a position of internal and external balance. This can be discussed with reference to Fig. 8.3 in which full employment is shown by the vertical line *Y**. When output is greater than full-employment output, prices would rise and there would be inflation, and when output is less than full-employment output, prices would fall and there would be deflation. The assumption of perfect international capital mobility is reflected in the horizontal *BB* line at the international interest rate i,). Only if the domestic interest rate (i) is equal to the world interest rate *(i,),* the balance of payments will be in equilibrium. If the interest rate were higher, there would be net inflows of capital, backing to appreciation of the currency. Conversely with a lower domestic interest rate, capital would flow out and a depreciation would take place.

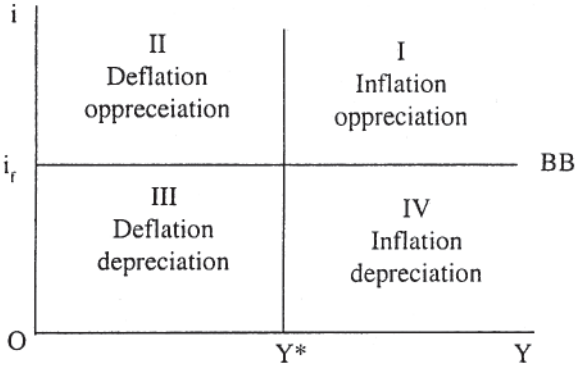

Fig. 8.3

In this scenario the working of the monetary and fiscal policies can be depicted in Fig. 8.4. Since we would need to argue in terms of the. rate of interest and income, we would use *IS* and *LM* curves rather than *AD* and *AS* curves. Suppose that the economy is initially at a position of full-employment equilibrium at *E,* where the goods and the money

markets and the balance of payments are also in equilibrium.

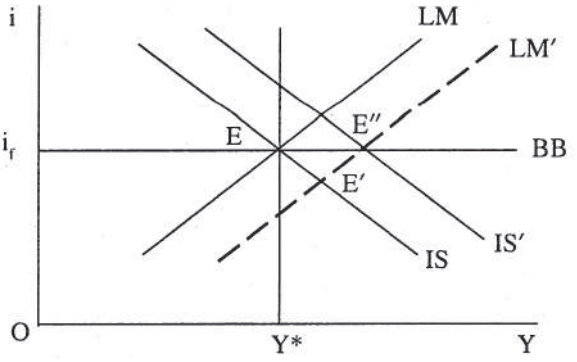

Fig. 8.4

A monetary expansion, now, shifts the *LM* schedule to *LM'*. A temporary equilibrium is achieved at *E',* where the market rate of interest falls below the world rate. The exchange rate immediately depreciates raising· home competitiveness which shifts the *IS* schedule to *IS'*. The economy moves rapidly from *E* via *E'* to *E"*. But at *E",* output is above the full-employment level. Prices would rise and real balances would fall. As the real money stock, $\frac{M}{P}$ declines, the *LM* schedule starts shifting to the left. Interest rates tend to rise, capital tends to flow in, and the resulting appreciation leads now to a decline in competitiveness which also shifts the *IS'* schedule back toward the initial equilibrium. Both the *IS* and the *LM* schedules thus move back toward point *E,* and the process continues until point *E* is reached.

At point *E,* interest rates have returned to their initial level and so have relative prices, -y-· Thus, in the long run money is completely neutral. Nominal money, prices, and the exchange rates all have increased in the same proportion, so that the real money stock and relative prices are. unchanged.

8.5 Purchasing Power Parity *(PPP)* Theory

Gustav Cassel, who was trying to define equilibrium exchange rates afte1 World War I, come to the view that exchange rate between two countries woul be in equilibrium· when the currencies of those countries can buy the sam bundles of goods and services. This is known as the law of one price, whid states that within a country the same good

cannot sell for different prices ir different locations at the same time. If there is any discrepancy in prices withir a country arbitrages would increase the demand where the price is low an increase the supply where the price is high. This would eventually equaliz the prices. The same thing will happen in international markets if internationa arbitrage is possible. Thus, each currency would have the same purchasing powe in different countries, and changes in exchange rates are primarily due to change: in the price levels between countries so as to maintain the terms of trad constant. The theory, in effect, argues that exchange rate movements primaril: reflect divergent rates of inflation. Thus, when *Pf* and / or *P* change, *e* change such a way as to maintain the terms of trade, $\frac{eP_f}{P}$ constant.

It is to be noted that the ***PPP*** theory depends critically on the assumption of perfect competition and perfect mobility which do not usually prevai Moreover, the theory might be quite plausible in the long run. But in the sho run exchange rates niove quite rapidly relative to prices; so in the short ru we should not at all be surprised to see substantial deviations of exchange rates from the rates implied by the *PPP* theory. The theory is a good predictor of the behavior of the exchange rate over periods when disturbances are caused by monetary factors only, such as in hyperinflation. But in the short run, monetary disturbances are not neutral, and even in the long run the exchange rate can change as a result of real disturbances.

8.6 Should Governments Intervene?

In Section 8.4 we saw that exchange rates often act as stabilizers and move to bring about internal and external balance. Such an hypothesis depends on the assumption that there is perfect competition in all the markets and that capital is perfectly. mobile. But in many less developed countries perfect competition does not prevail in many markets and capital markets are not well developed. The central banks of these countries often intervene in the foreign exchange market to meet the needs of planing for development But even in the so-called developed countries central banks intervene to affect exchange rates for several reasons. Probably the main reason is the belief that money capital flows represent merely unstable expectations and that the induced movements in exchange rates move production in the economy in an unnecessarily erratic fashion. Moreover, exchange rate fluctuations have their effects on inflation. So central banks sometimes

intervene in the exchange market *to* prevent the exchange from depreciating, with the aim of preventing a depreciation-induced increase in the inflation rate.

Now, the central bank intervention in the foreign exchange market can be of two types : sterilized and nonsterilized intervention. In the case of sterilized intervention a central bank buys foreign exchange, issuing domestic money. But then the increase in home money is reversed by an open market sale of securities. In the sterilized intervention case, therefore, the home money supply is kept unchanged. In the case of nonsterilization, by contrast, there is a change in the money stock equal to the amount of intervention.

It is widely believed that nonsterilized intervention, because it changes the money supply, will affect exchange rates. But experiences do not support this belief and strongly suggest that nonsterilized intervention and intervention that is backed by credible policies are quite effective in achieving the desired objectives.

8. 7 Exercises

a. Objective Type Questions :

1. The balance of payments of a country indicates-
   (a) the amount of payments made by a country to other countries.
   (b) the amount of payments made by other countries to this country.
   (c) the economic transactions of the residents of this country with the rest of the world.
   (d) none of the above.
2. If national income increases, trade balance deteriorates because–
   (a) exports fall;
   (b) imports rise;
   (c) the exchange rate rises;
   (d) none of the above.
3. A policy dilemma arises when-
   (a) there is boon and deficit;

(b) there is boom and surplus;

(c) there is recession and surplus;

(d) none of the above.

4. Select the correct ones-

(a) A tariff in an expenditure switching policy.

(b) A tariff is an expenditure reducing policy;

(c) Reducing government expenditure is an expenditure-reducing policy;

(d) A Devaluation is an expenditure-reducing policy.

b. **Short-answer Type Questions** :

5. Why do the balance of payments accounts always balance?

6. Analyze the effects of an autonomous fall in the demand for a country's exports under fixed and flexible exchange rate systems. In each case indicate the effects on the country's balance of payments and on the exchange rate.

7. If central banks never intervened in foreign exchange markets, could there be deficits or surpluses in a country's balance of payments?

8. Taking account of the effect of both the trade balance and the capital account, explain the relationships between balance of payments equilibrium and both expansionary monetary and fiscal polices within a fixed exchange rate system.

c. **Long-answer Type Questions** :

9. Assume that capital is perfectly mobile, the price level is fixed, and the exchange rate is flexible. Now let the government increase purchases. Explains first why the equilibrium levels of output and the interest rate are unaffected. Then show whether the current account improves or worsens as a result of the increased government purchases of goods and services.

10. Assume that there is perfect mobility of capital. How does the imposition of a tariff affect the exchange rate, output, and the current account? (Hint : Given the exchange rate, the tariff reduces our demand for imports).

11. Explain how and why monetary policy retains its effectiveness when there is perfect

mobility of capital.

12. Discuss the manner in which income, price adjustments, and money supply adjustments interact in leading the economy ultimately to full employment and external balance.

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Unit 9 ❑ The Economy in the Long Run

Structure

9.0 Objectives

This unit will help you to understand

- The long-run views of different schools of thought
- The Harrod-Domar Growth Equation
- The Solow Model
- The role of technical progress in economic growth and development.

9.1 Introduction

Ever since the time of the mercantilist-the middle of the fifteenth century to the middle of the eighteenth century-long-run prospects of the economy and how they can be improved have attracted the attention of economists. The mercantilists thought that a favorable balance of trade is productive of national prosperity and, so, they emphasized the importance of positive intervention by the state to achieve this end. The mercantilists were thus advocates of active and protectionist policies on the part of the state:

The French physiocrates of the late seventeenth and eighteen centuries, by contrast, emphasized the importance of natural law which, they thought, ultimately ruled economic and social behaviour. Thus, they maintained that the guiding rule in legislation and in

government in general should be laissez fare, laissez passer. The principle was a rallying cry against government intervention in any form for any social purpose. Moreover, in contrast to the mercantilist emphasis on trade, physiocrats emphasized the role of agriculture, which was the source of product net or net product. All wealth, according to them, originated in agriculture, none in any other industry, trade or occupation.

The classical economists, particularly Adam Smith (1723-1790), shared the physiocratic view of natural law. He maintained that the "invisible hand" of the price system operated to the welfare of all. Adam Smith's followers, the so-called classical economists, thought that the economy, if left to itself, would develop from a progressive state into a stationary one in the long run. The progressive state is characterized by a high level of investment (accumulation) which generally serves to increase total production but which also tends to keep up wages. This leads to increasing population. But, since the total amount of land· is fixed, as more and more persons are employed; there are diminishing average returns to additional labour in production. With increasing population on the one hand and diminishing returns on the other, wages tend to eat up the total product after the payment of rent. Reduced profitability discourages investment and a point is reached when the inducement to invest disappears and the stationary state is attained.

Such a portrayal of economic development by the classical economists was based on Mathus's theory of population which, in the eyes of many persons, made economics a "dismal" science. But it is often maintained that the classical economists did not fully appreciate the significance of the Industrial Revolution which had been going on since the middle of the eighteenth century. They were, however, able to incorporate all the important ingredients of economic charige into one concept, which was later called by the neoclassical economists the concept of the production function. It was thought that production of output (Y) was dependent on the amounts of land (L), labour (N), capital (K) and organization (Or) utilized. So the production function can be written as

$$Y = F(L, N, K, Or) \quad \text{..... (9.1)}$$

Since capital in more productive and the labour force goes on increasing output increases, of course, at a diminishing rate, as mentioned above. And, intruding their own good, men are led by "an invisible hand" to further social ends.

But Karl Marx (1818-1883) thought that the capitalist economy entrenched by the Industrial Revolution catered to the benefits of the capitalists at the cost of the working

class, the proletariat. According to him, the capitalist economy was doomed to be destroyed with ever-increasing ups and downs of the business cycle, and was to be replaced by the "dictatorship of the proletariat".

The Great Depression of the 1930s with *GNP* and employment falling by unprecedented amounts foreboded the Marxian forecast of the eventual downfall of the capitalist system. But Keynesian economics effectively provided the analytical framework for government intervention in the economy to tackle the problems of economic depression through the adoption of demand management policies, particularly fiscal policies. Friedman and Schwatz, however, pointed out that the severity of the Great Depression could have been reduced if the central banks in different countries had acted promptly and correctly.

Any way, with the evolution of monetary and fiscal policies, the governments can now tackle business cycle fluctuations quite effectively. In Units 6 and 7 we have discussed how the more persistent problems of inflation and unemployment are tackled. The attention of economists is now focused on the twin problems of growth and economic development. The two problems are related with one another. But, while the problems of economic development typically concern less developed economies, the problems of economic growth are the concern of the so-called developed economies.

9.2 The Harrod-Domar Growth Model

The Harrod-Demar growth model is associated with the names of R. F. Harrod and Evsey Domar. They wrote contemporaneously and arrived at more or less the same result regarding growth. Modern theories of economic growth can be said to have begun with the Harrod-Demar growth model. The model is based on several simplifying assumptions. It is assumed that (1) a constant proportion (s) of income *Y* is saved; (2) there are fixed coefficients of production, that is, the amounts of capital and labour needed to produce one unit of output are both uniquely given; and (3) the labour force grows over time at a constant rate *n,* fixed by noneconomic, demographic forces.

Now, since labour requirements per unit of output are given, it is impossible for *Y* permanently to grow at a constant rate greater than *n,* the rate of growth of the labour supply, which Harrod called the natural rate of growth. Hence, if there is to be steady growth in *Y* we must have

$$g \leq n$$

where g is the rate of growth of Y. If $g < n$, then there will be increasing unemployment over time. If we make the further assumption that the labour market works in such a way that increasing unemployment would be incompatible with equilibrium, the necessary condition for steady growth becomes

$$g = n \qquad \text{..... (9.2)}$$

On the other hand, since the amount of capital per unit of output is a constant, by assumption, we have

$$Y = kK \qquad \text{..... (9.3)}$$

where k is a constant.

From (9.3) we have

$$\log Y = \log k + \log K$$

or, $$\frac{1}{Y}\frac{dY}{dt} = \frac{1}{K}\frac{dK}{dt}$$

or, $$gw = \frac{1}{K} \qquad \text{.....(9.4)}$$

where gw is the warranted rate of growth and / stands for investment $= \left(= \frac{dK}{dt}\right)$. The equation (9.4) says that producers will be satisfied if the rate of growth (gw) is equal to $\frac{1}{K}$. But, for equilibrium we must also have that the amount people plan to· save must equal the amount they plan to invest. Hence, from equation (9.4) we have

$$gw = \frac{1}{K} = \frac{1}{Y}.\frac{Y}{K} = \frac{s}{v} \qquad \text{..... (9.5)}$$

where s is proportion of income· saved, v is capital-output ratio and / = S.

Thus we see that, on the assumptions mode, steady growth requires both $g = n$, equation (9.2), and $g = \frac{s}{v}$, equation (9.5), so that $n = \frac{s}{v}$

Since n, sand v are all independently determined, this will be possible only in a special case. This is the well-known Harrod-Domar problem, which led the authors to

conclude that in general full-employment steady growth would not be possible. Commenting on the characteristic of the Harrod-Domar model **R.M.** Solow points out that on the Harrod-Damar assumptions the economic system is at best balanced on a Knife-edge of equilibrium growth. Were the magnitudes of the key parameters-the savings ratio, the capital-output ratio, the rate of increase in the labour force-to ship ever so slightly from dead centre, the consequence would be either growing unemployment or prolonged inflation. In Harrod's terms the critical question of balance bails down to a comparison between the natural rate of growth which depends, in the absence of technological change, on the increase of the labour force, and the warranted rate of growth which depends on the saving and investing habits of bond-holder and firms.

Prof. Samnelson has collected six basic trends of economic development and he thinks that the Harrod-Domar growth model can account for all six of the basic trends. As the model become quite fashionable, an "essentially simple variant" of the model was used in India's First Five-Year Plan document. Yet the predictions of the model as regards economic stability have certainly not been borne out by facts. Much of subsequent work on growth has stemmed from efforts to explain the possibility of steady growth. One such important effort was mode by- **R.M.** Solow.

9.3 The, Solow Model

In the Harrod-Domar model there is no possibility of substituting labour for capital in production. According to Solow, if this assumption is abandoned, the knife-edge notion of unstable balance would go with it.

Solow starts with a linear homogeneous production function (obeying constant returns to scale) in capital (K) and labour *(L)* :

$$Y = F(K, L) \qquad \text{..... (9.6)}$$

where *Y* is the rate of output produced. A fraction *s* of this output is saved which, in equilibrium, must equal net investment or the rate of change in the capital stock, $\frac{dK}{dt}$ or *K*. So the basic equation is given by

$$sY = sF(K, L) = K \qquad \text{..... (9.7)}$$

If the labour force grows at the rate *n,* .we have

$$L(t) = L_0 e^{nt} \quad \text{..... (9.8)}$$

If, now, *r* stands for the capital-output ratio T then

$$K = rL = rL_0 e^{nt} \quad \text{..... (9.9)}$$

Differentiating (9.9) with respect to time, we get

$$\dot{K} = L_0 e^{nt}\dot{r} + nrl_0 e^{nt}$$

$$= (\dot{r} + nr)L_0 e^{nt} \quad \text{..... (9.10)}$$

Substituting (9.7) in (9.10), we get

$$(\dot{r} + nr)L_0 e^{nt} = sF(K, L_0 e^{nt})$$

$$= sL_0 e^{nt} F\left(\frac{K}{L_0 e^{nt}}, 1\right)$$

Dividing out the common factor, we arrive at the fundamental differential equation

$$i = sFr, 1) - nr \quad \text{..... (9.11)}$$

The function *F(r,* 1) appearing in (9.11) indicates the total product as varying amounts *r* or capital are employed with one unit of labour. Alternatively, it gives output per worker as a function of capital per worker. Hence, the equation (9.11) states that the rate of change of capital-labour ratio *(G)* is the difference of two terms, one representing the increment of capital and one the increment of labour.

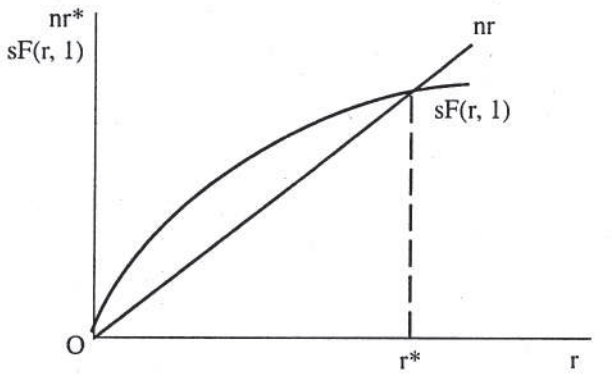

Fig. 9.1

In Fig. 9.1 the ray through the origin with slope n represents the function nr. The other curve is the function $sF(r, 1)$. The curve is drawn to pass through the origin and convex upward, implying that there would be no output unless both inputs are positive, and diminishing marginal productivity of capital obtains as would be the case with the Cobb-Douglas production function. If $r = r^*$, $r = 0$ since nr = sF(r, 1) and, hence, capital-labour ratio will not change. This implies that if the capital-labour ratio r^* should ever be established, it will be maintained, and capital and labour will grow thence forward in proportion. Solow also shows that whatever the initial value of the capital-output ratio, the system will develop toward a state of balanced growth at the natural rate.

9.4 Technological Development Progress and Economic

The Solow model shows that population growth as such need not pose any basic problem to economic growth, and economic growth in equilibrium would converge to the population growth rate so that output per worker remains the same. But output per head has continued to increase over the years in all developed countries. Moreover, on the basis of his own studies· dealing with the period from 1909 to 1949 in the United Shates. Solow points out that over 80 percent of the growth in output per labour over that period was due to technical progress. Solow's model could not account for this technical progress which is an exogenous factor in that model. On the other. hand, economic development in the developing countries like India can hardly be explained in terms of the Solow model. In many developing countries, economic development has been associated with increasing unemployment, and population growth has been governed be a variety of socioeconomic conditions.

Now, since the rate of growth depends on the rate of net investment over and above replacement investment, a different formulation of the Harrod-Domar growth model may help us to understand the process of economic growth 1n both the developed and the less developed countries in a better way.

We all know that macroeconomic equilibrium requires equality between saving and investment. In a stationery· state net investment is zero and saving is equal to the total

amount of replacement investment. From a stationary state growth may start because of net investment. Thus, if total investment rises over the amount of replacement investment, the rise in investment is equal to net investment. And, since for dynamic equilibrium we need to have $\Delta S = \Delta 1$, the growth equation can be written as

$$g = \frac{\Delta Y}{Y} = \frac{\Delta Y}{\Delta K} \cdot \frac{\Delta K}{\Delta I} \cdot \frac{\Delta S}{S} \cdot \frac{S}{Y} \qquad \text{..... (9.12)}$$

In (9.12) $\frac{\Delta Y}{\Delta K}$ is the incremental output-capital ratio whose value depends upon the degree of technical progress incorporated in the new capital equipment. $\frac{\Delta K}{\Delta I}$ stands for the increment in capital formation per unit of net investment. Its value depends on how investment is utilized for capital formation. Capital formation depends on various socioeconomic conditions. If a society decides to invest in building, temples and mosques, net capital formation would be smaller. Moreover, if the society is sluggish to incorporate new technology, marginal output capital ratio would be smaller. $\frac{\Delta S}{S}$ is the growth rate of saving and $\frac{S}{Y}$ is the average rate o savmg.

It is to be noted that in the Harrod-Domar model, the value of the growth rate given in equation (9.5) can hardly be zero or negative, since both the rate of saving (s) and the capital-output ratio *(v)* are positive. But in (9.12) growth rate can be zero or negative depending upon the value of the growth rate of saving.

The relation (9.12) can be · used for policy measures. In a developed economy where most of investment is privately undertaken, the government can hardly inftoenee $\frac{\Delta Y}{\Delta K}$ and $\frac{\Delta K}{\Delta I}$ put i can take measures to influence the growth rate of saving $\left(\frac{\Delta S}{S}\right)$. On the other hand, the government in a less developed economy, undertaking developmental planning, can incorporate now technology in the investments made by the public sector. Moreover, it can take measures to increase the rate of saving and the rate of capital formation.

Thus, whether it is a developed country or not, the government will have enough scope for augmenting economic growth.

9.5 Exercises

a. Objective Type Questions :

l. The mercantilists thought that for economic development-

(a) exports should be high;

(b) imports should be high;

(c) exports should exceed imports;

(d) none of the above.

2. According to the physiocrats, the source of all wealth is-

(a) agriculture;

(b) trade;

(c) manufacture;

(d) none of the above.

3. In the Harrod-Domar growth model the rate of growth rises if

(a) the capital-output ratio. rises;

(b) the average rate of saving rises;

(c) both the capital-output ratio and, the average rate of savmg rise;

(d) none of the above.

4. In the Solow model; the rate of growth rises if-

(a) the population growth rate rises;

(b) the capital output ratio rises;

(c) the rate of saving rises;

(d) all of the above.

b. Short-answer Type Questions

5. Which of the following government activities have effects on the long-term growth rate? Explain how they can do so.

(a) Monetary policy,

(b) labour market policies,

(c) educational and research policies,

(d) fiscal policy,

(e) population central programmes.

6. Discuss the role of government policy in raising

(a) the supply of labour and

(b) the supply of capital. How successful can such policies be?

7. Since 1973, the growth rate of productivity has sharply declined in most industrialized countries. List several of the factors that are responsible for this decline and discuss why the decline in productivity growth· is an important issue.

8. Suppose that the share of capital in income is 0.4 and the share of labour is 0.6. Capital grows by 6 percent, and labour declines by 2 percent. What happens to output?

c. Long-answer Type Questions :

9. Explain why, in the solow model, with exogenous technological change, the long-run equilibrium rate of growth in output is independent of the saving rate

10. An earthquake destroy one quarter of the capital stock. Discuss the impact on the economy. What happens to the growth rate?

11. (a) In the absence. of technical progress, what happens to output per head and total output over time? Why?

(b) What is the long-nm effect of the saving rate on the level of output per capita? On growth of output per capita?

12. Discuss the statement "The lower the level of income, the higher the growth rate of output."

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