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MACRO ECONOMICS - I

SEMESTER - I

ECONOMICS

BLOCK 2

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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COURSE INTRODUCTION:

As a learner in Economics, you have already gathered the basic concepts on Economics in your Undergraduate study. You have also come across a few important concepts in Micro, Macro and other branches in Economics. This course shall introduce you to some of the important theories in the field of Macroeconomics.

This is the second course of the First Semester of the MA programme in Economics. This course has been entitled 'Macroeconomics-I'. This course contains a total of fourteen units and has been divided into two blocks. Both the blocks contains 7 units each.This course shall introduce you to some of the basic theories in Economics, and hence is very important for the overall understanding of the discipline. Please note that in the second also, we shall discuss a few concepts of Macroeconomics in the course entitled Macroeconomics-II.

BLOCK INTRODUCTION

This is the second and last block of the course Macroeconomics I. In the first block, the first 7 units were discussed. Units 8 to 14 have been discussed in the block.

Unit 8 of the course has been entitled Keynesian Multiplier. In this unit, along with the concept of Keynesian multiplier, its working, the concept of dynamic multiplier and the relevance for underdeveloped countries have been discussed. The *ninth unit* of the course deliberates on Multiplier-Accelerator interaction. Here, discussions have been made on the accelerator and investment behaviour, multiplier-accelerator interaction, and the use of super-multiplier in business cycles. *Unit 10* extends the discussion on the concept of multiplier. Entitled as 'Further Topics on Multiplier', the unit shall deliberate on some advanced topics lie, the concept of static and dynamic multiplier,dynamic action of a multiplier,multi-sector multiplier; public expenditure multiplier and the balanced budget multiplier. The *eleventh unit* of course deliberates on demand for money (Classical approach). Here, some of the important theories like the quantity theory of money (Fisher's and Cambridge version), and a comparative study between the Fisher and Cambridge versions have been made. *Unit 12* discusses on demand for money (Keynes' approach). Here, some of the important theories like the Keynesian liquidity preference approach, Friedman's restatement of the quantity theory of money and a comparative analysis between Keynesian and Friedman's approaches have been presented. *Unit 13* deliberated on Neo-Classical and Keynesian synthesis.

In this unit, the neo-classical and Keynesian views on interest, the IS-LM model, its application have been discussed. Further, extension of IS-LM model with government sector has also been deliberated. The last unit of the course, i.e., *the fourteenth unit* of the course has been entitled 'IS-LM Extended Model (Foreign Sector Included)'. In this unit, the IS-LM model including foreign sector has been presented. In addition to this, discussions on balance of payments (BoP) disequilibrium and money supply; BoPdisequilibrium and adjustment Process; BoPdisequilibrium and full employment equilibrium have been made.

While going through a unit, you will notice some along-side boxes, which have been included to help you know some of the difficult, unseen terms. Some "ACTIVITY' (s) have been included to help you apply your own thoughts. Again, we have included some relevant concepts in "LET US KNOW" along with the text. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be better if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit.

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UNIT 8: KEYNESIAN MULTIPLIER

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8.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- derive the conceptual framework of multiplier
- describe the determinants of the value of multiplier
- explain the working of multiplier
- describe the concepts of static and dynamic multiplier
- outline the importance of the multiplier in underdeveloped countries.

8.2. INTRODUCTION

F.A. Kahn in early 1930s first developed the concept of multiplier in context with direct and indirect increases in employment as a result of initial increase in investment and employment. Kahn's concept was emphasizing on employment as a result his concept of multiplier is known as 'employment

multiplier'. Similarly, Keynes while refining the concept of multiplier focuses on investment and income and as a result, his multiplier is known as 'Investment or Income Multiplier'. Keynesian multiplier implies that total increase in employment, output or employment is manifold as compare to the increase in original investment.

Investment multiplier is one of the significant contributions from Keynes. The word multiplier means multiple. When a country decides to increase investment then change in income are not restricted to the initial level of investment, the changes in income or output will be many fold. In this unit, we shall discuss the concept of multiplier, its effects, working and importance. Then, we shall also discuss the concepts of dynamic multiplier.

8.3 THE KEYNESIAN MULTIPLIER

In this section, we shall discuss the concept of multiplier and its derivation.

8.3.1 The Concept of Multiplier

An injection to the circular flow of income leads to an increase in national income which is larger than the magnitude of the injection. The ratio of incremental increase in national income to the amount of fresh injection is called the multiplier. The injection into circular flow may occur through different means like- investment (I), government spending (G), exports (X) and these injections lead to changes in national income. Now suppose investment increases by an amount of Rs.500 and as a result, income increases by Rs.1500, then the multiplier is 3 (Rs.1500/Rs.500). Thus, multiplier is very important for generation and propagation of national income. Once the value of the multiplier is known then it becomes valuable information for policy makers to decide about investment, government expenditure, and exports and imports. In this unit we would focus on the Keynesian multiplier which is investment multiplier. Here injection to the circular flow of income occurs through

autonomous government investment expenditure. The investment multiplier is defined as the ratio of change in income to a change in autonomous investment that causes the change in income. Symbolically, $Ki = \frac{\Delta Y}{\Delta I}$ where Ki is the multiplier, Δ Y is the change in income, and Δ I is the change in autonomous investment.

8.3.2 Derivation of the Multiplier

The Keynesian multiplier can be derived from the income expenditure equation under equilibrium.

We know, Y= C+I, C: Consumption, I: Autonomous Investment, Y: Income

$$\text{Thus, } \Delta Y = \Delta C + \Delta I$$
$$1 = \Delta C/\Delta Y + \Delta I/\Delta Y$$
$$1 = MPC + \Delta I/\Delta Y, MPC: \text{marginal propensity to consume}$$
$$\Delta I/\Delta Y = 1 - MPC$$
$$\Delta Y/\Delta I = 1/1 - MPC$$
$$Ki = 1/1 - MPC \text{ or}$$
$$Ki = 1/MPS.....(i)\ MPS: \text{marginal propensity to save}$$

Equation 1 establishes the relationship between the MPC and Ki. It also enables us to determine the magnitude of the multiplier. From (1) it is clear that higher the value of the MPC or lower the value of MPS, higher will be the multiplier. Since MPC lies between 0 and 1, Ki lies between 1 and ∞. Keynes believed that Ki would typically vary between 1.5 and 10, with average value hovering around 3.

8.4 WORKING OF THE MULTIPLIER

Now, it would be interesting to understand the working of multiplier. Let's assume that State government decided to make an investment of Rs.5000/- Crore in order to revive the economy through upgrading rural infrastructure. Government decided to spend the entire amount through

construction of rural roads, building small dams, irrigation canals and fortification of agricultural land. In this process, government would make payment to various stake holders (labourer, farmers, material supplier etc.) for their contribution or services rendered during the work. Government is committed to spend Rs. 5000/- Crore to uplift the rural infrastructure and all stake holders will receive Re. 5000/- Crore for their contribution and services rendered during the rural infrastructure up gradation. People who received income from this rural infrastructure up-gradation will spend this amount on their daily consumption needs. Imagine, if marginal propensity to consume (MPC) of the people is 4/5 or 80%, then, Rs. 4000/- crore would be spent on consumption of goods and services. Individuals those are supplying consumer goods and services would receive Rs. 4000/- crore. The suppliers of consumer goods and services will also spend the amount on consumption of various goods and services. Marginal propensity to consume (MPC) of these suppliers remains the same i.e. 4/5 or 80%, then Rs. 3200/- crore would be spent on consumption. Those who receive Rs. 3200/- crore will also spend some of it on consumption of goods and services depending on their marginal propensity to consume. This chain of consumption expenditure cycle will continue and the income of people will keep on increasing. But every additional increase in income will be progressively less since a part of the income received will be saved. In this way, income increase to Rs.25000/crore as a result of initial investment of Rs.5000/crore. This can be shown as follows:

$$\Delta Y = 5000 + 5000 \times 0.8 + (5000 \times 0.8) \times 0.8 + [(500 \times 0.8) \times 0.8] \times 0.8 + ...$$

$$= 5000(1 + 0.8 + 0.8^2 + 0.8^3 ..... + ...)$$

Now applying the formula for the summation of a geometric progression series we get

ΔY = 5000 x 1/1-0.8

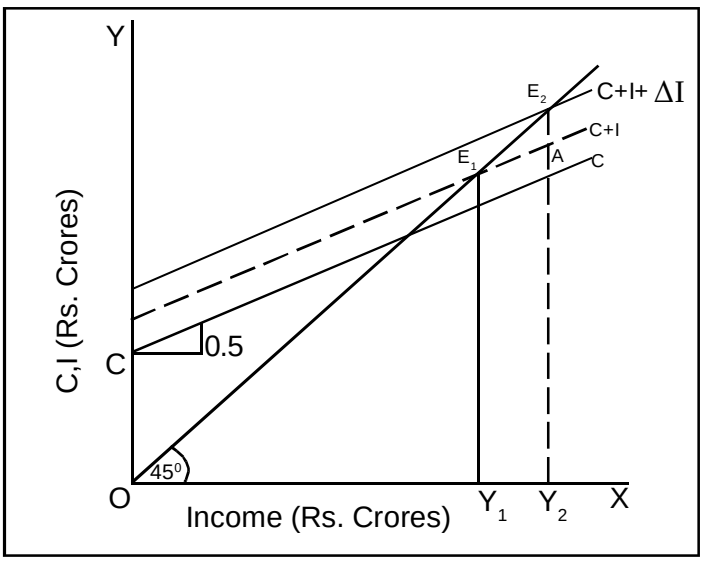
= 5000 x 1/0.2

= 5000 x 5

= 25000/

The process of income propagation as a result of increase in investment is shown with the Figure 8.1.

Figure : 8.1: Working of the Multiplier



In Figure 8.1, in the X-axis we measure income and in Y axis we measure consumption and investment. Line C in the diagram represents consumption function and it is drawn on the assumption that MPC is 0.5. So the line C has a slope 0.5. C+I is the income curve which intersect 45^O line at point E_1 where equilibrium is established. The equilibrium level of income is OY_1. Now with increment in investment by I, the income curve C+I shifts upward to C+I+ Δ I. This new income curve intersect 45^O line at point E_2. So the new equilibrium is established at E_2 and new equilibrium level of income is OY_2. Now the change in income, $Y_1Y_2=OY_2-OY_1$ is exactly double the initial change in investment E_2A.

i.e. $Y_1Y_2 = 2E_2A$

$Y = 2\ \Delta I$.

With the MPC value half and multiplier value 2, an initial increase in investment leads to final increase in income by two times the initial change in investment.

8.4.1 Assumptions of the Multiplier

The multiplier theory is based on the following assumptions:

- Ø The marginal propensity to consume is constant: In order to obtain the actual value of multiplier, it is assumed that there is no change in the marginal propensity to consume during the process of income propagation. This is because, if the MPC changes then the value of multiplier will also change.
- Ø There is no time lag in the multiplier process: In order to realise the full value of multiplier, it is assumed that there are no time lags (or, time intervals) between the receipt of income and the spending of it. Thus, it is assumed that the consumers spend the income as soon as they receive it.
- Ø There is net increase in investment: This assumption means that the net investment in the economy increases. Thus, it also means that an act of investment in one sector should not be offset by an act of disinvestment in some other sector of the economy.
- Ø Consumer goods are available in response to effective demand for them: The process of income propagation is subject to the availability of consumer goods. If the consumer goods are sufficiently available, the multiplier will continue to work and new incomes propagated.
- Ø Existence of excess capacity in consumer goods industry: For proper working of multiplier, there should be excess capacity in consumer goods industries. This is because, when increased investment creates excess demand for consumer goods, this can be met by using unutilised capacity in consumer goods industries.
- Ø Existence of elastic supply of capital: We know that an increase in investment would provide more employment to the workers (which results more spending and higher multiplier) only if there

are no bottlenecks in the supply of capital, raw materials and other resources for the proposes of business expansion.

This also means that the theory of multiplier is primarily more effective in an industrialised economy, rather than an agrarian economy.

- Ø There is a closed economy unaffected by foreign influence: For smooth working of multiplier, it is assumed that the economy is a closed one. If the economy is not a closed one and having trade relations with other countries, then it may have export surplus or import surplus which may affect the actual value of multiplier.
- Ø There is a change in autonomous investment and that induced investment is absent. This is so, because the accelerator effect of consumption on investment is ignored. Otherwise, the value of multiplier becomes far more than the usual.
- Ø There is less than full employment level in the economy: So long as there is involuntary unemployment (or less than full employment in the economy, income, output and employment will continue to expand on account of the operation of multiplier. But the moment, full employment stage is reached, income output and employment will stop increasing, howsoever high the MPC may be. So less than full employment is essential for the working of the multiplier.

8.4.2 Leakages of the Multiplier

We know that in reality multiplier is never equal to one or infinity. This means that whole of the increment in income is neither spent on consumption nor entirely saved. The main reason behind this is that there are several leakages from the income stream as a result of which the working of multiplier becomes limited and the process of income propagation is slowed down. The important leakages of multiplier are discussed below.

- **Saving:** Saving is an important leakage of multiplier which can reduce the multiplier effect of income propagation. If whole of the increment in income is spent on consumption (MPC=1) then multiplier become infinity times. But in reality, whole of the increased income is not spent but same part of it is saved, as a result we get a finite value of multiplier. In fact, when propensity to save is high, value of multiplier will become low. So saving is a leakage which limits the working of the multiplier.
- **Purchase of stock and securities:** Sometimes with newly created income people buy stocks and securities instead of spending on consumption. So it affects the working of multiplier and its value becomes smaller.
- **Debt Repayment:** Sometimes a part of income received by the people are used to pay the old debt. Since these incomes are not spent on consumption, the value of multiplier is reduced.
- **Liquidity Preference:** If the people of the society have strong liquidity preference then working of multiplier is limited. Thus, instead of spending on consumption, people may want to hold idle cash in hand. In such situations, the process of income propagation via multiplier is affected.
- **Price inflation:** Due to price inflation, a large part of increased income may be spent on paying higher prices instead of promoting consumption, income and employment.
- **Import:** If the country imports more, than a large part of income goes out from the domestic country to foreign countries. As a result of which income spent on domestic consumption becomes limited and so the multiplier.
- **Taxes and Corporate Savings:** Both of these affect the propensity to consume of the people and have retarding effect on multiplier working.



CHECK YOUR PROGRESS

Q 1: State the basic cause for the leakages in multiplier. Answer in about 30 words.

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Q 2: What is meant by multiplier? Answer in about 40 words.

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Q 3: Define the term investment multiplier. Answer in about 40 words.

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8.5 CONCEPTS OF STATIC AND DYNAMIC MULTIPLIER

Static multiplier works at a point of time or independent of time. This means that any change in the investment immediately results in a change in income. There is absence of time lag between initial investment and final change in income. It means that the moment $1 is spend on investment project; the income of society would increase by multiple. But in reality this does not happen. There is a time lag between the initial investment and ultimate increase in income as a chain of events occur in between. For example, an increase in investment leads to payment to suppliers of factor services, this payment gives purchasing power to factor service suppliers which they utilize in buying their requirements, this buying gives new income

to those who sell these requirements, this new income gets spent on other items and the process goes on. The multiplier that accounts of this entire process of income generation, expenditure, then further income generation and so on is called the dynamic multiplier.

One thing is clear that initial investment would generate an amount income that is greater than the initial investment. It should be noted that a specific time frame is required to generate the multiple level of income. The multiple level of income depends the successive rounds of spending that involves definite time framework. But, static multiplier does not consider the time path that changes the flow of income at multiple levels. The dynamic multiplier analysis does the job.

In the light of above discussion, it is clear that some realistic model of multiplier is necessary to understand the behavior of induced consumption and income over the period of time.

8.5.1 Dynamic Multiplier

A model of dynamic multiplier can be formulated involving time period or sequence that changes the relevant variables. Now, let us assume that a level of national income is in equilibrium in period 1. If, the government decided to enhance to increase an amount of investment of capital goods for the time period 2, the income of factors of production that are engaged in the production of capital goods would increase. But, we need to assume that there exists excess capacity in capital goods industries that responds immediately the rising aggregate demand in the economy.

Besides, we must assume that there exists a one period lag in response of change in consumption of the change in income. That is, a change in consumption in period t is a function of change in income of the previous period, that is, t-1.

In consideration with the above assumption, we can construct a simple model of dynamic multiplier.

$$Y_t = C_t + I_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$C_t = a + bY_{t-1}$ …… (2)

$I_t = I_t$ …… (3)

Look at the equation (3), this equation is consistent with Keynesian multiplier model that assumes that investment is an autonomous variable and it will not change by income or any other variables outside the model.

Substitute the equations (2) and (3) into (1), we have

$Y_t = a + bY_{t-1} + I_t$ …… (4)

The distinction between static and dynamic multiplier is that all about the time lag in consumption function. It's all about the changes in level of equilibrium from point-1 to point- 2 over a successive period of time to reach a new level of income.

Now, let's try to understand the model,

Level 1: Assumes that there is no change in investment or any component of aggregate demand in the level 1, therefore, the equilibrium level of income is equal to Y_1.

Level 2: In this time period, investment increases, as a result income also increases, so the identity for period 2 would be $\Delta Y = \Delta I$.

Level 3: In this time frame, consumption expenditure increases because of increase in income ($\Delta I = \Delta Y$) in the period 2, assuming one period lag in the consumption function. Therefore, income (Y2) at the end of period 2.

$= Y_1 + \Delta I$

At level 3, income rises because of induced consumption demand brought by increase in income level at 2. Increase in income in the level 2 is equal to increase in investment, ($Y_1 + \Delta I$ in level 2) increase in consumption at level 3. Income in level 3 will rise because of regular changes in investment that occurs in level 3. Therefore, at the end of level 3, level of income rise to:

$Y_3 = Y_1 + b\ \Delta I + \Delta I$.

At level 4: income increase because of new increase in investment (ΔI) at level 4 plus is the increase in income due to the

induced consumption expenditure resulting from the increase in income or consumption expenditure at level 3. During the level 4, increase in consumption expenditure would be $b.b\,\Delta I = b^2\,\Delta I$ plus the change in consumption expenditure induced by change in investment in period 3 by ΔI,

Thus, at level 4, total change in the income will be

$Y_4 = Y_1 + \Delta I + b\,\Delta I + b^2\,\Delta I$

This way, income would increased for indefinite period but the increase in income would be smaller in each successive period of time.

8.6 MULTIPLIER IN UNDER DEVELOPED COUNTRIES

The relevance of multiplier, in context with under developing countries is evaluated systematically by V.K.V.R. Rao in his article titled 'Investment, Income and Multiplier in an under-developed Economy'.

The author argues that the validity of the concept of multiplier exists only in the industrially developed, facing economic depression etc. Counties like U.K., U.S.A. are the ideal destination for smooth functioning of multiplier because of their excess productive capacity and large involuntary unemployment. The similar conditions (excess capacity in consumer goods industries and involuntary unemployment) hardly exist in under developed economies. In fact, the limited capacity of consumer goods industries results in inelastic supply of output in under developed counties.

The working of multiplier involves increase in national income and employment. In order to increase the national income and employment the supply of raw materials, capital needs to be elastic. This is because, when initial investment and working of multiplier comes in operation, it will lead to increase in aggregate demand. In order to meet this higher aggregate demand, supply of output would be necessary to increase in order to meet the increase aggregate demand of goods and services. But in under developed countries like- India, the availability of intermediate good i.e. steel, cement and capital puts some restrains on the operation and working of multiplier.

Now let's look in to the most important factor that determines the working of multiplier, its size and effectiveness is the involuntary open unemployment. When as a result of initial investment, aggregate demand for goods and services increases, there should be adequate supply of workers for various industries. The problem with under-developed counties is that this condition is not fulfilled because there exists disguised unemployment especially in agriculture.

Let's take the example of India. Indian economy is dominated by agriculture; income elasticity of demand for food grains was very high in the economy. When initial investment leads to increase in income of people, demand for food grains increases. But the supply of food grain is inelastic. So, it becomes difficult to enhance the supply of agricultural goods and services in response to increase in aggregate demand.

It means that the success of the working of Keynesian multiplier mainly depends on the following factors, viz., (a) There exists large excess capacity in the production of consumer goods therefore elastic supply of output. (b) The supply of raw and intermediate goods is adequate. (c) The presence of involuntary unemployed. (d) Agriculture output is sufficiently elastic.

Relevance for under developed countries: Earlier argument in case of India or under developed world has a background of 1950s and 1960s and the most significant critics were V.K.R.V Rao and A.K. Dasgupta. But, today after 70 years of independence, India as well as other developing world has changed. To the extent they fulfill the conditions necessary for the smooth working of the multiplier, the concept of multiplier would be relevant for them.

D.R. Khatkhate in his essay title 'The Multiplier Process in Developing Countries' said that multiplier can operate in under-developed counties if it is designed careful pattern of investment.

Last few decades, economic growth in industry and agriculture has brought significant diversification in structure. As a result, supply of output is elastic at least in industry. Similarly, there exists unutilized capacity in different consumer and capital goods industries. Besides, there exists

sizable potential in the production of intermediate goods like - cement, steel and fertilizers as and when requires.

With this changed structure of the economy if a systematic well balanced and diversified dose of investment is injected in the economy, it will result in growth of several industries simultaneously. The best example of balance and diversified dose of investment is the amount of investment made during the five year plans. This results in to multiple increments in output and employment.

Harrod-Domar in his theory of growth models has narrated that investment creates demand as well as fresh productive capacity. This model seems to be quite relevant as long as Indian economy is concerned because at present there existed surplus production capacity in Indian industries. It is also observed that the regular investment creating additional production capacity in the economy. It is this dynamic nature of economies from under developed countries that creates ideal conditions for the successful operation of multiplier in the economy in long run.

8.7 CRITICISMS OF MULTIPLIER

The main points of criticisms raised against the multiplier concept by Keynes are as follows:

- The concept of multiplier is based on some unrealistic assumptions like instantaneous relationship between income consumption and investment, constant marginal propensity to consume, absence of induced investment, presence of closed economy etc.
- Robertson, Goodwin and Lerner criticised the multiplier concept for ignoring induced investment. Keynes' multiplier takes into account the effect of change in consumption as a result of change in income but it does not take into consideration the effect of increased consumption on investment (induced investment).
- Keynes' multiplier tells us how increase in income leads to an increase in consumption. But actual studies show that the relationship between

income and consumption is not that simple as presumed by Keynes nor consumption is a function of income alone.

- Multiplier is also criticised for its static nature. The static nature of multiplier is unsuited to the ever changing dynamic world. However economists like Harrod, Hansen and Samuelson have tried to deal with the criticisms and made the whole analysis dynamic.



CHECK YOUR PROGRESS

Q 4: Differentiate between static and dynamic multipliers. Answer in about 60 words.

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Q 5: State the conditions for the functioning of the Keynesian multiplier. Answer in about 60 words.

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8.8 LET US SUM UP

- F.A. Kahn in early 1930s first developed the concept of multiplier in context with direct and indirect increases in employment as a result of initial increase in investment and employment. Kahn's concept was emphasizing on employment as a result his concept of multiplier is known as 'employment multiplier'.

- Similarly, Keynes while refining the concept of multiplier focuses on investment and income and as a result, his multiplier is known as 'Investment or Income Multiplier'. Keynesian multiplier implies that total increase in employment, output or employment is manifold as compare to the increase in original investment.
- Multiplier effect occurs when an increase in income arises because of new injection of spending.
- The success of multiplier depends on the size of the multiplier and time lag involved in the multiplier process is in operation in economy.
- If government decides to go for Keynesian style of demand management operation to correct the imbalance in the economy, it has to pay an attention towards these factors because excessive injection might lead to inflation and small injection will not resolve unemployment issue.
- Static multiplier means any change in the investment immediately results in to change in income. There is absence of time lag between initial investment and final change in income.
- Dynamic multiplier identifies the significance of time lag between the two macroeconomic variables i.e. initial investment and its impact on circular flow of income. Dynamic multiplier recognizes that change in circular flow of income is a gradual process that involves time lag.
- The relevance of multiplier, in context with under developing countries is evaluated systematically by V.K.V.R. Rao in his dynamic article title 'Investment, Income and Multiplier in an under-developed Economy'.
- The author argues that the validity of the concept of multiplier exists only in the industrially developed, facing economic depression etc.
- D.R. Khatkhate in his essay title 'The Multiplier Process in Developing Countries' said that multiplier can operate in under-developed counties if it is designed careful pattern of investment.



8.9 FURTHER READING

1) Ahuja, H. L. (2016). Macroeconomics. Agra: Laxmi Narayan Agarwal Educational Publishers.

2) Bhaduri, Dr. S. (2012). Macro Economics. Guwahati: New central Book Agency (P) Ltd.
3) Mukherjee, S. (2013). Macro Economics: A Global Text. Guwahati: New central Book Agency (P) Ltd.
4) Rana, K. C. & Verma, K.N. (2017). Macro Economic Analysis. Jalandhar: Vishal Publishing Co.
5) Shapiro, E. (1993). Macro Economic Analysis. New Delhi: Galgotia Publications Pvt. Ltd.

8.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The main reason behind the leakages in the multiplier is that there are several leakages from the income stream as a result of which the working of multiplier becomes limited and the process of income propagation is slowed down.

Ans to Q No 2: An injection to the circular flow of income leads to an increase in national income which is larger than the magnitude of the injection. The ratio of incremental increase in national income to the amount of fresh injection is called the multiplier.

Ans to Q No 3: Investment multiplier is defined as the ratio of change in income to a change in autonomous investment that causes the change in income. Symbolically, $\text{Ki} = \frac{\Delta Y}{\Delta I}$, where Ki is the multiplier, ΔY is the change in income, and ?I is the change in autonomous investment.

Ans to Q No 4: Static multiplier works at a point of time or independent of time. This means that any change in the investment immediately results in a change in income. There is absence of time lag between initial investment and final change in income. But in reality this does not happen. There is a time lag between the initial investment and ultimate increase in income as a chain of events occur in between. The multiplier that accounts of this entire process of income

generation, expenditure, then further income generation and so on is called the dynamic multiplier.

Ans to Q No 5: The working of Keynesian multiplier mainly depends on the factors like: (a) There exists large excess capacity in the production of consumer goods therefore elastic supply of output. (b) The supply of raw and intermediate goods is adequate. (c) The presence of involuntary unemployed. (d) Agriculture output is sufficiently elastic.



8.11 MODEL QUESTIONS

A) Very Short Questions (Answer each question in about 50-75 words)

Q 1: Briefly discuss the concept of investment multiplier.

Q 2: State the assumptions of the Keynesian investment multiplier.

B) Short Questions (Answer each question in about 250 words)

Q 1: Is the concept of multiplier applicable in an under developed economy? Discuss.

Q 2: Discuss the concept of dynamic multiplier.

Q 3: Discuss the shortcomings of the concept of Keynesian multiplier.

C) Long Questions (Answer each question in about 300-500 words)

Q 1: Critically discuss the concept of Keynesian multiplier.

Q 2: How would you derive the Keynesian multiplier? Discuss its policy relevance.

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UNIT 9 : MULTIPLIER-ACCELERATOR INTERACTION

UNIT STRUCTURE

9.1 Learning Objectives

9.2 Introduction

9.3 Principle of Accelerator: Conceptual Framework

9.4 Accelerator & Investment Behaviour

- 9.4.1 Accelerator Theory of Investment
- 9.4.2 Assumptions of the Theory of Acceleration
- 9.4.3 Example of the Principle of Accelerator

9.5 Multiplier - Acceleration Interaction

- 9.5.1 Background
- 9.5.2 Effects on National Income

9.6 Use of Super Multiplier in Business Cycle

- 9.6.1 Super-Multiplier: Meaning
- 9.6.2 Mathematical Calculation of Super Multiplier in Business Cycles
- 9.6.3 Use of Multiplier-Acceleration Interaction in Business Cycles

9.7 Criticisms of the Theory

9.8 Let Us Sum Up

9.9 Further Reading

9.10 Answers to Check Your Progress

9.11 Model Questions

9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- derive the conceptual framework of accelerator
- discuss the accelerator theory of investment
- describe the working of an accelerator
- illustrate the multiplier-accelerator Interaction
- discuss the concept of super-multiplier

- explain the working of super multiplier and business cycle
- put forward the weaknesses of the theory of accelerator

9.2. INTRODUCTION

John Maurice Clark put forward the first systematic explanation of the theory of acceleration in his article titled 'Business Acceleration and the Law of Demand'. This article was published in 'The Journal of Political Economy' in year 1917. Clark studied the ups and down in railroad traffic and the demand for railroad cars. In this study, he put forward a simple of acceleration focused on the relationship between change in the capital stock and changes in the aggregate output.

In 1933, Ragnar Frisch opened up new possibilities to this subject. Further John Hicks and Paul Samuelson identified the role of multiplier and accelerator in the business cycle. Similarly, Roy F. Harrod highlighted the significance of the role of accelerator in the creation of trade cycle.

In this unit, the multiplier-accelerator interaction has been discussed. As you go through this unit, you would be able to relate the principle of accelerator with investment behaviour. The concept of super multiplier has also been discussed. Finally, the criticisms of the theory of accelerator has been discussed.

9.3 PRINCIPLE OF ACCELERATOR: CONCEPTUAL FRAMEWORK

The concept of Accelerator was developed by Thomas Nixton Carver and Albert Aftalion. The theory of accelerator was there much before the Keynesian Economics started dominating the intellectual discourses in 20th century. This theory suggests that if an investment of companies would increase as a result of excess demand. While responding to excess demand, companies have two options; decrease demand by rising prices or increase investment to match the level of excess demand. Accelerator theory states

that companies would like to increase production to enhance their profit. This pattern will attract additional investors that will accelerate growth.

Let's describe the processes. When demand for consumer goods increases, there will be greater demand for machine or capital goods that would be producing and addressing the increased demand for consumer goods/services. In simple words, when there is a demand for consumer goods, the demand for machines or capital goods would also increase.

In reality, the concept of accelerator correlates the rate of change in consumption and the rate of change in capital investment. In a simple way we can say that when income increases, consumption is also increases. When consumption increases it will increased the investment / capital goods in many folds.

Acceleration Coefficient: Acceleration coefficient is the numerical value of the relation between an increase in income (ΔY) and as a result of it increase in investment (ΔI). Increase in investment (ΔI) leads to increase in consumption (ΔC). Let's understand it with the help of numerical example - if supposed, there is an increased in consumption expenditure by say Rs. 4 Crore. This phenomenon encourages business or entrepreneurs communities for the investment of Rs. 16 Crore. In this condition the accelerator would be $\frac{16}{4} = 4$.

The principle of acceleration has ability to explain both economic boom and recession in the economy. If an economy is on the path of high growth and experiencing boom, business firms would like to optimize their profit by investing in factories and in the form of capital investment. In recession, firm would simply reduce its investment. Any attempt in reduction in investment may expand the phase of recession in the economy because capital expenditure is the driver of economic expansion.

In a broader sense, the concept accelerator explains the tradeoff between output and capital investment. It means, if there is fluctuations (Increase or Decrease) in demand for consumer goods, it will fluctuates (Increase or Decrease) the demand for machines / capital goods that are

required for the production of consumer goods. The principle of accelerator explains the relationship between the rate of output in an open economy and the level of investments in the forms of capital goods.

Now let us consider that how government policy decision affects the functioning of the principle of accelerator. Now government decides to cut in tax rate. How it will affect the accelerator? When government policy decides to cut down the tax rate, disposal income of consumer would increase. When disposal income increases, the demand for various consumer goods would also increase. Reduction in tax rate would have positive impact on overall business environment. In order to meet the additional demand from consumer, additional capital would be employ to meet the growing needs of consumer goods. Overall, there will be an expansion of industry or growth of an industry.

9.4 ACCELERATOR AND INVESTMENT BEHAVIOUR

In this section, we shall relate the principle of accelerator with the investment behaviour in the economy.

9.4.1 Accelerator Theory of Investment

The theoretical postulate has revealed that when there is an increase in income or in consumption, it will lead to increase in investment in many folds. It's a simple arithmetic, when income increases, consumption will also increase. When consumption increases, there is need of greater amount of investment or capital goods to produce these goods. Without the additional amount of capital goods, the increased demand is impossible to fulfill.

From above theoretical postulate, we can observe that the principle of acceleration relates investment to the level of output. This relationship is captured by the capital output ratio (K/Y). This K/Y ratio is the accelerator. The theory of investment based on the acceleration principle is also called the accelerator theory of investment. According to this theory, investment changes as a result

of change in income or consumption. The change in investment is also known as induced investment.

We need certain amount of capital / machines to produce an output. The numerical equation in this regard can be stated as:

Y_t = Output

v = Capital-Output Ratio

Let us suppose that the capital output ratio in an economy is v, then we can write

$K_t = vY_t$ ……(1)

Where, Kt stands for the stock of capital, Y_t stands for level of output/income and, v for capital output ratio, with subscript t referring to current time period.

Now denoting t-1, t-2,...as preceding periods and t+1,t+2,…as succeeding periods, we can write

Kt-1 = vYt-1 …….. ……(2)

In this theoretical analysis, we have already assumed that capital-output ratio is constant. As a result of it, any change in output is possible when there are changes in the stock of capital.

Let us consider the fact that in this situation, when income is Y_t, the requirement of capital stock would be $K_t = vY_t$. . If income is Y_{t-1}, then the required capital stock would be $K_{t-1} = vY_{t-1}$.

If supposed, income increases from Y_{t-1} to Y_t, capital stock would increase from K_{t-1} to K_t. This explanation also states that K_{t-1} is equal toY_{t-1} and similarly K_t is equal to vY_t.

Now (2) - (1) yields

$K_t - K_{t-1} = vY_t - vY_{t-1}$

$K_t - K_{t-1} = v (Y_t - Y_{t-1})$ ……. (3)

An increase in capital stock in a given point of time $(K_t - K_{t-1})$ is primarily an investment that is shown in the equation (2). This equation can be written in the following form:

$I_t = v (Y_t - Y_{t-1})$ …… (4) (since investment is change in capital stock per unit of time)

Equation (4) exhibits that when there is an increase in income from previous year t-1 to t, and then the increase in investment will be v times more than the increase in income in previous year. In this equation v is capital ratio that shows the magnitude of accelerator. Now let's assume that if a capital-output ratio is 5. In this condition, as a result of income increases, investment will be increase by 5 times. We must understand that in this equation, investment is the function of change of income. Thus if we assume that the accelerator is 5 then for an increase of Rs.100 in output a Rs.500 increase in capital will be necessary. Now, let's understand the working of accelerator.

9.4.2 Assumptions of Theory of Acceleration

- Capital-output ratio is fixed or constant.
- Non-existence of Excess Capacity in Consumer Goods Industries:
- Excess capacity in Investment Goods Industries:
- Firms increases capital stock to meet the increase in demand for their products treating the increase in consumption to be permanent.
- Elastic Supply of Resources:
- Adjustments between sectors are instantaneous.

9.4.3 Example of the Principle of Accelerator

We must consider the fact that the amount of investment in the economy not only depends on the level of income but also depends on how fast the output rises or how fast the business rises or falls down. If we wish to rises the level of investment in the economy, we must ensure that output has to grow and grow at a constant rate towards upward direction.

Let us describe the principle of acceleration with the help of Table 9.1.

Table 9.1: Working of Principle of Acceleration

Year (1)	Output (2)	Desired Capital (3)	Replacement (4)	Net Investment (5)	Gross Investment (6)
1st	100	200	20	00	20
2nd	100	200	20	00	20
3rd	110	220	20	20	40
4th	120	240	20	20	40
5th	150	300	20	60	80
6th	170	340	20	40	60
7th	170	340	20	00	20
8th	160	320	20	-20	00
9th	140	280	20	-40	00

In the above Table 9.1, we have assumed the following:

- Capital-output ratio is 2:1, i.e. two units of capital are required to produce one unit of output.
- Average life of capital goods is 10 years and each period of replacement investment is assume to be10 per cent of the total capital stock in period1.
- There is an absence of excess capacity to produce. Therefore, investment will increase in response to an increase in demand for output.

Explanation of Table: In Table 9.1, the desired level of stock of capital required to meet the potentially increased in consumption is given in column 3. Column 3 shows that in order to meet the potentially increased in demand, the amount of capital stock has to be doubled that is given in column 2. Similarly, column 4 shows the constant replacement of investment of 20 units per time period. Column 5 has shown the net investment that is equal to changes in output during current and previous time period. Column 6 shows the gross investment that is the sum of replacement investment and net investment.

Now in column 3, it can be seen that when output has risen by 10 percent, in response to that, gross investment in capital goods has also increased from 20 to 40 units i.e. 100 per cent. When the demand for output raised (Column 4) by 10 units, gross investment remained at 40 units as shown in time period 3. It's visible from the above table that the demand for output raised during time period 4

& 5 as compared to time period 3 & 4. This increased in demand (4 to 5 period) results in to increase in investment up to 80 units in time period 5. But, similarly, it was also observed that there is gross fall in the rate of investment during the time period 6 from 80 units to 60 units. The gross investment has fall down despite of the fact that output has actually increased from time period 5 to 6 i.e. 150 to 170 units.

Similarly, it was also observed that if the output falls down by 10 units especially during the time period 8, the net investment also falls down by 20 and the gross investment becomes zero. What does it means? It means that while during the fall of the economy, the value of accelerator becomes limited. The limited role of accelerator means that the demand for investment goods starts falling below the value of the replacement demand. It also means that decline trend in investment is because of decline of demand for consumption goods that cannot exceed deprecation.



CHECK YOUR PROGRESS

Q 1: Define the term accelerator coefficient. Answer in about 30 words.

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Q 2: State the accelerator theory of investment. Answer in about 50 words.

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9.5 MULTIPLIER- ACCELERATOR INTERACTION

In this section, we shall discuss the interaction between multiplier and accelerator.

9.5.1 Background

Keynes made significant contribution in understanding the cyclical fluctuations by highlighting the ups and down in investment demand. Keynes in his multiplier theory has shown the effects of increase and decrease in investment on output and employment. The empirical evidence showed that the effect of multiplier is noticeable especially when multiplier worked during boom and recession i.e. during the business cycles. But it should be noted that Keynes ignored the importance of accelerator. Consequently Keynes and his theory of multiplier could not explain the cyclical and cumulative nature of the fluctuations in the economic activities.

An autonomous increase in the level of investment raises income by many fold depending the value of multiplier. But an increase in income further induces the increase in investment through acceleration effect. Increase in income brings about increase in aggregate demand for goods and services. In order to produce more goods, firms require more capital goods for which extra investment take place.

9.5.2 Effects on National Income

In economics, attempts were made to integrate the concept of multiplier and accelerator. Combined operation of multiplier and accelerator provides endless possibilities. The endless possibilities are depends on the values of accelerator and the magnitude of the multiplier. Economist like P.A. Samuelson, J.R. Hicks, R.F. Harrod and A. Hansen have made successful attempts to integrate these two significant parallel concepts.

$$\Delta Ia \rightarrow \Delta Y \rightarrow \Delta C \rightarrow \Delta Ii \rightarrow \Delta Y \rightarrow \Delta C \rightarrow \Delta Ii$$

Table: 9.2: Multiplier and Accelerator Effects of National Income

Multiplier Period (Stages)	Initial Outlay (Rs)	Induced Consumption (Rs)	Induced Net Investment (Rs)	Total Increase in National Income (Rs.)
1.	10	0.00	0.00	10.00
2.	10	5.00	10.00	25.00
3.	10	12.50	15.00	37.50
4.	10	18.75	12.50	41.25
5.	10	20.62*	3.74	34.36
6.	10	17.18	- 6.88	20.30
7.	10	10.15	- 14.06	6.09
8.	10	3.05	-14.20	-1.15
9.	10	0.58	+ 4.94	15.52
10.	10	7.76	14.36	32.12
11.	10	16.06	16.60	42.66

*20.625 rounded off to 20.62

Assumptions:

- Marginal Propensity to Consume = ½ = 0.5
- Accelerator coefficient = 2

Keeping the assumptions in mind, let us discuss the working of multiplier and acceleration simultaneously and its impact on income generation. The table given above elaborates the process of income generation gradually at each stage/cycle.

Let us consider stage-1 that has initial outlay of Rs. 10 crore. This outlay does not lead to any induced investment. Therefore, total rise in national income in stage-1 would be Rs. 10 crore (This amount is equals to the initial outlay of Rs. 10 crores).

We have assumed that marginal propensity to consume is = ½ = 0.5. In this circumstance, at stage-2, induced consumption would be Rs. 5 crore. Accelerator coefficient = 2, therefore induced investment would be Rs. 10 crore. The total increase in national income is Rs. 25 crore.

At stage-3, we have an induced investment of Rs. 12.50 crore and net induced investment of Rs. 15 crore being twice the difference between 12.50 crore and 5 crore.

At stage-4, it seems that this period is a peak period where income has reached to Rs. 41.25 crore because of the combine effect of multiplier and acceleration. This is also called super - multiplier.

At stage-5, the total income starts falling and falls to rock bottom level of - 1.15 crore at stage-8th time period. But again the income starts rising from 15.52 crore to 32.12 crore and goes upto 42.66 crore at stage-11 while completing the cycle.

This shows that marginal propensity to consume (MPC) of less than unity gives an answer to the question: Why does the cumulative process come to an end before a complete collapse or before full employment? Hansen says that the rise in income progressively slowed down on account of a large part if the increase in income in each successive period is not spent on consumption. This results in a decline in the volume of induced investment and when such a decline exceeds the increase in induced consumption, a decline in income sets in.

Thus, it is the marginal propensity to save which calls a halt to the expansion process even when the expansion is intensified by the process of acceleration on top of the multiplier process. However, we have assumed constant values of multiplier and acceleration coefficients but in a dynamic economy they vary cyclically. Thus, when we study the results of leverage effects or the interaction of multiplier and acceleration coefficients, we find that the level of income will be subject to various types of fluctuations depending on the values of accelerator and the multiplier.

9.6 USE OF SUPER-MULTIPLIER IN BUSINESS CYCLES

In this section, we shall discuss the concept of super-multiplier.

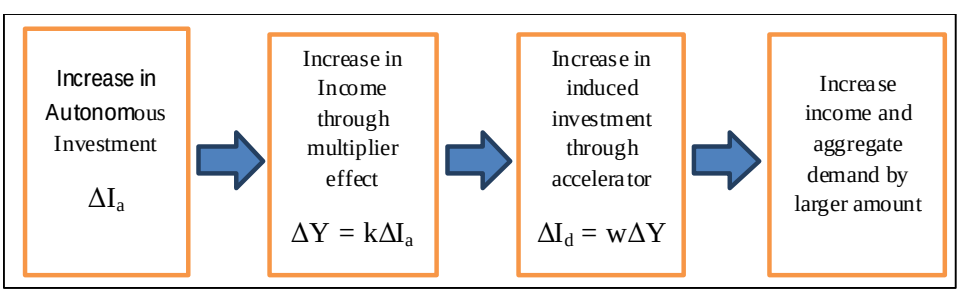
9.6.1 Super Multiplier: Meaning

The interaction between multiplier and accelerator is often called the super multiplier. The simultaneous operation of multiplier and accelerator can results into high or low level of income in the economy. The combined effect of changes in income (or

consumption) and investment upon each other gives us the super multiplier. The multiplier causes an autonomous increase in the level of investment to raises income by a multiple that depends on the size and value of multiplier. This increase in income will lead to increase in investment through accelerator effect. Once income rises, aggregate demand (AD) for goods and services increases. In order to produce more goods and services, we need more capital goods. For more capital goods, additional investment has to take place. This highlights the relationship between investment and income.

But it must be noted that the effect of super multiplier is bigger than the effect of simple multiplier. This has been shown in Figure 9.1.

Figure 9.1: Working of Super-Multiplier Effect



ΔIa = Increase in autonomous investment

ΔY = Increase in Income

k = Multiplier which is equal to $\frac{1}{1-MPC}$, where MPC is marginal propensity to consume.

ΔI_d = Increase in induced investment

w = Size of accelerator or capital-output ratio

Figure 9.1 shown above illustrates that an increase in autonomous investment increases income multiple time through multiplier effect. The value of multiplier depends on marginal propensity to consume (MPC). The value of MPC increases induced investment by accelerator times the increase in income. This

combine effect (Multiplier and Accelerator) brings large changes in the level of income in the economy.

9.6.2 Mathematical Calculation of Super Multiplier in Business Cycles

The concept of super multiplier includes both induced consumption i.e. marginal propensity to consume (MPC) and induced investment i.e. marginal propensity to invest. Super multiplier, while including both multiplier and accelerator states that investment is not only autonomous, but also partly induced.

In business cycle theory, this term super multiplier was first coined by J.R. Hick. The objective was to show that the relationship between changes in induced investment and corresponding change in income. In other words, super multiplier shows the ratio between changes in investment and change in equilibrium output.

Simple method of calculating super multiplier:

Total income is:

$Y = C + I_a + I_p$

Where Y = total income, C = consumption expenditure, I_a = autonomous expenditure and, I_p = induced (private) investment.

It must be noted that change in induced investment is mainly the demand for consumer goods or expenditure of households on consumption goods. Therefore, private consumption is the function of income.

But, Keynes states that consumption is a stable function of income i.e $C = bY$, where $b = MPC = d C/dY$, i.e. changes in consumption induced by changes in income. Similarly, marginal propensity to invest (MPI) is denoted by i, and that is ratio of change in the aggregate induced investment to a given unit change in aggregate income (dI/dY).

The equilibrium condition of income would be:

$Y = C + I_a + I_p$

$= bY + I_a + iY$

If we rearrange, we have:

$Y - bY - iY = I_a$

$Y (1 - b - i) - I_a$

Or, $Y = I_a/1\text{-}b\text{ -}i = 1/1\text{ -}b\text{- }i\ (I_a) = K'\ (I_a)$……(1)

Here, 1 / (1- b- i) is the super-multiplier (K').

If, an autonomous investment ↑ by given amount (ΔI_a), the corresponding increase in income will be:

$$\Delta Y = \Delta I_a/1 - bi = \Delta I_a .1/1 - b - a$$

$$\text{Here}, 0 \le b \le \text{and } 0 \le i \le 1.$$

$$\text{Moreover}, 0 \le b + i \le 1.$$

Equation 1 above makes it clear that change in income will be equal to the autonomous investment multiplied by super-multiplier.

9.6.3 Use of Multiplier-Accelerator Interaction in Business Cycles

It is clear from the above discussion that different value of marginal propensity to consume and accelerator will result in different cyclical fluctuations. For example: if the marginal propensity to consume (MPC) is 0.5 and the accelerator coefficient is 2. Taking in to consideration of all assumptions and the initial investment of Rs. 100 Crore, lets analyze that what changes would take place in income generation. This has been explained with the help of Table 9.3.

Table 9.3: Multiplier- Accelerator Interaction (Rs. Crore)

Time (1)	Initial Investment (2)	Induce Consumption (C = 0.5) (3)	Induced Investment (V = 2) (4)	Increase in Income (Columns 2+3+4) (5)
0	0	0	0	0
t+1	100	--	--	100
t+2	100	50	100	250
t+3	100	125	150	375
t+4	100	187.50	125	412.50
t+5	100	206.25	37.50	343.75
t+6	100	171.88	-68.74	203.14
t+7	100	101.57	-140.62	60.95
t+8	100	30.48	-142.18	-11.70
t+9	100	-5.48	-72.66	21.49
t+10	100	10.75	33.20	143.95

Table 9.3 shows that in time period t+1, an increase of Rs. 100 Crore as an initial investment. This initial investment will increase the consumption of Rs. 50 Crore in time period t+2. This is because the marginal propensity to consume is ½ or 0.5.

Rise in consumption would encourage investment of Rs. 100 Crores (50 X 2 = 100 in Column 4), because an accelerator coefficient is 2. As a result, finally an income (Columns 2+3+4) increases to Rs. 250 Crore keeping in mind that MPC is 0.5.

An actual increase in consumption in period t+3 and t+2 is Rs. 75 Crore (125-50 = 75). The accelerator coefficient is 2, and if we multiply this increase in consumption Rs.75 Crore, we get an induced investment of Rs. 150 Crore (75 X 2 = 150 in Column 4 in time period t+3). This results in total increases in income of Rs. 375 Crore (Columns 2+3+4)) in time period t+3.

An increase of total income of Rs. 375 will further increase the induced consumption to Rs. 187.5 (MPC = 0.5) in time period t+4. The difference of induced consumption Rs. 187.50 Crore minus Rs. 125 Crore = 62.50 Crore (Period t+3 and t+4). Let's multiply this amount by accelerator coefficient i.e. 2, 62.50 X 2 = Rs. 125 Crore of induced investment shown in column 4. Finally, the total of columns 2+3+4 gives an increase in income of Rs. 412.50 Crore in column 5 in time period t+4. This time period t+4 is the time cycle where highest income is generated in the successive rounds. Thereafter, it starts falling till it reaches to the lowest point when income actually lowered in minus of Rs. 11.70 Crore in time period t+8. But immediately the revival period starts with time period t+9.

Samuelson, in his model has shown these effects: initially the combined effect of multiplier and accelerator tends to increase the income, then falls and again rises at constant amplitudes.

9.7 CRITICISMS OF THE THEORY

The criticism on the theory of accelerator begins with its assumption. This theory assumes that capital-output ratio or the value of accelerator

would remain constant during the trade cycle. The ration will change whenever the composition of output changes or there is a change in technology.

Kaldor put forwards this argument and says that it would be wrong to assume that increase in income will lead to many fold increase in investment. Because in factories, there are already some machines that are kept ideally. If demand for goods increases as a result of increase in income, idle machines will be utilized first before making final decision on increase in fresh investment.

Similarly, if the enterpriser expects that the increase in demand is temporary phenomena, then business firms would exploit the existing capacity of machineries rather than make plan for installation for new set of machineries.

In order to make the working of accelerator possible, this theory also assumes that there exists surplus productive capacity in capital goods industries. If there exist no surplus production capacity in machine making industries, increased demand for machines (due to increase in income) will not be fulfilled.

Similarly, this theory assumes that the demands for machines (Capital goods) would remain stable in near future. But this is unacceptable because the size of accelerator cannot remain constant. In fact, the size and magnitude is largely depends on the business calculations and profitability of new installations of machines.

The theory of acceleration is also based on the assumption that there exists an availability of resources that could be utilized in capital goods industries in order to increased in production. But this assumption is true when there exist unemployment in the economy. In case, if economy has already reached to full employment, capital goods industries cannot be expanded.

The theory also assumes that increase in demand for output promptly increases induced investment. But there are possibilities of time lag before the generation of new investment. If the time lag is three years, full impact

of induced investment will not be felt in one year but will be spread over the three years.

The theory is also criticized for ignoring rate of interest completely. According to Joan Robinson, any theory of investment with no reference to interest rate cannot be considered a theory at all.



CHECK YOUR PROGRESS

Q 3: What was Samuelson's findings with regard to multiplier-accelerator interaction? Answer in about 30 words.

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Q 4: On what ground has Robinson criticized the theory of accelerator? Answer in about 50 words.

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9.8 LET US SUM UP

- John Maurice Clark put forward the first systematic explanation of the theory of acceleration in his article titled 'Business Acceleration and the Law of Demand'.
- Clark studied the ups and down in railroad traffic and the demand for railroad cars. In this study, he put forward a simple of acceleration focused on the relationship between change in the capital stock and changes in the aggregate output.
- In 1933, Ragnar Frisch's opened up new possibilities to this subject. Further John Hicks and Paul Samulson identified the role of multiplier

and accelerator in the business cycle. Similarly, Roy F. Harrod highlighted the significance of the role of accelerator in the creation of trade cycle. Acceleration coefficient is basically the numerical value of the relation between an increase in income (ΔY) and the resulting increase in investment (ΔI) via increase in consumption (ΔC).

- The concept of Accelerator was developed by Thomas Nixton Carver and Albert Aftalion. The theory of accelerator was there much before the Keynesian Economics started dominating the intellectual discourses in 20th century. In simple words, this theory propagates that when investment of companies would increase as a result of excess demand.
- The principle of acceleration has ability to influence both economic boom and recession in the economy. If an economy is on the path of high growth and experiencing boom, business firms would like to optimize their profit by investing factories and in the form of capital investment.
- In simple words, when income or consumption increases, investment will increases by a multiple amount. It is obvious that when income increases, consumption increases and there is need to increase greater amount goods and needs to be produced.
- Keynes made significant contribution in understanding the cyclical fluctuations by highlighting the ups and down in investment demand. Keynes in his multiplier theory has shown how the effect of increase and decrease in investment on output and employment. The impact of multiplier is bigger when multiplier works during the upswing or downswing of business cycles.
- The theory of super multiplier is mainly the interaction between multiplier and accelerator. The simultaneous operation of multiplier and accelerator can results into high or low level of income in the economy.

- The concept of super multiplier includes both induced consumption i.e. marginal propensity to consume (MPC) and induced investment i.e. marginal propensity to invest. Super multiplier, while including both multiplier and accelerator states that investment is not only autonomous, but is the part of derived demand.

9.9 FURTHER READING

1) Ahuja, H.L. (2016). Macroeconomics. Agra: Laxmi Narayan Agarwal Educational Publishers.
2) Bhaduri, Dr. S. (2012). Macro Economics. Guwahati: New central Book Agency (P) Ltd.
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5) Shapiro, E. (1993). Macro Economic Analysis. New Delhi: Galgotia Publications Pvt. Ltd.

9.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Acceleration coefficient is the numerical value of the relation between an increase in income (Δ Y) and as a result of it increase in investment (Δ I). Increase in investment (Δ I) leads to increase in consumption (Δ C).

Ans to Q No 2: We know that the principle of acceleration relates investment to the level of output. This relationship is captured by the capital output ratio (K/Y). This K/Y ratio is the accelerator. The theory of investment based on the acceleration principle is also called the accelerator theory of investment.

Ans to Q No 3: Samuelson, in his model of multiplier-accelerator interaction, has shown that initially the combined effect of multiplier and accelerator tends to increase the income, then falls and again rises at constant amplitudes.

Ans to Q No 4: The theory of accelerator has been criticised by Robinson as it ignores the rate of interest completely. According to him, any theory of investment with no reference to interest rate cannot be considered a theory at all.

9.11 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: Discuss the concept of accelerator coefficient and its relevance in policy intervention.

Q 2: Discuss the relationship between the principle of accelerator and investment behaviour.

Q 3: Briefly discuss the concept of super-multiplier.

B) Essay Type Questions (Answer each question in about 300-500 words)

Q 1: Describe the process of multiplier-accelerator interaction with the help of appropriate examples.

Q 2: Discuss the use of super-multiplier in business cycles.

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UNIT 10: FURTHER TOPICS IN MULTIPLIER

UNIT STRUCTURE

10.1 Learning Objectives

10.2 Introduction

10.3 Concepts of Static and Dynamic Multiplier

10.3.1 Dynamic Multiplier

10.4 Dynamic Action of a Multiplier

10.5 Multi-Sector Multiplier

10.6 Public Expenditure Multiplier

10.6.1 Numerical Example

10.6.2 Graphical Presentation of Government Spending and its Impact.

10.7 Balanced Budget Multiplier

10.8 Let Us Sum Up

10.9 Further Reading

10.10 Answers to Check Your Progress

10.11 Model Questions

10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- discuss the conceptual framework of static and dynamic multiplier
- acquire knowledge about the meaning of multi-sector multiplier
- put forward the meaning of public expenditure multiplier
- illustrate the meaning of public expenditure with the help of numerical and graphical example
- describe the concept of balance budget multiplier.

10.2 INTRODUCTION

We have already discussed the concept of multiplier in the earlier units. In this unit, we shall discuss the concept of dynamic multiplier. The concept of multi-sector multiplier and balance budget multiplier have also been discussed.

10.3 CONCEPTS OF STATIC AND DYNAMIC MULTIPLIER

Static multiplier is identified with several names like- 'comparative static multiplier', 'simultaneous multiplier', 'logical multiplier', 'timeless multiplier and 'legless multiplier' etc. It simply means that changes in investment immediately results in increase in income and there exists no time lag.

In other words, static multiplier means any change in the investment immediately results in to change in income. There is absence of time lag between initial investment and final change in income. It means that the moment $1 is spent on investment project; the income of society would increase by a multiple. Increase in both investment and income occur instantaneously. Time element is not brought into the discussion of the process of income generation. But in reality a specific time frame is required to generate the multiple level of income. The multiple level of income depends on the successive rounds of spending that involves definite time framework. But, static multiplier does not consider the time path that changes the flow of income at multiple levels. However, a realistic model of multiplier is necessary to understand the behavior of induced consumption and income over the period of time. We need do discuss dynamic multiplier in this context.

The above discussion exhibits that there is need for some realistic framework of multiplier that would enhanced our understanding on the behavior of induced consumption and income over the period of time. Now, let's discuss the concept of dynamic multiplier in this regard.

10.3.1 Dynamic Multiplier

Dynamic multiplier identifies the significance of time lag between the two macroeconomic variables i.e. initial investment and its impact on circular flow of income. Dynamic multiplier recognizes that change in circular flow of income is a gradual process that involves time lag. The multiplier works through consumption expenditure and income generation. The dynamic multiplier aptly recognizes the dynamic process of change in income at every stage as a result of

change in initial investment. The dynamic multiplier is all about stage-by -stage computation of the changes in income as a result of change in investment. John Maynard Keynes was of the view that the multiplier effect would be good or bad; multiplier effect may cause depression or bring out the economy from depression.

A model of dynamic multiplier can be formulated involving time period or sequence that changes the relevant variables. Now, let's assume that a level of national income is in equilibrium in period 1. If, the government decided to enhance to increase an amount of investment of capital goods for the time period 2, the income of factors of production that are engaged in the production of capital goods would increase. But, we need to assume that there exists excess capacity in capital goods industries that responds immediately the rising aggregate demand in the economy.

Besides, we must assume that there exists a one period lag in response of change in consumption of the change in income. That is, a change in consumption in period t is a function of change in income of the previous period, that is, t-1.

In consideration with the above assumption, we can construct a simple model of dynamic multiplier.

$Y_t = C_t + I_t$ ..... (1)

$C_t = a + bY_{t-1}$ ..... (2)

$I_t = I_t$ ..... (3)

From the equation (3) it will be observed that this equation is consistent with Keynesian multiplier model. We have assumed that investment (I_t) is an autonomous variable (i.e., autonomous investment: I_t). It means that investment is not dependent on changes in income and is determined by the variables that are inside the model only.

Substitute the equations (2) and (3) into (1), we have

$Y_t = a + bY_{t-1} + I_t$ ..... (4)

The distinction between static and dynamic multiplier is that all about the time lag in consumption function. It's all about the changes in level of equilibrium from point-1 to point-2 over a successive period of time to reach a new level of income.

Now, let's try to describe the model.

Level 1: Assumes that there is no change in investment or any component of aggregate demand in the level 1, therefore, the equilibrium level of income is equal to Y_1.

Level 2: In this time period, investment increases, as a result income also increases, so the identity for period 2 would be $\Delta Y = \Delta I$.

Level 3: In this time frame, consumption expenditure increases because of increase in income ($\Delta I = \Delta Y$) in the period 2, assuming one period lag in the consumption function. Therefore, income (Y_2) at the end of period 2= $Y_1 + \Delta I$

At level 3, income rises because of induced consumption demand brought by increase in income level at 2. Increase in income in the level 2 is equal to increase in investment, (Y1 + Δ I in level 2) increase in consumption at level 3. Income in level 3 will rise because of regular changes in investment that occurs in level 3. Therefore, at the end of level 3, level of income rise to:

$Y_3 = Y1 + b\ \Delta I + \Delta I$

At level 4: income increase because of new increase in investment (Δ I) at level 4 plus is the increase in income due to the induced consumption expenditure resulting from the increase in income or consumption expenditure at level 3. During the level 4, increase in consumption expenditure would be b.b Δ I= b2 Δ I plus the change in consumption expenditure induced by change in investment in period 3 by Δ I,

Thus, at level 4, total change in the income will be:

$Y_4 = Y_1 + \Delta I + b\,\Delta I + b^2\ \Delta I$

In this way, income would increase for indefinite period but the increase in income would be smaller in each successive period of time.

In short, the difference between static and dynamic multiplier could be summarized with the help of four points i.e. time element, process of changes, equilibrium and study of reality. The time element is significant because in static economic analysis there is no scope for time element and all variables refer to the same point of time. That is the reason static economy is also called timeless economy. On the contrary, in dynamic economics, the element of time occupies a significant place role and each variables refers to specific point of time.

In case of process of change, static economy shows only the condition of equilibrium but does not show the path of change. But, dynamic analysis shows the path of changes. In short, static economic analysis shows 'still' picture whereas the dynamic economics shows moving' pictures.

Similarly, static economics studies particular point of equilibrium but dynamic economics studies the process by which equilibrium is achieved. It means dynamic economics studies both equilibrium as well as disequilibrium. Finally, it can be said that statics analysis is far from reality and based on unrealistic assumptions like -perfect competition and perfect knowledge of market etc. But in reality, dynamic analysis takes these economic variables constantly changing.

10.4 DYNAMIC ACTION OF A MULTIPLIER

Single investment shock can be easily extended to cover the analysis of effects over time of permanent changes in net investment. A permanent increase in net investment is a continuous series of investment shocks of equal size. In order to have a complete picture of dynamic action of multiplier, we need connect the events of changes in investment situation and equilibrium.

For example, let us assume that the marginal propensity to consume (MPC) is ½. Let there be an increases of Rs. 100 Core of net investment at each period of time. We will simply add the effect over time of the individual investment shocks to obtain the total effect of the rise in the level of net investment. Let's understand the process explained in Table-1, given below.

Table: 01

Time Period	Change in Investment ΔI	Induced change in consumption ΔC				Change in Income ΔY
1.	100					100
2.	100	50				150
3.	100	50	25			175
4.	100	50	25	12.5		187.05
5.	100	50	25	12.5	6.25	193.75
↓	↓					↓
∞						200

Income raised by Rs. 100 Crore in period 1. In period 2, increase in income results in increasing in consumption of 50. But in period 2, there is an additional investment shock of Rs. 100 Crore, therefore, there is further increase in income of Rs. 100 Crore and this leads to total increase in income of Rs. 150 Crore in period 2. In period 3, additional dose of investment of Rs. 100 Crore would increase the total income to Rs. 175 Crore and so on. This process is numerically explained in the following table-2 given below.

Table: 02

Period: 01: 100

Period: 02: 100 + ½. 100

Period: 03: 100 + ½. 100 + $(½)^2$. 100

Period: 04: 100 + ½. 100 + $(½)^2$. 100 + $(½)^3$ 100.

Period: 05: 100 + ½. 100 + $(½)^2$. 100 + $(½)^3$ 100 + ……+ $(½)^{n-1}$. 100

Table: 03

Period	Δ I	Δ C	Δ Y	Δ S	C	I	S	S	Y	Position
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.	
0	0	0	0	0	80	20	=	20	100	Initial Equ
1	10	0	10	0	80	30	>	20	110	
2	10	5	5	5	85	30	>	25	115	Transition
…										
…										
$n \to \infty$	10	0	0	0	90	30	=	30	120	New HighEqu

(I= I_t = I**0** : S = S (Y_{-1}) : Δ Y = Y - Y_0: Δ C = C- C_0: Δ S = S - S_0 : a = 0.5 : K = 2)

*Equ= Equilibrium

Table above table exhibits the begning of equilibrium where income in period 0 is equal to consumption conditioned by previous income plus current investment or 100 = 80 + 20 and in this S = 1. It is seen that there is increase in investment with an increment of Rs. 10 Crore, similarly income will incrase by Rs. 10 Crore and the total incoem would be Rs. 110 Crore. But the income increases, consumption will not increases immediately and stayed at Rs. 80 Crore. When investment has further increases to Rs. 30 Crore, but still intended saving remains at Rs. 20 Crore.

Therefore, the difference between investment and intended saving equals unexpected extra income, or Δ C + Δ I - Δ Y (0 + 10 -10). So, period 1 ends and period 2 starts. In period 2, consumptions increases by Rs. 5 Crore that is merely half of the previous extra income of Rs. 10 Crore. In this, intended savings, increases by Rs. 5 Crore. Total income earned or produced in period 2 is equals Rs. 115 Crores that is equal to Rs. 5 Crore over preceding period. As the unchanged investment still exceeds intended savings by 5 in period 2, this is in fact the amount by which income in the next period will expand, and so it will go on.

In the period n, extra investment of Rs. 10 Crore reaches it limit, for it is no longer capable of generating additional consumption and saving on a 50 per cent basis. Total saving having increased that is enough to cancel out the extra investment plus the original investment, or 30 = 30.



CHECK YOUR PROGRESS

Q 1: State the importance of the concept of dynamic multiplier. (Answer in about 60 words).

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10.5 MULTI-SECTOR MULTIPLIER

So far we have seen that Keynes investment multiplier is primarily simple and static. In this, we learn that income depends upon consumption and investment. This Keynesian model is also recognized as two-sector model.

Research in the conceptual framework of multiplier especially after Keynes became more practical. Economist after Keynes extended the scope of multiplier by including some more variables in to it. Therefore, the concept of multiplier becomes multi-sector or complex multiplier. For example- Two sector model of Keynes primarily depends on consumption and investment. Let's include government expenditure and a tax as an extra variable in to the model, this model is knows as three sector models. Further, if we include import and export variables in to this analysis, it became four sector models.

10.6 PUBLIC EXPENDITURE MULTIPLIER

Private investment causes increase or decrease in national income. Similarly government expenditure has similar effect on national income. Both private and government investment has expansionary impact on national income. It must be noted that private investment has limitations,

therefore the doses of government investment becomes necessary to bridge the gap.

Government expenditure multiplier is also known as fiscal multiplier. It simply means the multiple level of increase or decrease in Gross Domestic Product (GDP) as a result of Increase or decrease of government expenditure and investment. It is the reciprocal of the marginal propensity to save (MPS).

As long as framing the concept is concerned, we can say that the impact of a change in income following a change in government spending is called government multiplier. Symbolically, it can be written as K_G

Basically, the government multiplier is the ratio of changes in income (ΔY) to a change in government spending (ΔG). Thus,

$$K_G = \frac{\Delta Y}{\Delta G} \text{ and } \Delta Y = K_G . \Delta_G$$

In other words, if an autonomous increase in government spending stipulates multiple level of increase in income. The rate of increase of income depends on the value of Marginal Propensity to Consume (MPC). The formula for K_G is the same as the simple investment multiplier representated by K_I .

Its formula (i.e., K_G) is: -

$$\Delta Y = \frac{1}{1\text{-}MPC} . \Delta\Delta \qquad OR \frac{\Delta Y}{\Delta G} = \frac{1}{1 - MPC}$$

$$Or K_G = \frac{1}{1\text{-}MPC} = \frac{1}{MPS}$$

The investment multiplier (K_I) is also the same as i.e.,

$$K_I = \frac{1}{1\text{-}MPC} \quad K_I = K_G$$

10.6.1 Numerical Example

The effect or an impact of multiplier depends on how much we spend (private or public investment). In a hypothetical example, let us assume that the rate of household consumption is 80 per cent. It means that whatever income household receives, out of that, 80 per cent would be spent on consumption. It is also called as household's marginal propensity to consume (MPC). In this case, if a household consumes 80 per cent of its income, it means the MPC of the households is 0.8.

In this hypothetical situation, let us assume that the government has decided to enhance its spending or expenditure by Rs 400 crore. This government expenditure is the source of income for the owners of factors of productions. The owners of factors of production would receive income in the form of wages, interest, rent and profit.

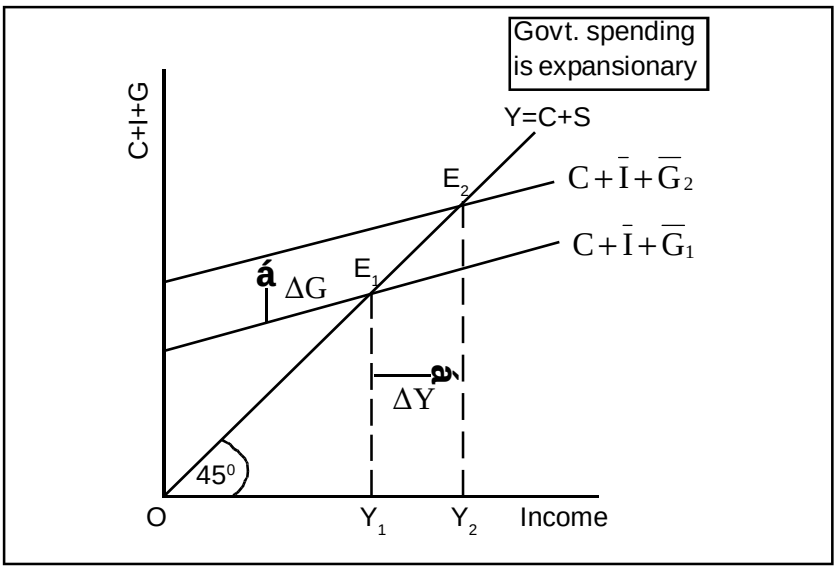
We have already assumed that the marginal propensity to consume is 0.8. That means, out Rs 400 crore spending / expenditure by government, Rs 320 crore would be spent on consumption by household sector. This increased consumption of Rs 320 crore by household sector would increase the second round of consumption. This process would go on and on. This entire process finally leads to increase in GDP by multiple levels. This is how the spending multiplier works.

10.6.2 Graphical Presentation of Government Spending and Its Impact

The impact of change in government expenditure is shown in this figure 10.1. In this figure, C + I + G1 is the initial aggregate demand schedule. E1is the initial equilibrium point and corresponding level of income is, thus OY_1. Once the government decided to increase its expenditure, aggregate demand schedule would shift to C + I + G_2. Because this line cuts 450 line at E_2. The new equilibrium level

of income rises to OY_2 - an amount larger than the initial one. Therefore, figure 10.1 shows that increase in income is larger than the increase in government spending.

Figure 10.1: Government Expenditure Multiplier



10.7 BALANCED BUDGET MULTIPLIER

The concept of 'Balanced Budget Multiplier' is one of the hypothetical concepts in macroeconomic literature. This conceptual framework is significant for certain policy matters. This concept is significant because applying this, one can understand how government manages the economy. So, let's discuss the concept of balance budget multiplier. Balanced Budget Multiplier is the ratio of changes in aggregate output (GDP) to a change in government expenditure that is matched by equal change in taxes. In other words, the concept of balance-budget multiplier is that the change in government spending / expenditure that is matched by changes in tax rates. While doing this exercise, the budget deficit or surplus of the government neither increased nor decreased.

In short, balance budget strikes balance between government spending and taxes. Balanced budget multiplier analyses what happens when there is equality between changes in government expenditure and taxes. When government takes this kind of policy decision, it keeps the budget balanced. In other world, balanced budget multiplier is primarily the sum of the

expenditures multiplier (Government spending) and the tax multiplier. As a result of it, balanced budget multiplier is equal to one. In this process (Increased in government expenditure & increased in taxes) the positive impact of government spending is nullify by the negative impacts of changes in taxes.

For example - when government decides to increased tax rate (ΔT) and the government expenditure (ΔG) at the same time, it will have no impact on the overall budget. Why? The reason behind it is when government increases the taxes (ΔT), that will be matched by an increased in government expenditure (ΔG). Therefore, the net effect on budget would be zero i.e. ($\Delta T = \Delta G$).

Suppose, if an income of an individual increases continuously, it will be resulted in declining level of disposable income. How? Because the existence of progressive taxation structure would gradually takes away every increase in income of the individual.

We should not forget that in an economy, disposal income is used for consumption purpose. When tax rate increased, an individual will have less disposal income there by less consumption expenditure of an individual. But the fall in individual consumption (due to less disposable income) would be less as compared to the increased in taxes. Therefore, the government expenditure rises more than the fall in consumption expenditure because of increases taxes. In this situation there will net increased in national income.

In a nutshell, the balanced budget multiplier mainly depends on the combined movement of tax multiplier and government expenditure multiplier. Besides, the concept of balanced budget assumes that tax multiplier is smaller as compared to government expenditure multiplier.

Let's illustrate the example of balance budget multiplier:

Example 01: Suppose, the government decides to increase it's expenditure by Rs. 200/- Crore and at the marginal propensity to consume (MPC) is 0.8.

The change in income $= \frac{1}{1-\text{mpc}} \times \Delta G = \frac{1}{1-0.8} \times 200 = \times 200 = 160 \text{ Crore.}$

The change in government expenditure = Taxes charged on people = Rs. 40 Crore

Change in Income $= \frac{\text{MPC}}{1-\text{mpc}} \times \text{Changes in taxes} = \frac{0.8}{0.2} \times 200 = \text{Rs. } 40 \text{ Crore}$

Therefore, Balanced Budget Multiplier = $\frac{\text{Change in Income}}{\text{Change in Exp/Tax}} = \frac{40}{40} = 01$

The example explains that the impact of balance budget on income of the country is not zero. This is because; the impact of government expenditure (Δ G) is more effective than the effect of tax multiplier (Δ T).

The interesting thing is government expenditure (Δ G) is responsible for increasing income. On the contrary, increase of taxes (Δ T), only that part of income is reduced which could otherwise have been spend on consumption by individuals. This entire progress leads to increasing in income more than the decline in disposable income by taxes.

Example 02: If suppose the government expenditure is increased (Δ G) by Rs. 1000/- Crore and at the same time government decides to increase taxes by Rs. 1000/- Crore. In this case, if the Marginal Propensity to Consume (MPC) is equal to 0.8, how much Gross Domestic Product (GDP) would change? Given, the government expenditure multiplier is 5 and the tax multiplier is - 4.

Solution: Given, the government expenditure multiplier is equal to 5 and at the same time tax multiplier (Δ T) is - 4. As a result of it, GDP will increase by Rs. 5000 Crore from the additional government expenditure Rs. 1000 Crore (Five times of Rs. 1000 crore). Similarly, GDP will decrease by Rs. 4000 crore from the additional Rs. 1000.00 crore taxes (- 4 times Rs. 1,000 crore). Thus, on balance, equilibrium income (GDP) will increase by Rs. 1,000 crore (Rs. 5,000 crore - Rs. 4,000 core).

In this situation, government expenditure increased by Rs. 1,000 crore and similarly government increases tax collection by Rs. 1,000 crore. Thus, it balances its budget. But while balancing equilibrium GDP increased by Rs. 1,000 crore.

Therefore, when government changes spending and taxes by the same amount, an equilibrium income or GDP changed by 1 time this amount.

Now we can say:-

The balance budget multiplier = 01.



CHECK YOUR PROGRESS

Q 2: Mention the other name for Government expenditure multiplier.

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Q 3: What does the balance budget multiplier seek to explain? (Answer in about 40 words)

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10.8 LET US SUM UP

- Static multiplier is also known as comparative static multiplier, simultaneous multiplier, logical multiplier, timeless multiplier and 'legless multiplier etc. It simply means that changes in investment immediately results in increase in income and there exists no time lag.
- Dynamic multiplier identifies the significance of time lag between the two macroeconomic variables i.e. initial investment and its impact on circular flow of income. Dynamic multiplier recognizes that change in circular flow of income is a gradual process that involves time lag.
- A model of dynamic multiplier can be formulated involving time period or sequence that changes the relevant variables.

- Research literature in multiplier especially after Keynes became more practical. Economist after Keynes enhances the scope of multiplier by including some more variables in to it. Therefore, the concept of multiplier becomes multi-sector or complex multiplier.
- The concept of 'Balanced Budget Multiplier' is one of the hypothetical concepts in economics that has significance while dealing with policy matters.
- It should be noted that the balanced budget multiplier is primarily based on the joint activity of tax multiplier and government expenditure multiplier. In this concept, it is assume that the impact of tax multiplier would be as compared to government expenditure multiplier.

10.9 FURTHER READING

1) Ahuja, H.L. (2016). Macroeconomics. Agra: Laxmi Narayan Agarwal Educational Publishers.
2) Rana, K.C. & Verma, K.N. (2017). Macro Economic Analysis. Jalandhar: Vishal Publishing Co.
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10.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Dynamic multiplier identifies the significance of time lag between the two macroeconomic variables i.e. initial investment and its impact on circular flow of income. Thus, it recognizes that change in circular flow of income is a gradual process that involves time lag. The multiplier works through consumption expenditure and income generation. In a way, the dynamic multiplier aptly recognizes the dynamic process of change in income at every stage as a result of change in initial investment.

Ans to Q No 2: Government expenditure multiplier is also known as fiscal multiplier.

Ans to Q No 3: Balance budget multiplier analyses what happens when there is equality between changes in government expenditure and taxes. When government takes this kind of policy decision, it keeps the budget balanced. In other world, balanced budget multiplier is primarily the sum of the expenditures multiplier (Government spending) and the tax multiplier.



10.11 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: Briefly discuss the concept of dynamic multiplier.

Q 2: Briefly discuss the concept of balanced budget multiplier.

B) Essay type Questions (Answer each question in about 300-500 words)

Q 1: Describe the concept of dynamic multiplier with the help of hypothetical examples.

Q 2: Describe how a dynamic multiplier functions.

Q 3: Describe the concept of public expenditure multiplier.

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UNIT 11: DEMAND FOR MONEY: CLASSICAL APPROACHES

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 The Quantity Theory of Money: Basic Concepts

- 11.3.1 A Brief History
- 11.3.2 Definition
- 11.3.3 Assumptions

11.4 The Transactions Form of the Quantity Theory

- 11.4.1 Modified Version of Fisher's Equation
- 11.4.2 Criticisms

11.5 Cambridge Version: The Cash Balance Approach

- 11.5.1 Superiority of the Cash Balance Approach
- 11.5.2 Criticisms of the Cash Balance Approach

11.6 Let Us Sum Up

11.7 Answers to Check Your Progress

11.8 Further Reading

11.9 Model Questions

11.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- discuss the quantity theory of money and its different versions
- To explain how a change in the supply of money influence the price level.

11.2 INTRODUCTION

In the previous chapter we have discussed the theory of employment, Say's law of market and related thought of the classical economics. The classical school tried to examine and explain the interaction between various economics variables and to examine how closely they are inter-related.

Since money existed in its various forms and the economic activities are believed to be closely associated with money, the classical thinkers also tried to find out the relation between money and the working of economic variables such as price, demand, supply etc. In this unit, we shall discuss the approach of classical economics with respect to the relationship between the supply of money and the general price level in the economy.

11.3 THE QUANTITY THEORY OF MONEY: BASIC CONCEPTS

In this section, we shall discuss some of the basic concepts relating to the quantity theory of money.

11.3.1 A Brief History

Jean Bodin of the mid-16th century can be considered as the one who has laid thefoundation to this stream of thought when he attributed the price inflation -- a crucial problem in western Europe then -- to the abundance of monetary metals imported from the mines of the Spanish colonies in south America. The mercantilists' writing-(a group of merchants and statesmenprior to the Physiocratsand Adam Smith) contained a refined and modified version of the quantity theory of money. Thinkers like George Berkeley, John Law and William Petty tried to study the importance and role of money in the economy and believed that money stimulated economic activity. According to them, "the more money in circulation, the greater the aggregate output". After undergoing considerable refinement, amendment, elaboration and extension by thinkers like David Hume, John Locke, Richard Cantillon, the theory became central to provide explanation to the monetary policy and primary tool in explaining financial behavior.

11.3.2 Definition

The quantity theory of moneystates that there is a 'direct relation between quantity of money in an economy and the level of prices of goods and services sold'. In other words, the theory holdsthat 'the money supply significantly affects economic activity and the rate of inflation'. Thus the theory says that the stock of money equals price times real income to be combined with a concept of velocity.

Thus, money is also treated like a commodity and its value is related to its supply. With an increase in its supply, the marginal value of money decreases resulting to an increase in price level (inflation). As inflation rises, the purchasing power (the value of money) declines where as a decrease in the supply of money will increase its buying capacity and an increase in its marginal value. Thus, in simple form,

P= f(M)

Where, P is price level

M is Supply of Money

If we double the supply of money, (M) the value of Price level also doubles and vice versa. "Double the quantity of money, and other things being equal, prices will be twice as high as before, and the value of money one-half. Halve the quantity of money and, other things being equal, prices will be one-half of what they were before and the value of money double."Thus, there is a direct and proportionate relation between money supply and price level.

11.3.3 Assumptions

The theory is based on following assumptions.

- **Full employment:** the economy is always in full employment and there are no underutilized or unemployed resources. The total goods and services available in the economy is given and fixed. The full employment assumption also holds the view that the economy is in equilibrium.

- **Operation of the Say's law of Market:** the theory is based on the assumption that the Say's law of market operate in the economy. It means that the sum of values of all goods produced is equivalent to the sum of values of all goods bought.
- **Velocity of Circulation is assumed to be constant:** By velocity of money, we mean the number of times a unit of money changes hand per unit of time. The theory assumes that, at a given quantity of money, the velocity of circulation is fixed. However, there arise a difference in opinion regarding the components of various elements such as supply of money, total transaction so on. While considering the total supply of money, there exist differences among the scholars whether or not to include the demand deposit. Also when real income is considered, whether to consider only the one consisting of income payments and income expenditure on consumer goods or to include all transaction involving production and distribution. This difference in opinion has given rise to different versions of the theory which are popularlyclassified as Transactions form, Income form and Cash balance theory.



CHECK YOUR PROGRESS

Q 1: State the Quantity theory of Money. Answer in about 40 words.

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Q 2: What is meant by velocity of circulation of money? Answer in about 40 words.

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11.4 THE TRANSACTIONS FORM OF THE QUANTITY THEORY

This Transaction form of the theory is based on the ideas and writings of Simon Newcomb (1885) and popularized by Irving Fisher (1911) in his book 'Purchasing Power of Money'. As the name suggests, the theory is based on the transactions carried out by different economic actors who in return receives money. The interaction between different economic agents can be expressed as:

MV = PT

M is the total Quantity of Money available in the economy

V is the velocity of circulation of money. Velocity is the average number of times each unit of money changes hands

P is the general price level

T is the total quantity of final goods and services exchanged during the year.

This equation developed by Fisher can be converted into the quantity theory of money. The theory is based on the following assumptions:

Velocity of circulation of money (V) , and total quantity of final goods and services exchanged during an year (T) are assumed constant and stable in the short run

The price level (P) is assumed to be passive during the period of analysis.

Velocity of money, as said earlier is the average number of times each unit of money changes hands. In other words, it is the speed at which money is transacted from one person to the other person. Velocity is greatly determined by the spending habits of the people, the payment mechanism that exists in the economy and the physical means by which people can carry money with them. The quantity theory assumes that velocity of money (V) and the Quantity of money (M) in the economy are independent of each other. Thus, a change in M does not affect the value of V. Further, the classical theory assumes that the economy is working in full employment and stable in the short run. Therefore, the quantity of goods and service produced (T) is constant. Since P is assumed to be passive, it depend on

the supply of money (M) and any change in M will lead to a proportionate change in P.

At the equilibrium the nominal quantity of money supplied (Ms) is equal to the nominal quantity of money demanded (Md).

Thus,Ms = Md = M, where M is fixed by the central bank .

Thus, rewiring the equation, we get:

Md . V = PT or M.V = P.T

Or, Md = PT/V

Thus, according to fisher, the demand for money depends on:

- the total number of transactions,
- the average price level, and
- the velocity of circulation.

The equation given by Fisher is an identity and holds the relationship between the money supplied and the price level. The equation suggests that the total value of all goods and service sold during any period (PT) equal the total quantity of money spend during that period (MV). In other words, other things remaining the same, the price level rises or falls proportionately with a given increase or decrease in the quantity of money. Let us consider the following numerical example.

Suppose the quantity of money is Rs. 200 in an economy, the velocity of circulation of money (V) is 6; and the total output to be transacted (T) is 600 units, the average price level (P) will be:

P = MV/T

= 200× 6/ 600 =

= Rs. 2 per unit.

If now, other things remaining the same, the quantity of money is doubled, i.e., increased to Rs. 400 then:

P = 400 × 6/ 600 = Rs. 4 per unit

We thus see that according to the quantity theory of money, price level varies in direct proportion to the quantity of money.

11.4.1 Modified Version of Fisher's Equation

It may be noted that Fisher's equation initially included only primary money (currency money) only. Later, realizing the importance of credit money, he expanded his equation as:

MV+M'V' = PT

Where M = Primary money (Currency money)

V = Velocity of circulation of Money

M' = demand deposits of banks (credit money)

V' = Velocity of circulation of credit money

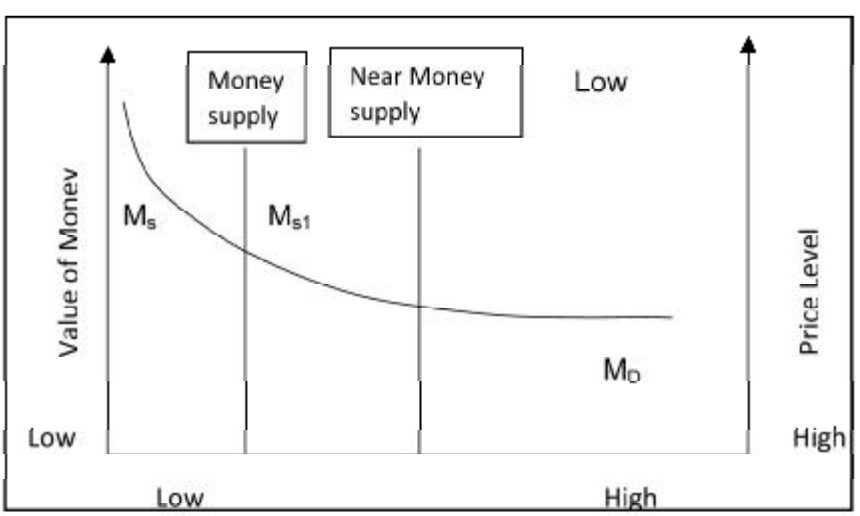
P = Price Level

T= Volume of Trade

In the right-hand side of the equation, by multiplying the total goods and services (T) with the price (P) gives us the total value of payments during the period under our analysis.

This theory can be easily understood with the help of the following diagram. On the left hand side, we take the value of money and on the right hand side we take the price level.

Figure 11.1: Quantity of Money: Fisher's Approach



In Figure 11.1, the curve MDrepresentsdemand for money. It slopes downward because as the value of money decreases, consumers are forced to carry more money to make purchases.

Similarly, when the value of money is high, consumers demand little money because goods and services are comparatively cheaper and can be purchased for low prices whereasMsrepresents the initial supply of money. It is vertical in shape because, the supply is determined exogenously (usually by the central bank). The intersection of the MD and Ms Curve determine the value of money and the price level of the economy.

Now let us assume that the central bank has decided to increase the supply of money from Ms to Ms1. As a result of the increase in the money supply, there is a change in the value of money as well as the price level. With the increase in the supply of money, the value of money comes down where as the price level increases. In other words, though the magnitude of changes in value of money and the price level are same, they move in the opposite direction.

The transaction approach provides explanation to the inflation and offer a tool to keep it under control. According to Quantity theory of money, inflation can be brought under control by reducing the supply of money. When inflation surges due to war, natural calamity or for any other reason, a decrease in the supply of money can bring the price level under control. In other words, the central bank can control the movement of price level by controlling the money supply.

11.4.2 Criticisms

Fisher's version of the quantity theory has beencriticized on the following ground:

- Ø The theory is based on the supply of the money and ignores the demand side of the money, which plays a crucial role in determining the value of money.
- Ø In an economy, transactions takes place both for goods and services and for capital assets. Even if we assume that the

transactions of goods and services are constant, the trade of capital assets varies frequently and when there is frequent trade of capital assets, it is wrong to assume that T is constant.

- Ø The theory cannot be regarded as an adequate theory of money as it does not consider the rate of interest.
- Ø The theory also assumes that the four components i.e., M,V, P and T are independent of each other. But in real life, a change is the quantity of money do affect V and T. hence it is unrealistic to assume that V and T are constant.
- Ø Many of the assumption like existence of full employment, value of V and T remaining constant, operation of the Say's Law of Market etc. are unrealistic.
- Ø P is not passive. Keynes believes that changes in P can bring about changes in other variables.



CHECK YOUR PROGRESS

Q 3: According to Fisher, what happens when the supply of money is increased? Answer in about 40 words

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Q 4: According to the quantity of money, how can inflation be controlled? Answer in about 60 words.

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11.5 CAMBRIDGE VERSION: THE CASH BALANCE APPROACH

Some economists like Marshall, Robertson, and Hawtrey took a different approach to the quantity theory which is popularly known as the cash balance approach or Cambridge approach. Though the ideas of this approach is found in the writings of Locke, Petty, and Cantillon, the idea was popularized by Cambridge economists like Pigou.

Unlike transaction approach, which focused on the transaction of the money, the cash balance approach, as the name suggest,emphasises on the cash balance. The approach focuses on the store of value function of money, and holds the view that the value of money depends on the demand for money. In the words of Marshall, "In every state of society there is some fraction of their income which people find it worthwhile to keep in the form of currency; it may be a fifth or a tenth or a twentieth."The advocates of the theory argues that the real demand for money comes from those who want to hold it rather than those who want to just exchange it for something else. People demand money not just to spend but also to hold it as asset. The amount of money an individual wishes to hold is determined by the value of money i.e., the amount of goods and services the money can purchase. The people like to hold a portion of their nominal income in the form of money (cash balance.) The value of money, thus is determined by the demand for it. When demand for money increases, people will reduce their expenditure to hold larger amount of money. This will lead to decrease in the demand of goods and services and a reduction in the price level follows. When there is less demand for money, people spend more on goods and services leading to an increase in the price level

The cash balance approach is based on the equation of the quantity theory of money, MV=PT

According to Pigouand other Cambridge economists,

MV= PT,

Solving for M,

M=PT/V

Or M= 1/V x PT

Let 1/V =k

Then, M =kPT

Where, M = supply of money,P = Price Level, T = Total amount of goods and services, k = the fraction of annual sales volume held in the form of cash balance.

In the equation, k is defined as 1/V representing that there exists an inverse relation between demand for cash balance (k) and velocity of circulation of money (V). if the value of V increase, k declines. In other words, the demand for money as a store of value decreases if the demand for money as a medium of exchanges increases.

Since the Cambridge approach is based on the demand for money, we can express it as

Md= kPY

Where Md = demand for money, Y = Real National Income, P= average Price Level of Currently produced goods and services, PY = nominal income, K= proportion of nominal income (PY) that people want to hold as cash balance.

Solving for k,

K = Md/Py,

Where y = Y-Tax i.e., disposable income.

The important feature of the cash balance approach is that it makes the demand for money as a function of income alone.

Let us consider a numerical example.

Assume the economy is in equilibrium withk = 1/6, PT = 3000.

Thus, the equation, M= kPT,

If the money supplied (M) is 500, the economy shall be in equilibrium because, M= 1/6 x 3000 = 500

If the central bank increases the quantity of money in the economy from Rs 500 to 600, the people now have larger cash balance than they want to hold. The people want to hole 1/6 PT as cash balance, but they have cash balance equal to 1/5PT (k=M/PT=600/3000=1/5). Thus, the

supply of money exceeds the demand for money. As a result, people tries to reduce their cash balance and will spend their excess money balance to purchase goods and services. This will result in an increase in PT. Since the economy is in full employment, the T will not increase. Hence, an increase in supply of money will lead to an increase in price level. The PT will increase up to the level, where it is 3600 .Once PT increase to 3600, the cash holding will come down to 1/6 (600/3600 =1/6), money supply become equal to money demand, and the economy reaches equilibrium.

11.5.1 Superiority of the Cash Balance Approach

The cash balance approach is considered to be superior based on the following ground:

- The theory brings to light the role of income and consider it as an important factor of economic development rather than the total transaction in an economy.
- The theory is based on the demand side of the money which is more realistic in approach. The transaction approach deals with the supply side of the money.
- By analyzing the factors responsible for the changes in the value of k offers the economistsa clue to find an answer to the problems like uncertainty, inflation, unemployment, and other crisis in an economy.
- The theory has laid the foundation for the famous liquidity preference theory of money.
- The Cambridge equation is consistent with modern emphasis on aggregate demand for stabilizing the levels of income and employment.

11.5.2 Criticisms of the Cash Balance Approach

In spite of the various advantages and superiority of the theory, it is also criticized by scholars on the following grounds:

- Ø The theory does not take into account various motives for holding money including the speculative demand for money.
- Ø The theory ignore the role of interest in determining the demand for money.
- Ø The theory also criticized over the fact that it consider the purchasing power of the money for consumption purpose alone and ignores other demand for goods.
- Ø The theory has failed to explain the phenomenon of trade cycle
- Ø (e). The theory assumes the constancy of the value of k and T. Constant value of T implies full employment in the economy where as constancy in the value of k means constancy in the value of V. both these are unrealistic in nature.
- Ø The theory also failed in explain the real forces behind the changes in the price level such as investment, saving and income.

The quantity theory of money is one of the important theories that explains the relation between increase in the money supply, value of money and price level. On the one hand the theory explains the relation between money supply and price level and on the other hand it explains the relation between supply of money and the value of money. The cash transaction approach deals with the supply of money and the cash balance approach deals with the demand for money.



CHECK YOUR PROGRESS

Q 5: Why do people hold money, according to the cash-balance approach? Answer in about 40 words.

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Q 6: According to the cash balance approach, what is the impact of an increase in the supply of money by the central bank? Answer in about 40 words.

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11.6 LET US SUM UP

- The quantity theory of money asserts that there is a direct relation between the total money supply and the aggregate price level
- According to Irvin fisher, a doubling in the supply of money will double the pricel level and the value of money will be one half. The equation is MV = PT. where MV stands for the supply of money and PT stands for the demand for money. Here V and T are assumed to be constant.
- The cash balance approach holds that the value of money is determined by the demand for money and supply of it. it is based on the store of value function of money. If the money supply is increased, people will have more money than they wish to hold. The excess money people will use for additional goods and services. This increased demand will increase the price level.



11.7 FURTHER READING

1) Ahuja, H.L. (2016). Macroeconomics. Agra: Laxmi Narayan Agarwal Educational Publishers.
2) Rana, K.C. &Verma, K.N. (2017). Macro Economic Analysis. Jalandhar: Vishal Publishing Co.
3) Shapiro, E. (1993), Macro Economic Analysis. New Delhi: Galgotia Publications Pvt. Ltd.
4) MukharjeeS. (2013).Macro Economics: A Global Text.Guwahati: New Central Book Agency (P) Ltd.

5) Bhaduri, Dr. S. (2012).Macro Economics.Guwahati: New Central Book Agency (P) Ltd.

11.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q 1: Quantity theory of money is an economic theory developed by classical economists which state that there is a direct relation between the supply of money and price level. An increase in the quantity of money supplied leads to an increase in the price level and vice versa.

Ans to Q 2: The velocity of circulation of money means the number of times a unit of currency change hands per unit of time. It is the rate at which money is circulated, changes hand or turns over in the economy during a given period of time.

Ans to Q 3: According to Fisher, when the supply of money increases, the price level also increases accordingly. Ie, if the supply of money doubles, the price level also doubles and the value of money falls by one half.

Ans to Q 4: According to Quantity theory of money, inflation can be brought under control by reducing the supply of money. When inflation surges due to war, natural calamity or for any other reason, a decrease in the supply of money can bring the price level under control. In other words, the central bank can control the movement of price level by controlling the money supply.

Ans to Q 5: According to the cash balance approach, people demand money not just to spend but also to hold it as asset. The amount of money an individual wishes to hold is determined by the value of money i.e., the amount of goods and services the money can purchase.

Ans to Q 6: According to the cash balance approach, when the central bank increases its supply of money, people will have more money in their hand. Given a fixed cash balance people wish to hold, the increased money will be used to demand goods and services. This will result in an increase in the demand and subsequently increased price level.

11.9 MODEL QUESTIONS

A) Short questions (Answer each question in about 150 words).

Q 1: Explain the Cambridge cash balance approach

Q 2: Explain the impact of increase in the supply of money according to the quantity theory of money.

B) Essay type questions (Answer each question in about 150 words)

Q 1: Explain the quantity theory of money. How does it explain the inflation in an economy?

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UNIT 12: DEMAND FOR MONEY: KEYNES' APPROACH

UNIT STRUCTURE

12.1 Learning Objectives

12.2 Introduction

12.3 Keynes' Liquidity Preference Approach

- 12.3.1 Demand for Money
- 12.3.2 The Demand for money and The Liquidity Preference Curve
- 12.3.3 Money Supply
- 12.3.4 Determination of Equilibrium Rate of Interest
- 12.3.5 Liquidity Trap

12.4 Friedman's Reformulation of the Quantity Theory of Money

- 12.4.1 Limitations of Friedman's Reformulation of the Quantity Theory of Money
- 12.4.2 Friedman vs Keynes

12.5 Criticisms of the Liquidity Preference Theory

12.6 Let Us Sum Up

12.7 Further Reading

12.8 Answers to Check Your Progress

12.9 Model Questions

12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- to discuss Keynes'Liquidity preference theory of demand for money
- to explain how the rate of interest is determined using the liquidity preference theory of the demand for money
- to discuss Friedman's reformulation of the quantity theory of money
- make a comparison between Keynes and Friedman's approaches
- trace the limitations of the Keynes's theory liquidity preference theory of money.

12.2 INTRODUCTION

In the previous Units we have the Classical approach to demand for money. In this unit, we shall discuss the Keynesian theory of demand for money, particularly relating to the liquidity preference approach. The Reformulation of Friedman's Quantity theory of money has also been discussed, and a comparison between the Keynesian approach and the Friedman's approach has been made. Finally, the shortcomings of the Keynesian approach has been pointed out.

12.3 KEYNES' LIQUIDITY PREFERENCE APPROACH

In the previous Unit we have discussed the quantity theory of money. The theory underwent considerable changes and dramatic revision under various schools of thought. J M Keynes and the Keynesian school has pioneered in this revision and put forth a new stream of thought which is popularly known as the Liquidity Preference Theory of Money.

Money can be kept or transacted in various form such as currency or can be converted to assets like bond. The cash form of money is called liquidity. The liking for people to hold money in cash form is called liquidity preference. Liquidity in simple sense refers to the speed and convenience at which something can be converted to something else of one's choice. Money, when held in the form of cash, is a riskless asset and can be converted to any other form (to buy any goods or services) without any loss and difficulty. But it does not yield any interest. If it is converted to bond, it yields interest but there is an amount of risk associated with it. Thus, of the given amount of money, how much does a person or an economic agent prefer to keep as liquid cash and what motivates one to keep it as liquid money is explained by the liquidity preference theory.

The term "Liquidity preference" is coined by J M Keynes in his famous book 'The General Theory' to explain the functional relation between the quantity of money demanded and the factors determining it. Everyone prefers to hold money for various reasons including its convertibility. Money held in cash form is the most easy and most convenient form as it can be

usedto meet our needs directly. As mentioned above, holding money as cash does not involve any loss or risk as asset. To induce people to invest it in other assets such as bond, debentures, bills of exchange, they need to be rewarded for the risk they are taking and for the sacrifice they are taking in putting away their preference. This reward, known as interest rate, is given for parting with liquidity. The higher the preference of the people to hold money, the higher is the interest rate and vice versa. Thus, the rate of interest is determined by the demand and supply of money. The supply of money is determined by the central bank or such agencies designed for it whereas the demand for money arise based on the preference of people to hold money in liquid form. Now let us examine in details various factors that motivate people to hold money in liquid form.

12.3.1 Demand for Money

According to Keynes, people prefer to keep at least a part of the money in liquid form for various reasons. He listed the reasons under three broad motives, viz., transaction motive, precautionary and speculative motive.

Transaction motive: Every individual / economic agent need money in liquid form to meet his day to day transactions such as to buy food, medicines, transportation and other needs. The amount of money one prefer to keep in liquid form to meet his/her day to day transaction is determined by:

- the size of personal income : the higher the size of the income, the higher the demand for money.
- the length of the time between pay days: if payment is given on a daily basis, the less is the demand for money
- Spending habit: a spendthrift will demand more money than a person who spends each penny with caution.
- the method of payment: The method of payment prevailing in a society also determines the amount of money to be kept in liquid form. If the society is converse more with modern means of

payments such as online payment, bank transactions including payments through cheques, etc the amount of money individual keep in liquid form will be less.

Thus, we can put transaction motive of money as

$T_{dm} = f(Y)$

where, T_{dm} means transaction demand for money and Y stands for money income.

The transaction motive is broken down into two part: (i) income motive (ii) business motive. Under income motive, the preference of an individual to meet day to day expenditure is included whereas under business motive, the preference of a business man to meet his business requirements such as wage payment to workers, cost of raw materials, etc. are included.

Precautionary motive: Individuals being rational in their behavior, keep some money to meet unforeseen situations and emergencies. Keynes included the balances not earmarked for some definite expenditure in the near future but held instead to "provide for contingencies requiring sudden expenditure and for unforeseen opportunities of advantageous purchases" under this heading. People are uncertain about the fluctuations arise in the spending and so to meet this uncertain and unforeseen expenditure, they keep a part of their income in liquid form. The demand for money arise from people to meet some unforeseen emergencies, contingencies and accidents and the business firms to safeguard their future as well as to take advantage of an unanticipated advantage or opportunity is called demand for the precautionary motive. This demand depends on:

- nature of the person: If a person is very optimistic about the future and anticipate very little risk, the demand for money form such people for precautionary purpose will be very less. On the other hand if a person is very pessimistic and anticipate a lot of

risk in future he prefer to keep a major share of his income in liquid form to meet this unforeseen circumstances.

- Ø size of the Income: In the size of the person or the firm is large, the demand for precautionary purpose will be large and vice versa.
- Ø farsightedness: a person or firm with good farsightedness can better anticipate the future and adjust his demand for money.

Speculative motive: The third source of demand for money arise from the speculative motive of the economic agents. The notion of holding money for speculative purpose was a new and revolutionary Keynesian idea. For instance, peoplemay expect a decrease in the price of bond (an increase in the interest rate) in future and to take advantage of that situation they hold money in liquid form. While holding money in liquid form, they do not get any interest but they assume that the future interest rate can offset the present loss of holding money. Given the expectations about the changes in the rate of interest in future, less money will be held under the speculative motive at a higher current rate of interest and more money will be held at a lower current rate of interest. Thus there exist an inverse relationship between the money held for speculative purpose and the rate of interest.

Money held under speculative purpose serves its store of value function. Though the precautionary motive of holding money also serves the store of value function, what make the speculative motive different is that the money is held to take advantage of the price fluctuations of financial assets such as bonds and not to meet the personal needs.

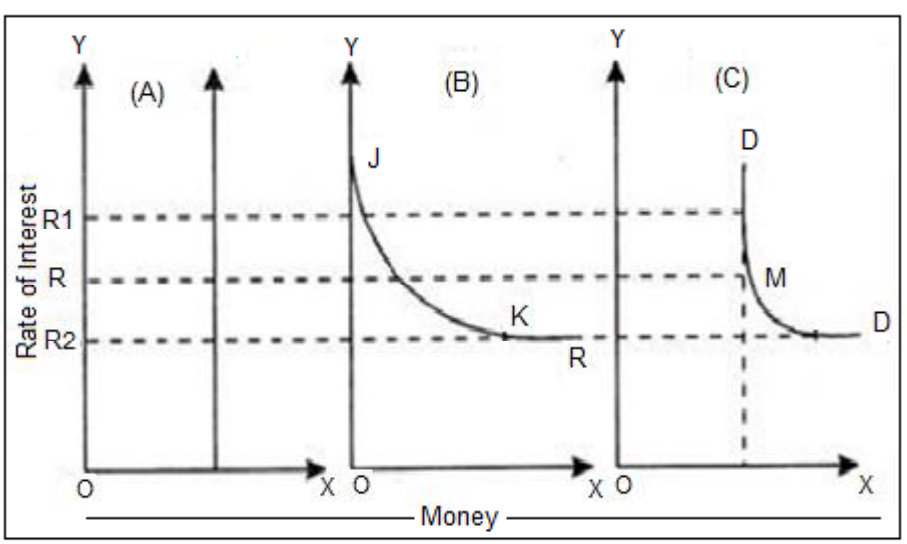
12.3.2 The Demand for Money and the Liquidity Preference Curve

The total demand for money is the summation of demand of the transaction motive, precautionary motive and speculative motive.

That is, $D_m = T_{dm} + P_{dm} + S_{dm}$. The demand for money has a negative slope because of the inverse relationship between the speculative demand for money and the rate of interest.

The transaction balance and precautionary balance are held with the intention of being used to make purchases to meet individual (the holder's) want. The amount of money demanded for both the purpose are influenced by market and social factors and do not have any bearing on the prevailing rate of interest. Hence they are 'interest inelastic in nature'. Since both these balances are not influenced by the rate of interest, they are referred as "demand for active balance". On the other hand, the speculative demand for money is determined by the rate of interest and often referred to as "demand for idle balance". The summation of the demand for active balance and the demand for idle balance gives us the liquidity preference demand for money. Thishas been represented with the help of Figure 12.1.

Figure 12.1: Demand for Money: Keynes' Approach



In the above figure, Y axis represent the rate of interest and x axis represent the demand for money. Thedemand for active balance (transaction demand and precautionary demand) is shown in part A and they are interest inelastic. So whatever is the interest rate (R or R_1 or R_2), the Money demand remain unchanged. The

demand for idle balance shown in part B is interest elastic -- with a decrease in the interest rate from R to R_2 the demand for money increases. The sum of active balance and idle balance shown in part C gives the liquidity preference. When the interest rate decreases from R to R_2 the preference of the people to hold money in the liquid from increases and vice versa.

12.3.3 Money supply

The supply of money at any time is the aggregate of the money stock of all the economic agents in an economy. This makes the supply of money a stock variable. Thus, the supply of money is fixed at a particular point of time. The money supply includes the legal tender money, the bank money including the demand deposits and the credit money. There is always a monetary authority, usually the Central Bank, for every economy to control and regulate the supply of money.

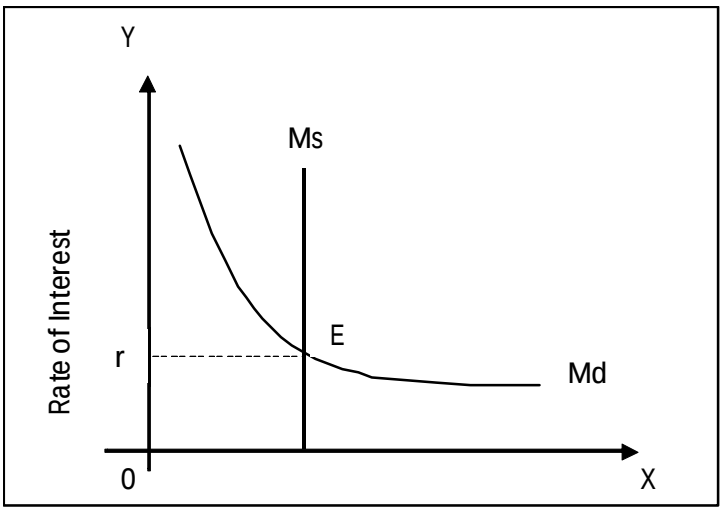
Since the supply of money is determined by the Central Bank or the monetary authorities of the economy, it is perfectly inelastic to the rate of interest. Hence, whatever is the rate of interest, the supply of money takes the form of a vertical straight line.

12.3.4 Determination of Equilibrium Rate of Interest

The equilibrium rate of interest is determined by the demand and supply of money. Given the supply of money and the income level, and sum of the transactions demand, precautionary demand and speculative demand for money will equal the supply of money at a particular rate of interest. This equating rate of interest thus becomes the equilibrium rate of interest. This has been represented with the help of Figure 12.2.

In Figure 12., Md represents the demand for money and Msrepresents the supply of money. The Equilibrium is reached at E, whereMd = Ms and the interest rate of r is determined.

Figure 12.2: Determination of the rate of Interest: Keynes' Approach



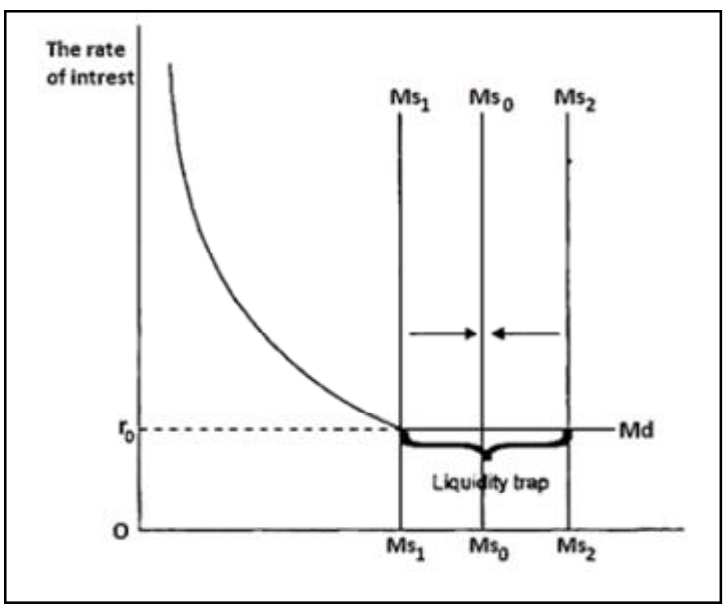
What makes the liquidity theory differ from the classical view is that, according to Keynes, monetary forces alone determine the rate of interest whereas for classical school the real forces such as productivity of capital and thrift determine it. Further, taking a different view from the classical thinkers who were of the opinion that interest is the reward for postponing consumption (i.e., reward for saving / thriftiness) for Keynes, it is the reward for 'parting with liquidity'.

12.3.5 Liquidity Trap

It is quite obvious from the figure 12.2 that when Ms shifts to the right due to an increase in the supply of money, the rate of interest will fall. Monetary authorities increase the supply of money during recession or depression. This is done to reduce the rate of interest so that people spend more on consumption and investment and thereby the problem of demand deficiency is addressed. Though theoretically this is true, in practice, there are times when these monetary policies become in effective, an increase in the supply of money may not lead to a decrease in the interest rate or the preference for liquid money. The monetary policies aimed at stimulating the economy by an increased money supply become ineffective. Keynes believed that at a very low rate of interest peoples'

demand for money becomes perfectly elastic. They are so convinced about a fall in the prices of financial assets and rise in the rate of interest that they willingly absorb whatever money comes to them. They hold on to the liquid cash and refuse to spend. This makes the liquidity preference curve horizontal at a low rate of interest. When this happens no rightward shift of the money supply curve can bring down the interest rate. Interest rate remains unchanged at what is called the floor rate. This situation was described by Keynes as the 'Liquidity Trap'. The Liquidity Trap' can be explained with the help of Figure 12.3.

Figure 12.3: Liquidity Trap



In Figure 12.3, it is seen that the rate of interest is determined at r where Md equals Ms. When the supply of Money increased from Ms_1 to Ms_2 the interest rate does not decrease. In other words, the preference of the people to hold liquid money is in no way affected by an increase in the supply of the money.



CHECK YOUR PROGRESS

Q 1: Why does by speculative demand for money arise? Answer in about 60 words.

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Q 2: When does liquidity trap occur? Answer in about 60 words.

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12.4 FRIEDMAN'S REFORMULATION OF THE QUANTITY THEORY OF MONEY

Friedman in his essay, "The Quantity of Money-A Restatement" published in 1956, set down a particular model of quantity theory of money. In his restatement of the quantity theory, he asserts that "Money does matters". He also pointed out the fact that his quantity theory is basically a theory of demand for money. It is rather not a theory of output, income or price. Friedman's theory of demand for money is partly Keynesian and partly non-Keynesian. Friedman formulated his demand for money in the form of real money defined as M/P where M is income in nominal terms and P is price index. For specifying the determinants for real money,

Friedman makes a distinction between two kinds of ultimate wealth holders - individual households and business firms.

Demand for money by ultimate Wealth holders: According to Friedman, for ultimate wealth holders, 'Money is one form in which they chose to hold their wealth'. So, demand for money for them may be expected to be the function of the following variables:

- **Total Wealth:** Total wealth includes both physical and non human wealth. 'In practice, estimates of human wealth are seldom available.' Friedman considers 'permanent income' as the most useful measure of total wealth.
- **Proportion of Human wealth in Total Wealth:** According to Friedman, human wealth such as personal earning capacity is a major asset but because of some institutional constraint the conversion of human into non-human wealth is limited. So, 'the fraction of total wealth that is in the form of non-human wealth is an additional important variable'.
- **The expected rate of Return on Money and other assets:** The expected rate of return on money is zero, sometimes even negative as is in case of demand deposits. But the rate of return on other form of assets like bonds, equities, securities, is greater than zero. So, there is a relative cost of holding money. This relative rate of real return is a determinant of demand for money.
- **Other Variables:** The other variables include-(a) the services rendered by money as an asset, (b) the degree of economic stability expected to prevail in the future.
- **Wealth holders Demand function for Money:** Friedman has symbolized these determinants into a demand function for money by an individual wealth holder as followings:

  $M/P=f\ (y, w, r_m, r_b, r_e, \Delta p/p; u)$

Where, M= demand for nominal money, P= price index, M/P= demand for real money, y= real income, w=fraction of wealth in non-human form (i.e., fraction of income derived from property),r_m =expected rate return on money,r_b = expected rate of return on fixed value securities, including expected change in their prices, r_e = expected rate return on equities

including expected change in their prices, Δ p/p = expected rate of change of prices of goods (i.e., the expected rate of return on real asset), u= any variable other than income which may affect the utility attached to the services of money.

Friedman however has mentioned the problems in applying this demand function for the economy as a whole. Problems arise in aggregation due to i) change in the distribution of real income (y) in the fraction of non-human wealth (w) and ii) problem in defining y and w in estimating expected rate of return as constructed with actual rate of return, and quantifying the variables classified under u. Even if the problem of distribution of y and w are ignored, the above equation may be applied to the economy as whole but still the problem of quantifying the variables classified under u remains.

- **Demand for Money for Business Firms:** Friedman mentioned that the demand for money by the business firms depends on the following modifications-
  - Friedman includes 'Scale' of the enterprise as a substitute variable for 'Total wealth' and for him, there are several measure for scale- total transaction, net value added, net income, total non money capital and net worth.
  - The rate of returns on money and alternative assets is much important as these rates determine the net cost of holding the money balances.
  - The variables classified under u is also equally important for the business firms as in case of the ultimate wealth holders.

Aggregate Demand for Money: According to Friedman, the money demand function mentioned above in the equation can be regarded as symbolizing the business demand for money with w excluded, and also symbolizes the aggregate demand for money too.

12.4.1 Limitations of Friedman's Reformulation of the Quantity Theory of Money

The limitations of Friedman's reformulation of the quantity theory of money are as follows:

- Friedman has been criticised for using broad definition of money including M1 and M2 which leads to the conclusion that interest elasticity of demand for money is negligible. In this situation his theory is weak to make a choice between short run and long run interest rates.
- As Friedman considers money is not a luxury good.
- Johnson criticises Friedman in unnecessarily separating wealth from income. For him, income is the return of wealth and wealth is the present value of income.
- Friedman neglects the effect of prices, output or interest rates on money supply but they do have significant impacts.
- Friedman does not tell anything about the timing and speed of adjustment or the length of time to which his theory is applicable.

Conclusion: Friedman's application to monetary theory of the basic principle of capital theory- that is the yield on capital, and capital the present value of income-is probably the most important development in monetary theory since Keynes's general theory. The theoretical significance lies in the conceptual integration of wealth and income as influence on behaviour.

12.4.2 Friedman versus Keynes

The comparison between Friedman and Keynes can be seen from the following points-

- Friedman uses a broader definition of money as compared to Keynes in explaining the demand for money. He treats money as an asset or capital goods which is held for the stream of income. On the other hand, the Keynesian definition of money consists of demand deposits and non-interest bearing debt of the government.
- According to Friedman the demand for money on the part of wealth holders is a function of money variables. In Keynesian theory, the demand for money as an asset is confined to just

bonds where interest rates are the relevant cost of holding money.

- Ø In Friedman's theory the monetary changes will directly affect prices and production of all types of goods and people will buy or sell any asset held by them. But according to Keynes, monetary changes affect economic activities indirectly through bond prices and interest rates.
- Ø Keynes divides money balances into transaction, precautionary and speculative motives. But no such distinction has been made by Friedman.
- Ø Friedman uses permanent and nominal income to explain his theory of money. Keynes, on the other hand, does not make any such distinctions.

12.5 CRITICISMS OF THE LIQUIDITY PREFERENCE THEORY

The liquidity preference theory is criticized on the following grounds.

- It is pointed out that the rate of interest is not determined by monetary forces alone. Real forces also influence the rate of interest.
- The Keynesian theory is indeterminate if we follow the circular reasoning.To know the rate of interest we must know the demand for money for active purpose; this can known only when we know the level of income; the level of income depends on investment; to know investment we must know the rate of interest; but it is the rate of interest that we are trying to find out!
- There is no empirical evidence to the existence of a liquidity trap.
- Prof. Pigou has pointed out that if saving is not a function of rate of interest then people would save even at zero rate of interest. This appears to be absurd.
- The theory also appears to contradict the reality. During boom period the demand for holding liquid cash is very low, so the rate of interest should be also low. But in reality, the interest rate is at its highest during boom. Opposite happens during depression.



CHECK YOUR PROGRESS

Q 3: Why according to Friedman, the wealth holders demand money? Answer in about 40 words.

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Q 4: Mention the factors on which the business firms' demand for money depends. Answer in about 60 words.

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12.6 LET US SUM UP

- According to Keynes, people prefer to hold liquid money for three purposes: transaction motive, precautionary motive and speculative motive. The transaction motive and precautionary motives are interest inelastic whereas speculative motive is interest elastic. Thus the rate of interest is determined by the demand for liquid money for speculative purpose.
- According Liquidity preference theory, at a very low rate of interest, an increase in the supply of money may not lower the interest rate anymore, making the monetary policy ineffective. This is known as liquidity trap.

12.7 FURTHER READING

1) Ahuja, H.L. (2016). Macroeconomics. Agra: Laxmi Narayan Agarwal Educational Publishers.
2) Rana, K.C. &Verma, K.N. (2017). Macro Economic Analysis. Jalandhar: Vishal Publishing Co.
3) Shapiro, E. (1993), Macro Economic Analysis. New Delhi: Galgotia Publications Pvt. Ltd.
4) MukharjeeS. (2013).Macro Economics: A Global Text.Guwahati: New Central Book Agency (P) Ltd.
5) Bhaduri, Dr. S. (2012).Macro Economics.Guwahati: New Central Book Agency (P) Ltd.

12.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Speculative demand for money arises from the expectation about the behavior of prices in the financial assets such as bonds. Money holders keep liquid cash to take advantage of changing prices of financial assets such as bonds. They speculate about future bond prices and act accordingly. This increases the demand for idle cash.

Ans to Q No 2: At a very low rate of interest peoples' demand for money becomes perfectly elastic. They are so convinced about a fall in the prices of financial assets and rise in the rate of interest that they willingly absorb whatever money comes to them. They hold on to the liquid cash and refuse to spend. This situation was described by Keynes as the 'Liquidity Trap'.

Ans to Q No 3: According to Friedman, the demand for money on the part of wealth holders is a function of money variables. The demand function for money by an individual wealth holder as followings:

$M/P=f\ (y, w, r_m, r_b, r_e, \Delta p/p; u)$

Where, M= demand for nominal money, P= price index, M/P= demand for real money, y= real income, w=fraction of wealth in non-human form (i.e., fraction of income derived from property),r_m

=expected rate return on money,r_b = expected rate of return on fixed value securities, including expected change in their prices, r_e = expected rate return on equities including expected change in their prices, Δ p/p = expected rate of change of prices of goods (i.e., the expected rate of return on real asset) , u= any variable other than income which may affect the utility attached to the services of money.

Ans to Q No 4: Friedman mentioned that the demand for money by the business firms depends on the following modifications-

- 'Scale' of the enterprise. Scale here means: total transaction, net value added, net income, total non money capital and net worth.
- The rate of returns on money and alternative assets is much important as these rates determine the net cost of holding the money balances.
- The variables classified under u in the wealth holders' category is also equally important for the business firms as the ultimate wealth holders.

12.9 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: Briefly discuss the concept of liquidity trap.

Q 2: How is the equilibrium rate of interest is determined in the Keynesian approach? Discuss.

B) Essay type Questions (Answer each question in about 300-500 words)

Q 1: Critically discuss the liquidity preference theory of money.

Q 2: Discuss Friedman's Reformulation of the Quantity Theory of Money. Make a comparison between Keynes and Friedman.

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UNIT 13: NEO-CLASSICAL AND KEYNESIAN SYNTHESIS

UNIT STRUCTURE

13.1 Learning Objectives

13.2 Introduction

13.3 Neo-Classical and Keynesian Views on Interest

13.4 IS-LM Model

- 13.4.1 Goods Market Equilibrium: The IS Curve
- 13.4.2 Why Does IS Curve Slope Downward?
- 13.4.3 Money Market Equilibrium: The LM Curve
- 13.4.4 Goods and Money Market Equilibrium
- 13.4.5 Shift in IS Curve
- 13.4.6 Shift in LM Curve
- 13.4.7 Comparative Static Analysis: Shift in IS Function
- 13.4.8 Comparative Static Analysis: Shift in LM Function
- 13.4.9 Criticisms of the IS-Lm Curve Model

13.5 Extension of IS-LM Model with Government Sector

- 13.5.1 The IS Curve in Three Sector Model
- 13.5.2 Crowding Out Effect

13.6 Application of IS-LM Model in Monetary and Fiscal Policies

- 13.6.1 Fiscal Policy
- 13.6.2 Monetary Policy

13.7 Let Us Sum Up

13.8 Further Reading

13.9 Answers to Check Your Progress

13.10 Model Questions

13.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- describe the interrelation between goods market and money market,
- explain how the rate of interest is determined in the economy with the help of IS-LM model,

- discussthe factors that determine the shift in IS and LM curves,
- analyse the effects of government policies on the rate of interest and national income.

13.2 INTRODUCTION

In the previous units, we have discussed the Keynesian theory ofincome determination. In that simple model Keynes considered the investment to be determined by two factors: the marginal efficiency of capital and the rate of interest where investment is considered to be independent of the level of national income. In the money market, the rate of interest is determinedby the demand for and supply of money. The changes in the interest rate influence changes in the National income and output. One major drawback of the Keynesian analysis, as pointed out by different scholars, is that though the changes in the rate of interest in the money market affect the investment and level of income, Keynes completely ignored the influence of the goods market on the interest rate.The IS-LM (Investment Saving-Liquidity Preference Money Supply) model has emerged as a tool to rectify this drawback. It is considered as an extension of the Keynesian analysis trying to explain that the rate of interest is determined by both monetary and real factors.In fact equilibrium income and interest are simultaneously determined by the interaction of the money market and the goods market. This model explained with the help of IS-LM tool iswidely known as the "Neoclassical Synthesis" and is used as the standard interpretation of the Keynesian economics.

In this unit, a summary of the basic distinctions between the Neo-Classical and Keynes with regard to interest has been presented. Further, the IS-LM model and its applications have been discussed. Extension of IS-LM model with the Government sector has also been discussed.

13.3 NEO-CLASSICAL AND KEYNESIAN VIEWS ON INTEREST

The Neo-Classical and Keynes' view on different aspects relating to interest has been summarised in Table 13.1.

Table 13.1: Neo-Classical vs Keynesian Views on Interest

Criterion of Distinction	Neo-classical	Keynesian
Definition of Interest.	Interest is a reward for the use of loanable funds	Interest is a reward for parting with liquidity.
Nature of Interest	Interest is a real-cum-monetary phenomenon and the theory of interest is a real-cum-monetary theory of interest.	Interest is a purely monetary phenomenon and the theory of interest is a monetary theory of interest.
Determination of Rate of Interest	Rate of interest is determined by the equality between the demand for and supply of loanable funds.	Rate of interest is determined by the equality between demand and supply of money.
Demand Side	The demand for loanable funds is the demand for investment, consumption and hoarding. Demand for loanable fluids for all the three purposes is a negative function of the rate of interest.	The demand for money means the demand for liquidity or the demand to hold money in cash for the transactions motive, the precautionary motive and the speculative motive. The demand for transactions and precautionary motives is a constant function of income and is interest-inelastic, while the demand for speculative motive is a negative function of the rate of interest. The speculative demand for money becomes perfectly elastic at a minimum level of the rate of interest, this is called *liquidity trap*.
Supply Side	The supply of loanable funds comes from savings, dishoarding, bank credit and disinvestment. The supply of loanable funds from all these sources is a positive function of rate of interest.	The supply of money is fixed and controlled by the monetary authority and is perfectly interest-inelastic.

Saving-Investment Equality	Rate of interest is the equilibrating force between saving and investment.	Income, and not the rate of interest, is the equilibrating force between saving and investment. Rate of interest, being a purely monetary phenomenon, brings equality between demand and supply of money.
Role of Money	It regards money as a flow since the supply of money is related to the period of time. Moreover, the demand for hoarding is not related to the expectations of future rate of interest. Besides, money supply is believed to be interest-elastic.	The theory considers money both as a medium of exchange and a store of value. Speculative demand for money is based on the expectations of the people about the future rate of interest. Money supply is fixed, interest-inelastic and stated in stock terms related to a specific point of time.
Minimum Level of Rate of Interest	Like the classical theory, this theory also admits the possibility of zero rate of interest and that there can be no minimum limit to the rate of interest.	The theory admits that the demand for money curve becomes perfectly elastic at a certain minimum level of the rate of interest which indicates that the interest rate cannot fall below this minimum limit mainly due to the psychology of the people.
Scope of the Theory	The loanable funds theory is also stated essentially in the traditional classical terms and is founded on the unrealistic assumption of full employment.	This theory considers the possibility of (under employment) equilibrium and, therefore, this theory has a larger scope, i.e., it is applicable in full employment as well as less-than- full employment conditions.

13.4 IS-LM MODEL

The IS-LM model which is also known as Hicks- Hansen model was developed by scholars like Harrod, Meade and Hicks in 1936 in their various studies and later Alvin Hansen gave its final form in 1949. The model tries to explain the inter-relation between investment, national income, demand and supply of money and the rate of interest. The model suggests that

these variables are mutually interdependent and can be represented by the two curves called the IS and LM curves. It is a two sector model, containing both a real sector-the goods market and a monetary sector - a market for financial assets.



LET US KNOW

- **IS Curve:** The IS curve the IS curve is the locus of those combinations of rate of interest and the level of national income at which goods market is in equilibrium.
- **LM Curve:** The LM curve is the locus of those combinations of rate of interest and the level of national income at which money market is in equilibrium.

13.4.1 Goods Market Equilibrium: The IS Curve

The product market is the market for goods and services. The product market is in equilibrium when saving and investments are equal. The IS curve for an economy shows various combinations of the level of income and rate of interest that make saving equal to investment. As mentioned earlier, I-S stands for investment and saving respectively. Thus, the IS curve represent the equality between saving and investment. Savings are determined by the level of income and the saving function is shown by the equation: $S= -a +sY$

Where -a is autonomous dissaving,s is propensity to save.

Similarly, the Investment is determined by the rate of interest which is endogenous. It can be shown as: $I = I$ (i)

Where 'i'is the rate of interest.

Thus, there are two variables in the real market: income and the rate of interest. For the market to be in equilibrium it is necessary that savings equal investment.

i.e., S = I

And substituting the above equation,

-a +sY = I (i)

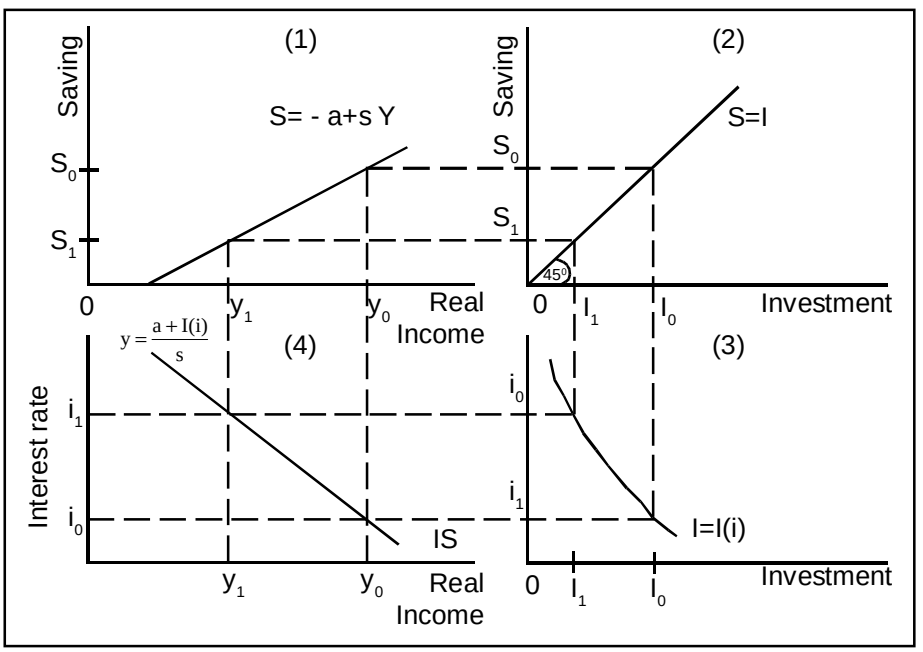
sY = a + I (ii)

or Y = $Y = \frac{a + I}{s}$

A close examination of the above equations show that there are various combinations of the level of income and the rate of interest that will make investment and saving equal. If the interest rate is high in the market, it lowers the level of investment which in turn leads to a fall in income and the corresponding saving. The locus of goods market equilibrium values of income and the interest rate is called the IS curve.

The derivation of the IS curve has been shown graphically in Figure 13.1.

Figure 13.1: Derivation of the IS Curve



In the part I of Figure 13.1, at Y1 of income we have S1 of saving. The part II of the diagram shows the equality of S and I and the S1 of the saving is converted to I1 of the investment (the 45o line shows the equality between the two variables.) the investment schedule in the part 3 shows that the I1 of investment is carried out at i1 of interest rate. Thus, the coordinate of y1 and i1is plotted in part 4 of the diagram. the coordinate of income and investment is obtained at the point where Saving is equal to investment. If the income level is Yo there is a higher level of saving, say, So and this saving is converted to Io of investment (in part II of the diagram) the higher level of investment can be done only if there is a lower level of interest rate (io). In part 4 of the diagram, we have another coordinate of income and interest rate where S = I. In this way, we can obtain a large number of income-interest coordinates for which savings equal investment. Joining all these coordinates we get the IS curve.

The product market is in equilibrium at any combination of income and interest rate on the IS curve. In other words, the product market is not in equilibrium for any combination of income and interest rate off the IS curve. As we have seen in earlier chapters, there is an inverse relation between investment and rate of interest. This inverse relationship is shown in the IS curve and so it slopes negatively indicating that higher levels of income are associated with lower interest rates.

13.4.2 Why does IS Curve Slope Downward?

As seen above, the IS curve slopes downward. With decline in the rate of interest, the investment increases followed by an increase in the aggregate demand and national income. Thus, a lower rate of interest is required to have a higher level of income. This makes the IS curve slope downward.

Steepness of the IS curve depends on (1) the elasticity of the investment demand curve, and (2) the size of the multiplier. The elasticity of investment demand shows how elastic is the demand for investment good to the rate of interest. If the demand for investment good is highly elastic, then a small shift in the rate of interest will yield a large change in income. So the IS curve will be relatively flat; whereas, if the demand for investment good is less elastic, the IS curve will be more steep.

The second factor is the size of the multiplier. The size of the multiplier is determined by MPC and if the MPC is large, the Multiplier and the change in the income also will be large. Thus, if the multiplier is large, the IS curve will be flatter and small multiple value give a comparatively steep IS curve.

13.4.3 Money Market Equilibrium: The LM Curve

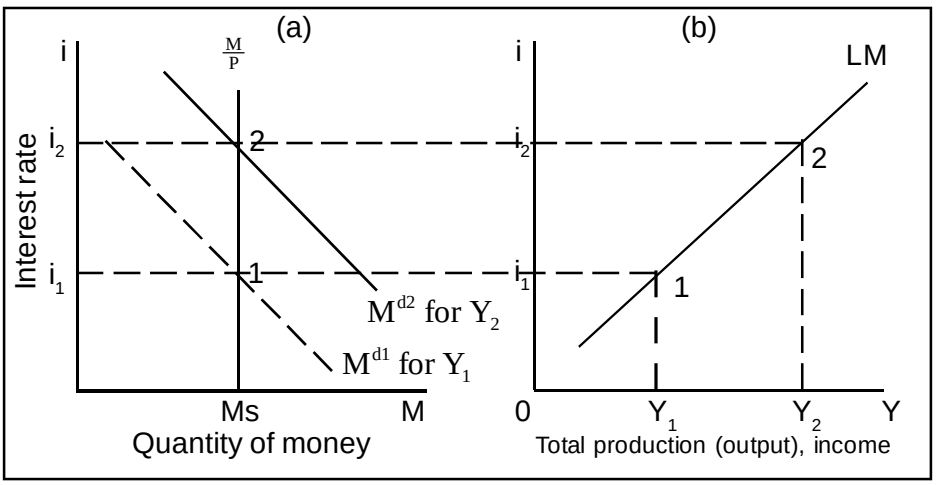
The money market is in equilibrium when the demand for money is equal to the supply of money. L stands for liquidity and M stands for Money supply. The demand for money (after adjusting for inflation) is determined by the level of income (for transaction purpose and precautionary purpose) and the rate of interest (for speculative purpose). Thus, the demand for money is:

$M_d = f(Y, i)$

The supply of the money (M_s) is determined exogenously, by the central bank or the monetary authority.

Thus, the interest rate is determined by $M_d = M_s$. The LM curve for an economy shows various combinations of the level of income and the rate of interest that make the demand for money (L) equal to the supply of money (M). The derivation of the LM curve has been shown graphically with the help of Figure 13.2.

Figure 13.2: Derivation of the LM Curve



The demand for money when the national income is at Y_1 is given by the curve M^{d1}. The supply of money, which is fixed, is shown by the line Ms. At the equilibrium where Md=Ms, the rate of interest is i_1. Now at a higher level of income of Y_2 Demand for money increases to M^{d2} and there is a higher level of interest rate, at i_2. In this way, we can derive a number of coordinates for income and interest rate which give us the LM curve. In otherwords, the LM schedule shows various combinations of income (Y) and interest rate (i) which bring equilibrium to the money market.

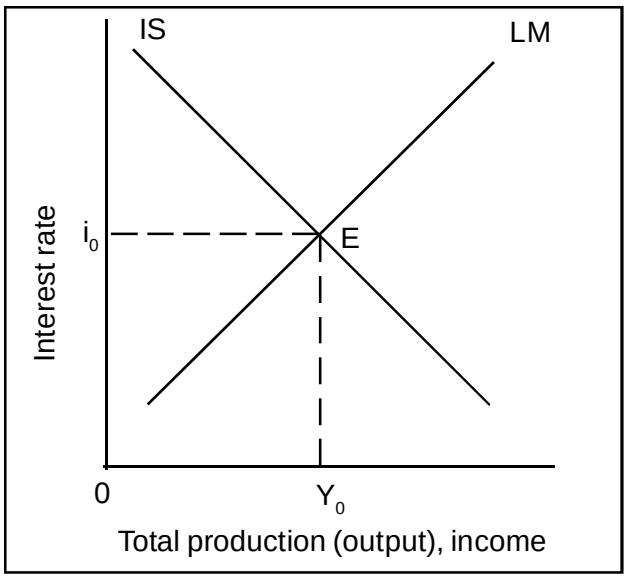
13.4.4 Goods and Money Market Equilibrium

Now we have the IS functions which respresnts the goods market equilibrium and LM function representing the money morket equilibrium. The simultaneous equilibrium of the two market can be obtained by the intersection of these two functions. The equilibrium point (E) in the figure denote i_0 of interest rate and Y_0 of income. Any point other than the equilibrium point represent either excess supply or demand on the money and product market. Goods market equilibrium has been shown with the help of Figure 13.3.

The intersection of IS and LM represent the equilibrium of real variables such as demand and supply of output (goods market) and demand for real money balances equals the real quantity of

money in existence. Here the role of the price in determining the real values should not be forgotten. To make the model simple, it is assumed that the price is fixed and it is exogeneously determined.

Figure 13.3: IS-LM Equilibrium



The IS-LM modoel is based on (i) the investment demand function, (ii) the consumption function, (iii) the money demand functin, (iv) the quantity of money. Any change in these factors will cause a shift in the IS or LM curve and will therefore change the equilibrium levels of the rate of interest and income.

13.4.5 Shift in IS Curve

A change in any factors of the IS equation will result to a change in the IS curve.The level of autonomous expenditure determines the position of the IS curve. The autonomous expenditure includes government expenditure, investment and consumption expenditure which does not depend on the level of income.So any change in the autonomous expenditure can lead to a shift in IS curve.

An increase in autonomous investment or decrease in saving will shift IS to the right. This is because of the forward operation of the multiplier followed by the increase in investment or consumption expenditure. Naturally, an expansionary fiscal policy will shift the IS curve to the right indicating a rise in income at the same interest rate. Similarly, a decrease in autonomous investment or increase in saving will shift the IS curve to the left due to the backward operation of the multiplier. Therefore, a contractionary fiscal policy will shift IS to the left indicating a fall in income at the same interest rate.

13.4.6 Shift in LM curve

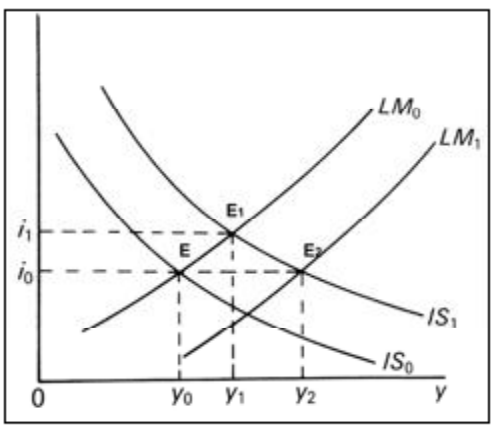
There are two factors that shift the LM function. (i)changes in the demand for money (ii) changes in the exogenously fixed money supply. The first factor, ie the changes in the demand for money arises from a change in the liquidity preference for holding money by the people. A change in price level or the expectations of people about the future tend to change their demand for holding money. Due to the changes in the economic conditions, payment habit or other factors that influence the preference of people, the money demand curve will shift. The second factor, the supply of money, is determined by the monetary authorities and therefore, a change in the policies by the authorities will result into changes in the supply of money.

An increase in the supply of money or a decrease in the liquidity preference will shift the LM curve to the right. Thus an expansionary monetary policy will shift LM curve to the right indicating an increase in income at the same rate of interest. Similarly, a reduction in the supply of money or an increase in liquidity preference will shift LM curve to the left. Thus, a contractionary monetary policy will shift LM to the left indicating a fall in income at the same interest rate.

13.4.7 Comparative Static Analysis: Shift in IS function

A shift in investment or in consumption will result to a shift in IS function. An increase in any of this will result to a rightward shift and a decrease will lead to a leftward shift of IS curve as shown in the following diagram. In the figure 13.4 the initial equilibrium is given at E where the IS_o and LM_o intersect. With a rightward shift in the IS curve, a new equilibrium is established at E_1. Thus there is an increase in the national income and the interest rate. This increase in the national income is determined by the multiplier effect of the investment.

Figure 13.4 Effect of the Shift of IS curve followed by the LM curve



The change in the goods market will result to a change in money market too. Increased level of output will result to an increased demand for money. Since the supply of money is fixed, it will result to an increase in the rate of interest of i_1 where the new equilibrium of E_1 is establishedat the intersection of IS_1 and LM_o.

If the monetary authorities increase the supply of money, the LM schedule will shift to the right from LM_o to LM_1. Further, if the money supply is increased to the extent to keep the rate of interest at io, a new equilibrium is established at E_2 and the national income will increase to Y_2. It is important to note that when both the IS and LM shift to the right, the national income is bound to go up. But we cannot be sure of interest rate. A rightward shift of IS raises the

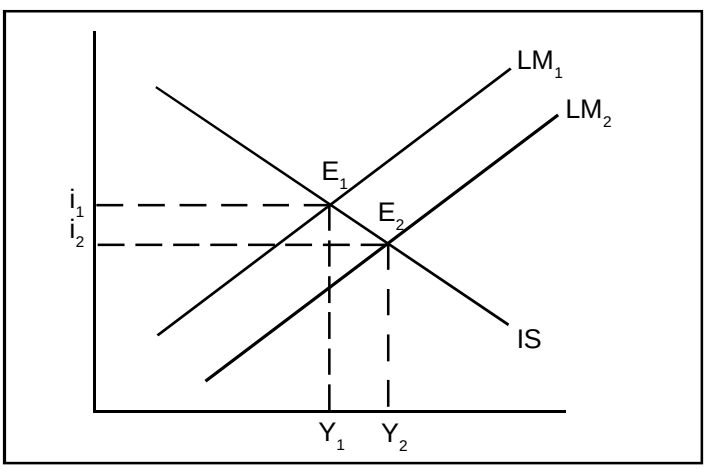
interest rate, while a rightward shift of LM lowers the interest rate. Therefore, only when the shifts of the two curves are equal, the interest rate will remain unchanged. If the shift of IS is greater than that of LM, the interest rate will rise; if the shift of LM is greater than that of IS, interest rate will fall.

Again when IS curve shifts to the left with no change in LM, the rate of interest as well as income will fall. This is because a fall in investment or consumption expenditure will bring down the income due to the backward operation of the multiplier. With reduced income less money will required for active purposes which will pull down the demand for money leading to a fall in interest rate. However, if leftward shift of the IS is accompanied by the leftward shift of LM we can only be sure of a fall in income. The change in interest rate will depend on the relative shifts of the two curves. When the shifts of the two curves are equal, the interest rate will remain unchanged. If the shift of IS is greater than that of LM, the interest rate will fall; if the shift of LM is greater than that of IS, interest rate will rise.

13.4.8 Comparative Static Analysis: Shift in LM Function

An increase in the supply of money, keeping the IS curve constant will decrease the rate of interest and increase the level of income. This has been shown with the help of Figure 13.5.

Figure 13.5: Effects of the Shift of LM Curve



In Figure 13.5, it has been seen that when the money supply increases, LM_2 curve shifts to LM_1. The rate of interest fall from i_1 to i_2. The output increase from Y_1 to Y_2. Thus an increase in the supply of money, keeping the other factors constant will result to a decrease in the rate of interest and increase in the output.

13.4.9 Criticisms of the IS-LM Curve Model

The IS-LM model has been considered as a significant advancement to explain the true behaviour of the economy and also in establishing the relation between goods and money market. Further, the IS-LM model succeeds in integrating and synthesizing fiscal policies with monetary policies, and theory of income determination with the theory of money. In spite of these advantages, the model has the following limitations.

- Ø The model is based on the assumption that rate of interest is flexible and the central bank or other monetary authority has no control over it.
- Ø IS-LM model work only if the investment is interest- elastic. If the investment is interest- inelastic, the model fail to operate.
- Ø Don Patinkin and Milton Friedman have criticised the IS-LM model as being too artificial and over-simplified. It is unrealistic to divide the economy into monetary and real sector as they are quite interwoven.
- Ø The model fails to give a satisfactory explanation on the impact of the changes in price level of commodities.



CHECK YOUR PROGRESS

Q 1: Choose the correct option:

A rightward shift in the IS curve, keeping the LM curve constant will result to:

(a) Increase in the rate of interest and national income.

(b) Decrease in the rate of interest and national income.

(b) Increase in the national income but a decrease in the rate of interest.

(d) Decrease in the national income and an increase in the rate of interest.

Q 2: What the IS and LM curves exhibit? Answer in about 50 words.

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Q 3: What will be the changes in the Income and rate of interest with a shift in the LM curve? Answer in about 40 words.

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13.5 EXTENSION OF IS-LM MODEL WITH GOVERNMENT SECTOR

In the previous discussion, we have seen that the equilibrium level of income and interest rate are given by the interaction of the IS and LM curves. Further, we have seen that the shift in IS and LM leads to a change in national income as well as the rate of interest. Now let us look into the equilibrium of an economy by introducing government as the third sector along with goods and service sector.

The government collects money from the economyand spends money into the economy through various programmes. The money receipt of the government are mainly through taxation, public borrowing and sales of goods and services. The expenditure of the government are purchasing goods and services, transfer payment and to repay debts. In the model it is

assumed that the income and the expenditure of the government are equal. Though, the expenditure of the government is equal to its income, they have an important effect on the economy.

13.5.1 The IS Curve in Three Sector Model

With the introduction of the Government, people need to pay taxes to the government and so the consumption and saving are determined by disposable income (i.e., income after paying tax- Yd= Y-t). The income of the government through taxes is assumed to be in proportion to the national income and tax rate (T =tY).

Thus, the saving function is

$S = -a + sY_d$

Since Yd = Y-t and

T = tY

S=-a +s(i-t) Y

With the introduction of government in the model, the aggregate demand in the economy are now composed of consumption, investment and government expenditure.

Thus, Y = C+I+G

And the disposable income is divided between saving and consumption.

i.e., Yd = Y-T = C + S

Or the total income consists of consumption, saving and tax.

i.e., Y = C+S+T

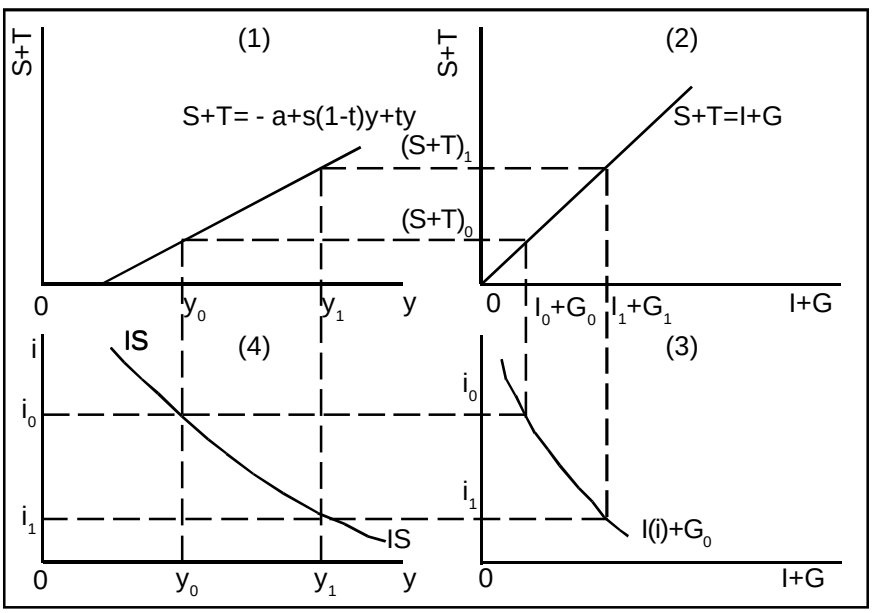
Thus, the goods market equilibrium requires that

S+ T = I + G and the equation of the is function is

I(i) +G =-a+s(1-T)Y + TY

This can be explained with the help of the Figure 13.6.

Figure 13.6: Derivation of the IS Curve when Government Sector in included



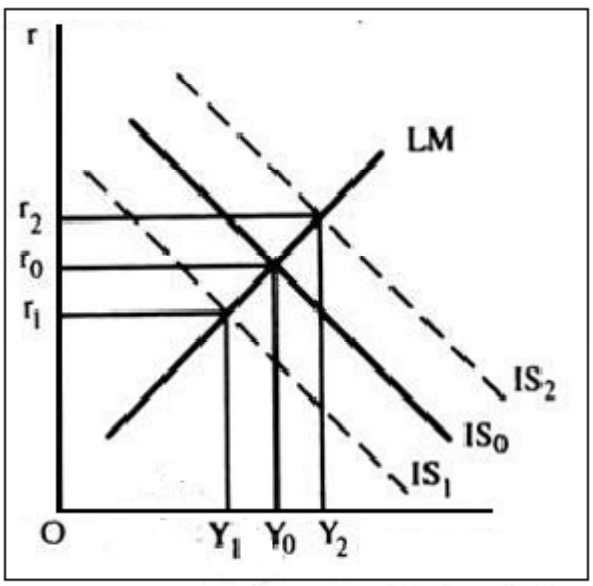
In Figure 13.6, the first part of the diagram indicate the level of saving plus tax at various income levels. That is, at Y_0 of output, the level of saving (S) plus the level of Tax (T) would be $(S+T)_0$ the second part of the diagram shows the equality of saving and tax $(S+T)_0$ to investment expenditure and government spending. I_o + G_o .the rate of interest requires to bring this equilibrium is io .Thus we have the first coordinate of income and interest rate of IS curve. Similarly, for Y_1 of income, we have $(S+T)_1$of saving and taxation. For this increased level of saving and tax, we need a higher rate of investment and government spending, equal to I_1+G_1. The increased level of investment requires a lower rate of interest, equal to i_1. Thus, we have another coordinate of IS curve, ie Y_1 of income and i_1 of interest rate.

Now, if the government increases tax, S+T function will move to the left. This means, for each output level, a lower interest rate is required. This is needed to increase the investment to compensate the increased S+T. This will lead to a shift in the IS curve to the left. On the other hand, a reduction in the tax rate or an increase in the

government spending will shift the IS curve to the right. The result of a shift in the IS curve, keeping the LM curve unchanged, has been shown in Figure 13.7.

In Figure 13.7, it has been seen that with the increase in the tax rate, the IS curve shift to the left (from IS_0 to IS_1). This shift with a constant LM curve, will lead to a decrease in the national income from Y_0 to Y_1 and decrease in the interest rate from r_o to r_1. If the government reduce the tax rate, the IS curve will shift from IS_0 to IS_2. This will lead to an increase in the national income from Y_o to Y_2 and the rate of interest from r_0 to r_1

Figure 13.7: Effect of Changes in Tax Rate



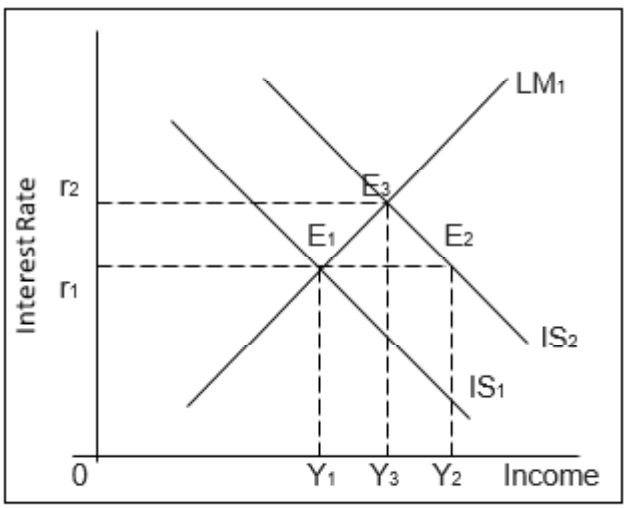
Similar situation exist when government decrease or increase its expenditure. With the increase in public expenditure, the IS curve will shift to the right from IS_0 to IS_2. This will result to an increase in the income from Y_0 to Y_2 and increase in interest rate from r_0 to r_1. A decrease in the public expenditure follows a reduction in the national income and interest rate as seen by the shift of IS curve from IS_0 to IS_1.

13.5.2 Crowding Out Effect

The concept of crowding out has become popular in 1970s and 1980 as economist tried examining the impact of increased public spending. Crowding out effect means that increased public spending may lead to an increase in the rate of interest leading to a decline in private investment and in National income.

To finance the increased spending, government need additional source of income and usually they are raised from the open market through sale of bonds and securities or through increased taxation. In both these cases, resources for private investments are squeezed out and are used for the public investment. This will increase the rate of interest. Ultimately, many of the private investment will become non-profitable. Thus, as a result of the increased public expenditure, private investments are crowded out. The effect of crowding out can be explained with the help of the Figure 13.8.

Figure 13.8: Crowding Out Effect through the IS-LM Model



In Figure 13.8, the initial equilibrium is E_1 where IS_1 interest LM_1 with the increase in the public spending, if the interest rate were to remain constant, the income would have increased uptoY_2. But this does not happen because, to meet the increased public spending, private resources are mobilised resulting to an increase

in the rate of interest. As a result of the increased interest rate from r_1 to r_2, the Equilibrium is set at E_3 and the increase in income is limited to Y_3.



CHECK YOUR PROGRESS

Q 4: Choose the correct option:

In the three sector model, an increase in the government expenditure will:

(a) not have any impact on the economy.

(b) increase the national income but reduce the private investment.

(c) increase the private investment but decrease the national income.

(d) decrease both national income and private investment.

Q 5: Mention the impact of increase in the Tax rate. Answer in about 30 words.

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Q 6: State the impact of increase is government spending. Answer in about 40 words.

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13.6 APPLICATION OF IS-LM MODEL IN MONETARY AND FISCAL POLICIES

In this section, we shall focus on the impact of the changes in various policies, namely fiscal policy and monetary policies on the equilibrium.

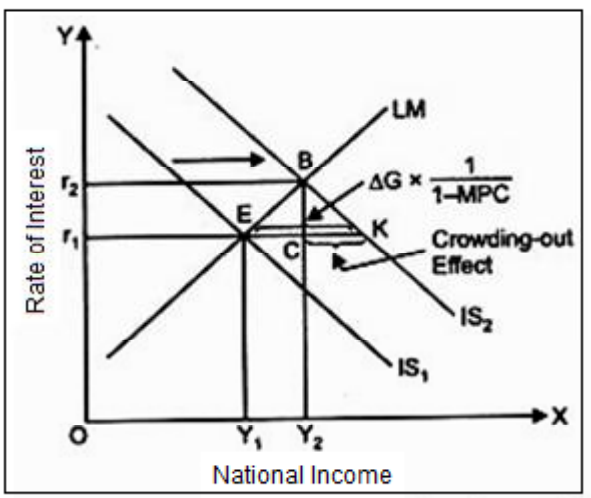
Let us first have look at the effect of Fiscal policy on income and rate of interest.

13.6.1 Fiscal Policy

Let us first explain how IS-LM model shows the effect of fiscal policy of increase in Government expenditure on level of national income. We know that as part of the fiscal policy, government can either make changes in its expenditure or it can make changes in the tax rate. An increase in the expenditure or a decrease in the tax rate is known as expansionary fiscal policy; whereas, as part of the contractionary fiscal policy, government may either cut its expenditure or may increase the taxes.

The Case of Expansionary fiscal policy (through Increase in Expenditure): As part of the expansionary fiscal policy, government might increase its expenditure. With the increase in public spending, the demand for goods and services will increase leading to a rightward shift in the IS curve. This has been shown Figure 13.9.

Figure 13.9: Expansionary Fiscal Policy: Impact of Increases in Government Expenditure on Interest and Income

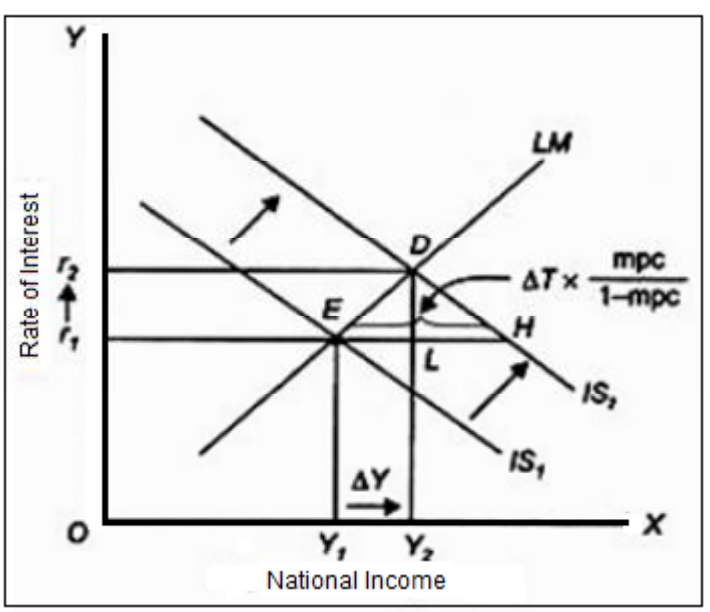


In Figure 13.9, it has been seen that the IS curve has shifted from IS_1 to IS_2. The equilibrium has shifted from E to B and the income has increased from Y_1 to Y_2. If the interest rate were to remain at r_1 the increase in income would have been up to the

distance of CK. But as a result of the increase in government expenditure, the rate of interest has increased which has led to the decrease in the private investment. This decrease in private investment as a result of the increase in the public expenditure is known as the crowding out effect. In the above diagram, as a result of the expansionary fiscal policy, the rate of interest has increased from r_1 to r_2 and the income has increased from Y_1 to Y_2.

The case of Expansionary Fiscal Policy (through Reduction in Tax Rate): Reduction in taxation can be another tool for the expansionary fiscal policy. When government reduce taxes, the disposable income of the people increases. This will leave the people with more income in their hand and will increase their consumption. With the additional income in hand, people demand more goods and services. As a result, cut in taxes causes a shift in the IS curve to the right. This is shown in the Figure 13.10.

Figure 13.10: Expansionary Fiscal Policy: Effect of Cut in Tax Rates



From Figure 13.10, it has been seen that with the shift of the IS curve from IS_1 to IS_2 following the reduction in taxes, the economy moves from equilibrium point E to D. As a result, rate of interest rises from r_1 to r_2 and level of income increases from Y_1 to Y_2. Income

equal to LH has been wiped out because of crowding-out effect on private investment as a result of rise in interest rate.

Please note that Government at times may needs to fight inflation and the tool at hand with the government is to increase the tax rate. This Contractionary fiscal policy has a reverse effect of the expansionary fiscal policy. Higher tax rate will leave people with less income and there will be a decrease in the demand for goods and services.

Effectiveness of Fiscal Policy Summed Up: The increase or decrease in the income as a result of the changes in fiscal policy of the government is determined by the responsiveness of the market to the changes in the rate of interest. If the demand for money is interest elastic, as a result of the fiscal policy, the increase in the rate of interest would be limited. This will pursue people to take more investment activities and will generate a higher rate of output. Similarly, if the demand for investment goods is less interest elastic, the impact of an increase in investment would be greater. Thus, we can conclude that when the fiscal policy multiplier is larger, then interest elasticity of demand for money is more, and interest elasticity of demand for investment goods is less.

13.6.2 Monetary Policy

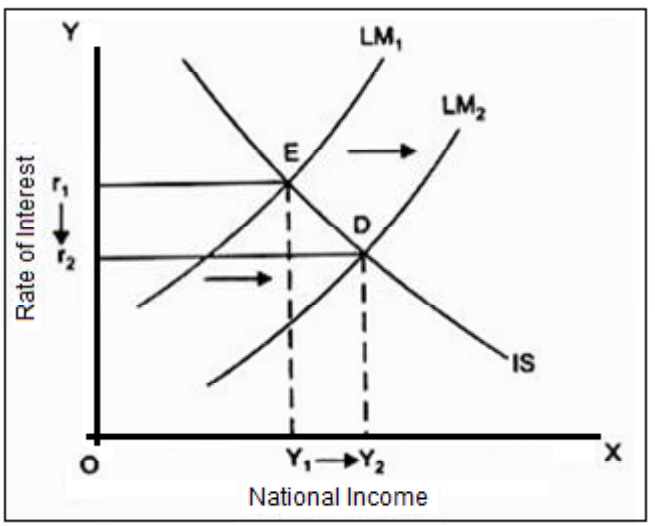
Another instrument with the government to bring equilibrium in the economy is to make changes in the supply of money. Government, with the help of the central bank of the country can increase or decrease the supply of money. A change in the supply of money can bring a shift in the LM curve whichin turn bring changes in the level of income and rate of interest.

The Case of Expansionary Monetary Policy: If the economy is in recession, the government can adopt an expansionary monetary policy by increasing the supply of money. With the increase in the supply of money, people will have more liquid money in their hand.

Assuming that the liquidity preference of the people remain constant, people now will increase their demand for goods and services. The impact of the increased supply of money on interest rate and income has been explained with the help of Figure 13.11.

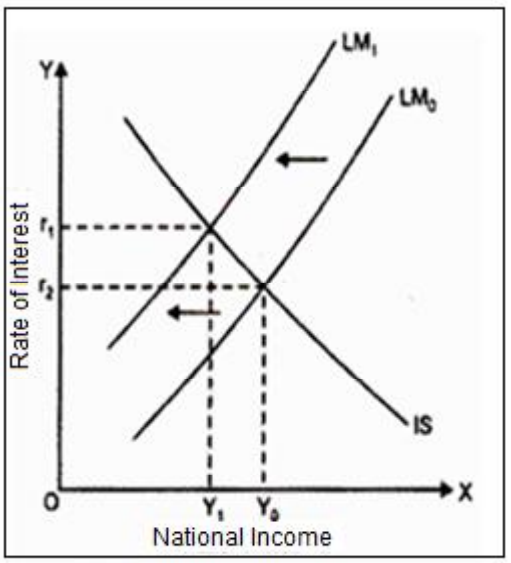
In Figure 13.11, it has been observed that with the increase in the supply of money, LM curve shift from LM_1 to LM_2. The decrease in the rate of interest gives a tempo to the investment and increase the demand for goods and services. This in turn increases the national income. The equilibrium shift from E to D and the income increase from Y_1 to Y_2.

Figure 13.11: Effect of Expansion in Money Supply on Interest Rate and Income



The Case of Contractionary Monetary Policy: If the economy is suffering from inflation, the central bank will adopt tight monetary policy. The reduction in the supply of money will have a reverse effect on the expansionary monetary policy. A decrease in the supply of money shift the LM to the left, from LM_1 to LM_0.This in turn increase the rate of interest and a fall in the investment which ultimately lead to a reduction in the National income from Y_0 to Y_1, as has been shown in Figure 13.12.

Figure 13.12: Contractionary Monetary Policy to Control Inflation



Effectiveness of Monetary Policy Summed Up: The effectiveness of monetary policy is determined by the responsiveness of the interest rate to the increase in money supply. If an increase in the supply of money does not make any change in the rate of interest, the investment and the level of income will not change. In other words, if the demand for money is less interest elastic, an increase in supply of money will lead to an increase is the output and income. Further, it can happen that an increase in the money supply may decrease the rate of interest but the investors may not be optimistic about the future and so may be reluctant to make investment. Thus, the increase in the income will be less if the demand for investment good is less interest elastic. In short, with the increase in money supply, the rate of interest declines. This gives a tempo to the investment andit leads to an increase in the demand for goods and services.



CHECK YOUR PROGRESS

Q 7: Which of the following policy measures would simultaneously decrease output and increase interest rates? Choose the correct option.

(a) The central government increases its public expenditure.

(b) The central bank increases the supply of money.

(c) The central government decreases the Cash Reserve Ratio.

(d) The central government decreases the tax rate.

Q 8: Mention the policy measures to control inflation. Answer in about 20 words.

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Q 9: State the effect of the expansionary monetary policy. Answer in about 40 words.

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13.7 LET US SUM UP

- The IS curve is the schedule of combinations of the interest rate and the level of income such that the goods market is in equilibrium and the LM curve shows the equilibrium of the money market. The intersection of the IS and LM curve shows the simultaneous equilibrium of both the market.
- A rightward shift in the IS curve increases the income and rate of interest where the leftward shift of the IS curve decrease the income and rate of interest. An increase in the supply of money, keeping the IS curve constant will decrease the rate of interest and increase the level of income
- In the three sector model, the public expenditure incurred by the government yield a multiple effect on the income. The increase in public expenditure crowd out the private investment.
- The relative effectiveness of the fiscal policy and monetary policy depend on the elasticity of demand for money and investment goods.

13.8 FURTHER READING

1) Levacic, R. & Rebman, A. (xxxx).Macro economics: An introduction to Keynesian-Neoclassical controversies. Xxxxxx: Macmillan press Ltd.
2) Froyen, R. T. (xxxx). Macroeconomics: Theories and Policies. Xxxxxx: Pearson Education
3) Mankiw, G. (xxxx). Macro Economics. New Delhi: Tata Mc Graw Hills.
4) Salvatore, D. (xxxx). Macroeconomics Theory. Schaum's Outline Series. New Delhi: Tata Mc Graw Hills
5) Duilio, E. Macro Economic Theory, Schaum's Outline Series. New Delhi: Tata Mc Graw Hills
6) International Encyclopedia of Social Science. The Gale Group Inc.

13.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: (a) increase in the rate of interest and national income

Ans to Q No 2: IS curve is the locus of those combinations of rate of interest and the level fo national income at which the goods market is in equilibrium. LM curve is the locus of those combinations of rate of interest and the level of national income at which the money market is in equilibrium.

Ans to Q No 3: A rightward shift in the LM curve will result to a decrease in the rate of interest and increase in the income. A leftward shift in the LM curve will result to an increase in the rate of interest and decrease in the income.

Ans to Q No 4: (b) increase the national income but reduce the private investment.

Ans to Q No 5: An increase in tax rate will increase lead to a leftward shift in the IS curve. This will result to a decrease in the national income and a fall in the rate of interest.

Ans to Q No 6: When the government spending increases, the national income as well as the rate of interest increases. But when the rate of interest increases, there will be a decrease in the private investment which is known as the crowding out effect.

Ans to Q No 7: (d) The central government decreases the tax rate.

Ans to Q No 8: To control inflation, central government can increase the rate of tax. The central bank can intervene by decreasing the supply of money.

Ans to Q No 9: In the expansionary monetary policy, the central bank increases the supply of money. When the supply of money is increased, keeping the liquidity preference constant, the rate of interest falls and this will lead to an increase in the investment and consequently increase in the output.



13.10 MODEL QUESTIONS

A) Short questions (Answer each question in about 150 words).

Q 1: With the help of the ISLM model show the effect of:

(a) a change in tax rate

(b) a change in the money stock

(c) a change in government spending.

Q 2: Explain the concept of crowding out effect.

Q 3: Discuss the effects of fiscal policy.

B) Essay Type questions (Answer each question in about 400 - 500 words)

Q 1: Explain the simultaneous income and interest rate determination in goods and money market.

Q 2: Explain the change in income and interest rate as a result of changes in the IS and LM curves.

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UNIT 14: IS-LM EXTENDED MODEL (Foreign Sector Included)

UNIT STRUCTURE

14.1 Leaning Objectives

14.2 Introduction

14.3 The BP Line

14.4 The Mundel-Flemming Model: Perfect Capital Mobility under Fixed Exchange Rate

14.4.1 Monetary Expansion

14.4.2 Fiscal Expansion

14.5 Perfect Capital Mobility and Flexible Exchange Rates

14.5.1 Adjustment Due to an Increase in World Demand for Domestic Goods.

14.5.2 Fiscal Policy

14.5.3 Change in Money Stock

14.6 Let Us Sum Up

14.7 Further Reading

14.8 Answers to Check Your Progress

14.9 Model Questions

14.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- acquire knowledge on the functioning of the IS-LM Model which includes foreign sector
- describe how a nation can achieve internal and external balance with fiscal and monetary policies under a fixed and flexible exchange rate system
- explain the relative efficiency of monetary and fiscal policies in different situations.

14.2 INTRODUCTION

In unit 13, we have learned about the integration of real and monetary sectors of the economy through the IS and LM curves. We also developed some understanding regarding various applications of the IS-LM Model. In this Unit we are extending the IS-LM model to incorporate the external sector as well. For this we would be introducing a new tool called the BP line.

Internal equilibrium or balance refers to such values of the economic variables within the economy that all the variables tend to be repeated at the same level. It refers to a situation of full employment or a very low rate of unemployment (frictional unemployment arising in the process of changing jobs) along with zero or acceptable rate of inflation.. The external equilibrium, or balance, on the other hand, is the condition in which ex-ante purchases of foreign goods, services, and securities and transfer payments made to foreigners, equal ex-ante purchases of goods, services and debt of country concerned and transfer payments made by foreigners to domestic residents. This is collectively known as balance of payments equilibrium which is represented by the BP line.

By introducing the BP line into the IS-LM model we can examine how internal and external equilibrium can be simultaneously attained under different exchange rate regimes. The extended model enables us to examine the relative efficiency of monetary and fiscal policies in attaining economic objectives under different exchange rate regimes. The starting point of the discussion has to be the Mundel-Flemming model which was developed in 1960s that pointed to what is popularly referred to as the 'impossible trinity'. In the following sections we would first elaborate on the tool BP line, then present the basic Mundel-Flemmingmodel, and finally, extend the model allowing exchange rate to fluctuate.

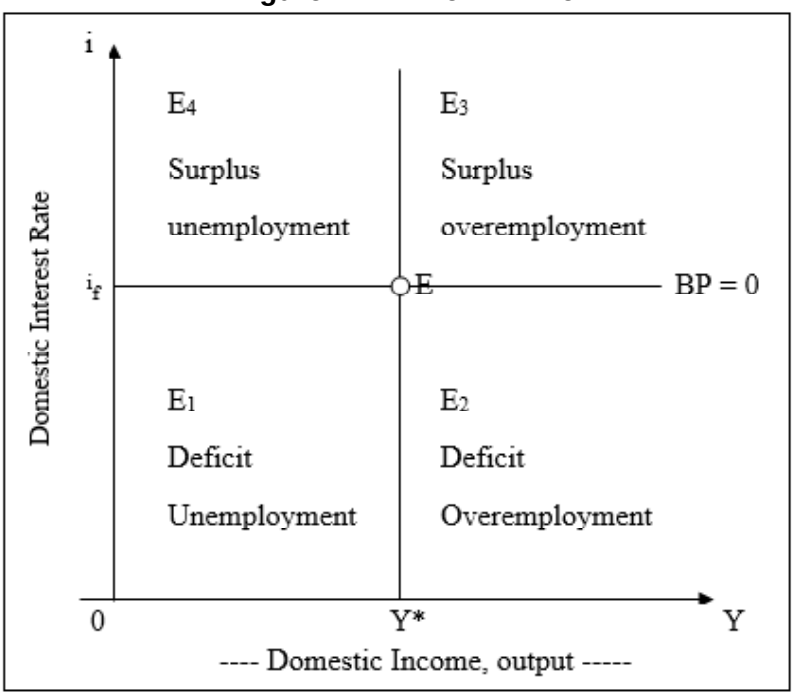
14. 3 THE BP LINE

The balance-of-payments accounts, as we all know, are a record of the transactions of the economy with other economies. The capital account

describes transactions in assets, whereas the current account covers transactions in goods and services as well as transfers. Any payment to foreigners is a deficit item in the balance of payments whereas any payments from foreigners is a surplus item. The balance-of-payments (BOP) are always balanced in accounting sense. In an open economy, with perfect capital mobility, any defect/surplus in current account would be financed by capital inflow/outflow.

The BOP function or the BP line shows the various combinations of interest rate and national income at which the nation's balance of payments is in equilibrium. Given the world rate of interest as if, with perfectly elastic supply of capital worldwide, the BP line is a horizontal straight line as shown in Figure 14.1

Figure 14.1: The BP Line



In Figure 14.1, we have seen that along BP=0, there is balance-of-payments equilibrium. Thus, the economy is with external balance. The assumption of perfect capital mobility worldwide forces the BP=0 line to be horizontal. Along BP=0, the domestic interest equals world interest rate. If domestic interest rates are higher, there is a vast capital account overall surplus. Opposite to this, there is an unlimited deficit if domestic interest rates are below foreign rates.

In Figure 14.1, Y * is the full employment level of output and income. Thus, points to the left of the level Y * represent unemployment situations, whereas points to right of Y* represent overemployment situations. Thus, point E is the only point at which both internal and external balance are achieved. Points other than E, thus, represents various situations of internal as well as external imbalances. For, example, point E_1 indicates deficit and unemployment situation, point E_2 indicates deficit and overemployment situation, and so. Thus, each point on the Figure 14.1 can be viewed as an intersection of the IS and LM curves. In order to know how the adjustment through fiscal (affecting the goods market) and monetary (affecting the money market) policies is done, so that the economy achieve both external as well internal equilibrium is a system of fixed exchange rate, let us proceed to the next section.

14.4 THE MUNDELL-FLEMING MODEL: PERFECT CAPITAL MOBILITY UNDER FIXED EXCHANGE RATE

The IS-LM BP model to the open economy is also known as the Mundell-Fleming Model.The model was developed at the start of the 1960s, by two colleagues of IMF, named Mundel and Flemming. It is the most widely used macro model of an open economy. In its initial formulation, the Mundell-Fleming Model gives a better account of how fiscal and monetary policies of a country works under high capital mobility.

Under perfect capital mobility, even a very small change in domestic interest rate bring about a vast capital inflow/outflow. Thus, with a system of fixed exchange rate, the central banks cannot conduct an independent monetary policy. For instance, let us suppose that a country wants to raise interest rate. Accordingly, a tight monetary policy is adopted. Lured by the high interest rate, the portfolio holders worldwide want to take the advantage of it, since there is perfect capital mobility. As a result, foreigners try to buy domestic assets and there is huge capital inflow. The balance-of payments shows a huge surplus and the exchange rate tend to increase. To keep the exchange rate constant, the central bank has to intervene. It buys the foreign

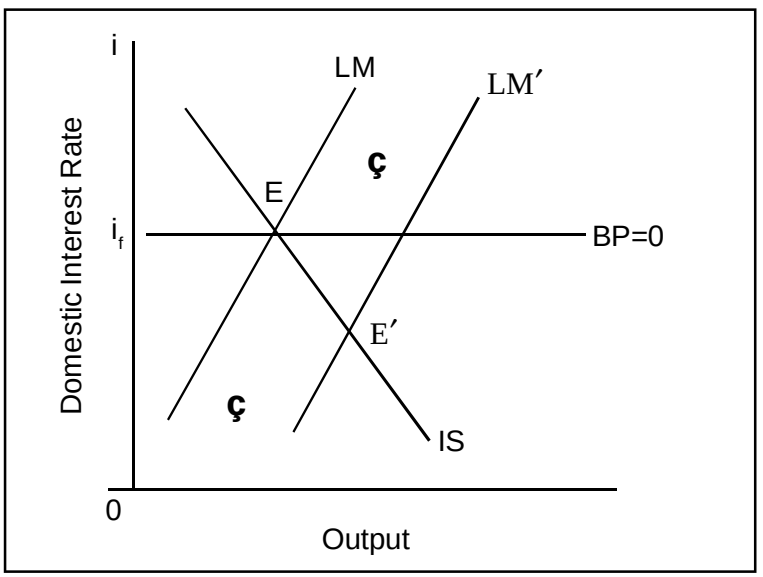
money, in exchange for domestic money. Home money stock will increase and, as a result, the initial monetary contraction to raise interest rate will got reversed. This process continues until the home interest rate come down to the initial level.

Thus, under fixed exchange rates and perfect capital mobility, a country cannot pursue an independent monetary policy. The interest rate should be no other than the world interest rate. Just like the repercussions of contractionary monetary policy mentioned above, a monetary expansion also have impact in similar line of argument. Let us consider Figure 14.2.

14.4.1 Monetary Expansion

It is known to us that the LM curve captures the picture of monetary policy executions. In the open economy IS-LM model (Figure14.2), BP=0 schedule is horizontal due to perfect capital mobility. Thus, BP is balanced at the equality of domestic and foreign interest rate (i=if). Let us suppose that a monetary expansion starts from point E. As a result, the LM schedule shifts to LM' and the economy moves to point E'.

Figure 14.2: Open Economy IS-LM Model

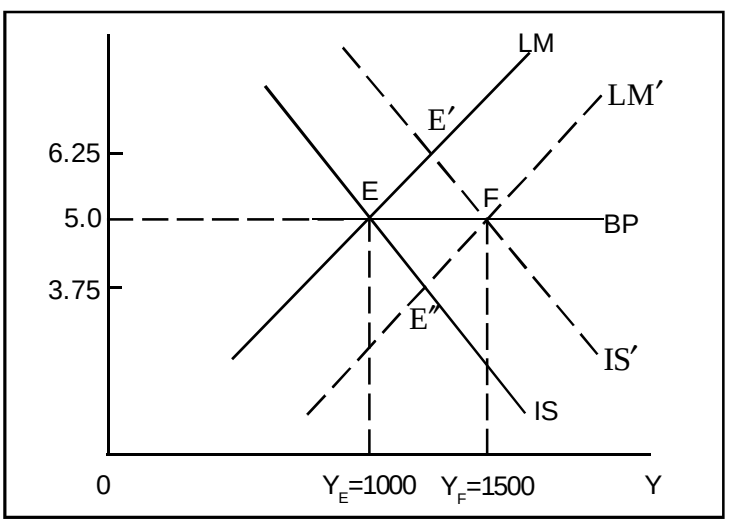


But E' exhibits a huge payment deficit because, at lower interest rate indicated by point E' capital will go out from the country. Accordingly, exchange rate will depreciate. The central bank has to intervene in order to maintain a fixed exchange rate. It sells foreign money and receives domestic money in exchange. As a result, domestic money supply will decline and the LM' will shift back ultimately to LM. Thus, under fixed exchange rates and perfect capital mobility, monetary policy is totally ineffective.

14.4.2 Fiscal Expansion

Under fixed exchange rates and perfect capital mobility, fiscal policy is extremely effective. A nation can reach the full - employment level of national income with equilibrium in its balance of payments only through the appropriate fiscal policy. Let us take an IS-LM model in Figure 14.3. Initially, point E is the equilibrium that established with income level YE =1000 and interest rate i=5% prevailing in the world market. This means that the country can buy or lend any desired amount at 5.0 percent. Under, such circumstances, the nation, to achieve full employment level of national income, should pursue the expansionary fiscal policy that shifts the IS curve to the right to IS' so that it crosses the horizontal BP curve at point F, at YF =1500.

Figure14.3: IS-LM Model: Fiscal Expansion



The intersection of the broken IS' curve with the unchanged LM curve indicates a tendency for the nation's interest rate to rise to i=6.25%. However, because of perfect capital mobility at i=5%, there is a capital inflow from abroad. It will lead to increase in the nation's money supply, as the foreign currency is exchanged for domestic currency. As a result, the LM curve will shift to LM'. As a result, the broken curves IS' and LM' intersect at point F on the horizontal BP curve, with income level Y_E = 1500 and interest rate i=5%, and the nation is simultaneously in internal and external balance. Thus, with fixed exchange rates, monetary policy is completely ineffective if international capital flows are highly elastic.



CHECK YOUR PROGRESS

Q 1. State whether the following statement is true(T) or false (F).

a. The capital account of balance of payments describes transactions in assets, whereas the current account covers transactions in goods and services as well as transfers. (T/F)

b. Under fixed exchange rates and perfect capital mobility, a country cannot pursue an independent monetary policy. (T/F)

Q. 2 "Under fixed exchange rates and perfect capital mobility, monetary policy is totally ineffective." (Explain in 50-60 words).

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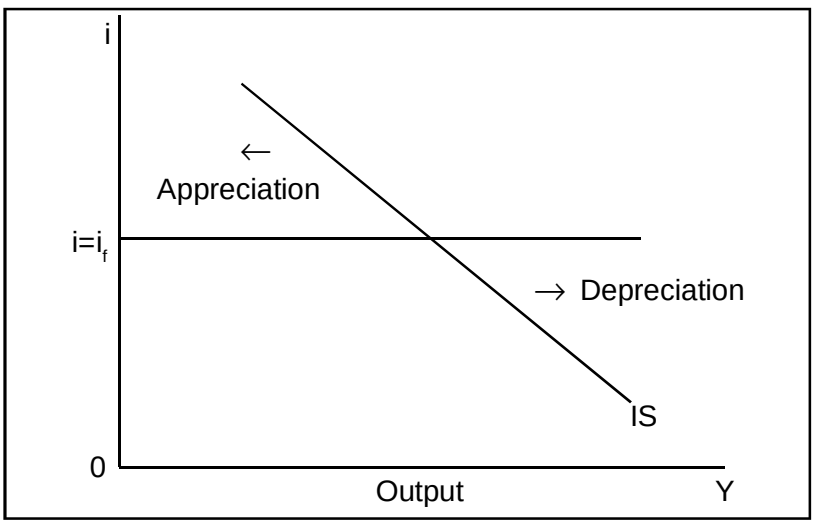
14.5 PERFECT CAPITAL MOBILITY AND FLEXIBLE EXCHANGE RATES

This section utilizes the IS-LM-BP model to examine how internal and external balance can be reached simultaneously with monetary policy under

a freely flexible exchange rate system (or with rate changes) . Under fully flexible exchange rates the central bank does not intervene in the market for foreign exchange. The exchange rate must adjust to clear the market so that the demand for and supply of foreign exchange balance. Any current account deficit must be financed by private capital inflows, and vice versa.

Again, since there is no obligation to intervene, the central bank can set money supply at will. Thus, there exists no automatic link between the balance of payments and the money supply. Therefore, change in real exchange rate can be traced through the IS schedule. As the real exchange rate is a determinant of aggregate demand, the changes in the real exchange rate shift the IS schedule. Figure 14.4 depicts the link between aggregate demand and the interest rate. It the home interest rate were higher than if, there would inflow of capital into the economy. This capital inflow would cause currency appreciation. Goods are becoming relatively more expansive, and as a result aggregate demand is falling. Thus, the IS schedule will be shifting to the left.

Figure 14.4: Link between Aggregate Demand and Interest Rate

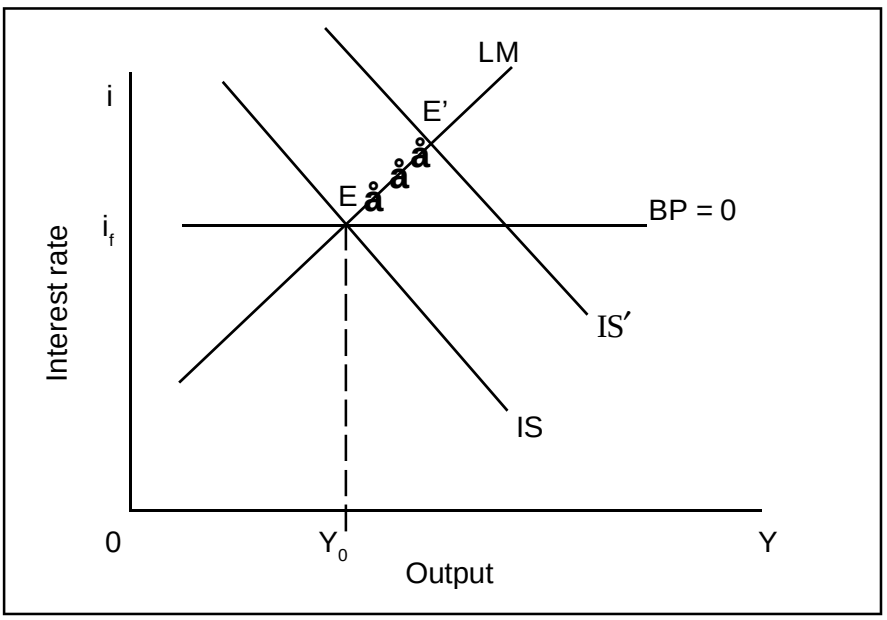


On the other hand, any point below the i=if represents depreciation. Thus, goods will become relatively cheaper and a result, aggregate demand will increase. The IS schedule will therefore be shifting to the right. Let us now see how various disturbances affect output and the exchange rate, and how adjustment takes place in a system of flexible exchange rate with perfect capital mobility.

14.5.1 Adjustment Due to an Increase in World Demand for Domestic Goods.

It is clear from Figure 14.5 that an initial equilibrium is established at point E, through the interaction of the IS schedule, the LM schedule and BP=0. Let us now suppose that there is an exogenous rise in world demand for domestic goods. This implies an excess demand for domestic goods, as compared to the available supply. At the initial interest rate and exchange rate, to achieve goods market equilibrium, the IS schedule shifts out and to the right, to IS'.

Figure14.5: Equilibrium through intersection of BP line, IS-LM Curves



Thus, at point E', in Figure14.5 the goods and money market clear. Due to increased demand, in response, there is a tendency for output and income to increase. The induced increase in money demand, interest rate will increase and bring the domestic economy out of the line with international interest rates. As a result, there will be inflow of capital and appreciation of exchange rate. Hike in exchange rate will make domestic goods relatively costly. Accordingly, demand shifts away from domestic goods and net export declines. The reverse process continues. As long as domestic interest rate exceeds the world level and, ultimately the IS curve

shifts back to the original position. Thus, it has been clear that under conditions of perfect capital mobility, an expansion in exports has no lasting effect on equilibrium output.

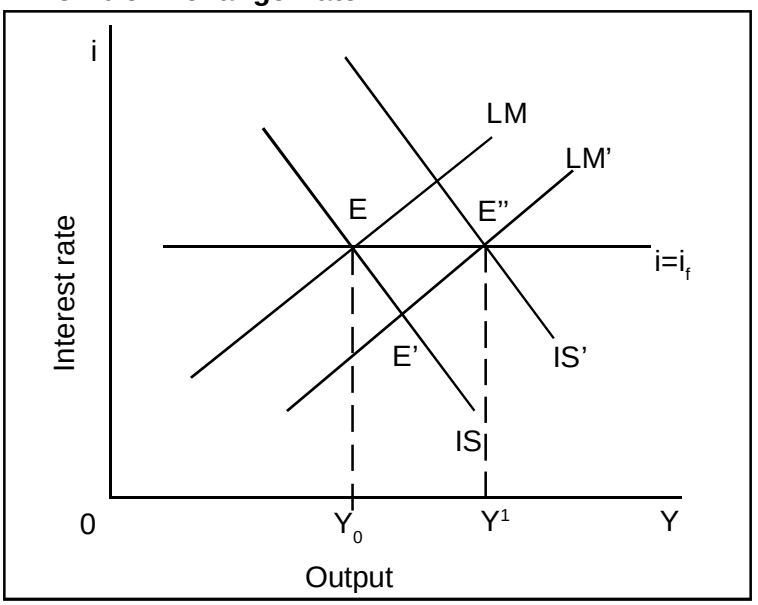
14.5.2 Fiscal Policy

Fiscal expansion in case of flexible exchange rate and perfect capital mobility, does not change in equilibrium output. Instead, it produces an offsetting exchange appreciation. As a result, foreign goods become cheaper in comparison to domestic goods. Therefore, there occurs a shift in the composition of domestic demand towards foreign goods and away from domestic goods.

14.5.3 Change in Money Stock

A change in money stock, under flexible exchange rate system lead to an increase in income and a depreciation of the exchange rate. Let us suppose that initially, the economy is in equilibrium at point E (Figure4.6). Now ,let us consider an increase in nominal quantity of money. Given the prices, at E, there will be an excess supply of real balances. In order to restore equilibrium, either interest rates would have to be lower or income would have to be larger. As a result, the LM schedule shifts down to the right to LM'. The LM' schedule cuts IS schedule at E'. But E'.is not an equilibrium point . Due to lower interest rate E' than that of the world level, there will be huge capital outflows. This outflow of capital put pressure on the exchange rate to depreciate.

Figure 14.6: Equilibrium of Money and Goods Market under Flexible Exchange Rate



Exchange depreciation means that import prices rise and domestic goods become relatively less expensive.Thus, demand for domestic output expands. As a result, the IS curve shifts out to the right. This shifting continues until exchange depriciation has raised demand and output to the level indicated by point E''. It is only at point E'' the goods market, the money market are in equilibrium at an interest rate which is compatible with the world interest rate. Thus, in a system of flexible exchange rate, it becomes clear that the monetary expansion improves the current account through induced depreciation.



CHECK YOUR PROGRESS

Q 3. State whether the following statement is true (T) or false (F).

a. Under fully flexible exchange rates the central bank does not intervene in the market for foreign exchange. (T/F)

b. With flexible exchange rates and perfect capital mobility, fiscal policy is completely ineffective at influencing the level of national income. T/F)

Q. 4 "Under conditions of perfect capital mobility and flexible exchange rates,, an expansion in exports has no lasting effect on equilibrium output." (Explain in 50-60 words)

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14.6 LET US SUM UP

- Economies in these days worldwide are linked through trade in good and through financial markets.
- The balane - of - payments accounts are a record of the transactions of the economy with other economies.
- The capital account describes transactions in assets, whereas the current account covers transactions in goods and services as well as transfers.
- Any payment to foreiners is a deficit item in the balance of payments whereas any payments from foreigners is a surplus item.
- The BP function is determined on the assumption that the economy is in a state of equilibrium, both internally and externally.
- BP function is represented by different combinations of income and rates of interest.
- A contractionary monetary policy leads to a BP surplus, while an expansionary monetary policy to a BP deficit.
- Under fixed exchange rates, the central bank holds constant the price of foreign currency in terms of the domestic currency.
- Under flexible exchange rates, the exchange rate may change from time to time.

- International trade in goods mean that some of the demand for our output comes from abroad and that some spending by our residents is on foreign goods.
- When there is perfect capital mobility, interest rates in the home country cannot diverse from those abroad.
- Under fixed exchange rates and perfect capital mobility,monetary policy is totally ineffective to influence output. Increase in money stock in order to reduce domestic interest rate would lead to a huge outflow of capital, tending to depreciation of exchange rate.
- Fiscal policy is highly effective under fixed exchange rates with perfect capital mobility
- Under flexible exchange rates, monetary policy is highly effective and fiscal policy is ineffective in changing output.



14.7 FURTHER READING

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14.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: a) True b) True

Ans to Q No 2: When exchange rate depreciates, the central bank has to intervene in order to maintain a fixed exchange rate. It sells foreign money and receives domestic money in exchange. As a result, domestic money supply will decline. Thus, under fixed exchange rates and perfect capital mobility, monetary policy is totally ineffective.

Ans to Q No 3: a) True b) True

Ans to Q No 4: Due to increased demand, in response, there is a tendency for output and income to increase. The induced increase in money

demand, interest rate will increase and bring the domestic economy out of the line with international interest rates. As a result, there will be inflow of capital and appreciation of exchange rate. Hike in exchange rate will make domestic goods relatively costly. Accordingly, demand shifts away from domestic goods and net export declines. The reverse process continues as long as domestic interest rate exceeds the world level and, ultimately the IS curve shifts back to the original position. Thus, it has been clear that under conditions of perfect capital mobility, an expansion in exports has no lasting effect on equilibrium output.

14.9 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: Explain the meaning of internal and external balances.

Q 2: Explain the effectiveness of fiscal policy under fixed exchange rates and perfect capital mobility

Q 3: "Under flexible exchange rates, monetary policy is highly effective and fiscal policy is ineffective in changing output." Explain.

B) Essay-type Questions (Answer each question in about 300-500 words)

Q 1: How can an open economy achieve the internal and external balances through an appropriate application of monetary and fiscal policies under the system of fixed exchange rate?

Q 2: In what way can an open economy achieve the internal and external balances through a mix of monetary and fiscal policies under flexible exchange system?



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