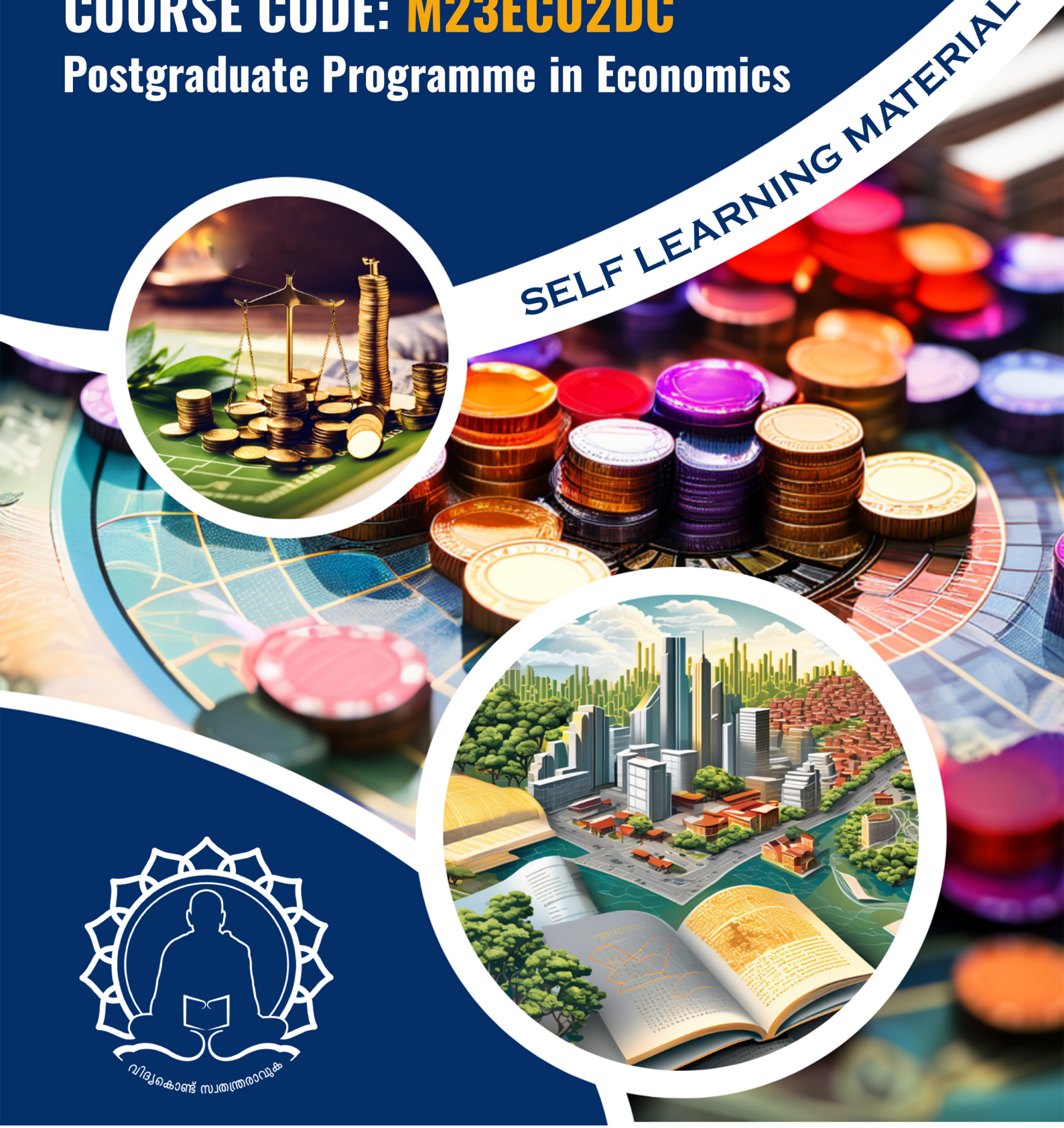
MACROECONOMICS I

COURSE CODE: M23EC02DC

Postgraduate Programme in Economics

SELF LEARNING MATERIAL



വിദ്യകൊണ്ട് സ്വതന്ത്രരാവുക

SREENARAYANAGURU OPEN UNIVERSITY

The State University for Education, Training and Research in Blended Format, Kerala

SREENARAYANAGURU OPEN UNIVERSITY

Vision

To increase access of potential learners of all categories to higher education, research and training, and ensure equity through delivery of high quality processes and outcomes fostering inclusive educational empowerment for social advancement.

Mission

To be benchmarked as a model for conservation and dissemination of knowledge and skill on blended and virtual mode in education, training and research for normal, continuing, and adult learners.

Pathway

Access and Quality define Equity.

Macroeconomics I

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Semester - I

Discipline Core Course
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Self Learning Material

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MA Economics
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Printed and published on behalf of Sreenarayanaguru Open University by Registrar, SGOU, Kollam.
www.sgou.ac.in

ISBN 978-81-967121-3-6
9 788196 712136

DOCUMENTATION

Production

February 2024

YouTube

MESSAGE FROM VICE CHANCELLOR

Dear
I greet all of you with deep delight and great excitement. I welcome you to the Sreenarayanaguru Open University.

Sreenarayanaguru Open University was established in September 2020 as a state initiative for fostering higher education in open and distance mode. We shaped our dreams through a pathway defined by a dictum 'access and quality define equity'. It provides all reasons to us for the celebration of quality in the process of education. I am overwhelmed to let you know that we have resolved not to become ourselves a reason or cause a reason for the dissemination of inferior education. It sets the pace as well as the destination. The name of the University centres around the aura of Sreenarayanaguru, the great renaissance thinker of modern India. His name is a reminder for us to ensure quality in the delivery of all academic endeavours.

Sreenarayanaguru Open University rests on the practical framework of the popularly known "blended format". Learner on distance mode obviously has limitations in getting exposed to the full potential of classroom learning experience. Our pedagogical basket has three entities viz Self Learning Material, Classroom Counselling and Virtual modes. This combination is expected to provide high voltage in learning as well as teaching experiences. Care has been taken to ensure quality endeavours across all the entities.

The university is committed to provide you stimulating learning experience. The postgraduate programme in in Economics is conceived to be a continuum of the UG programme in Economics as it has organic linkage with the content and the form of treatment. In fact is a progression of the finer aspects of theories and practices. The discussions are meant to arouse interest among the learners in understanding the discipline in the real context and therefore, the examples are drawn heavily from the real life experiences. The provision for empirical evidences integrated endeavour of the academic content makes this programme special and relevant. We assure you that the university student support services will closely stay with you for the redressal of your grievances during your studentship.

Feel free to write to us about anything that you feel relevant regarding the academic programme.

Wish you the best.

Regards,
Dr. P. M. Mubarak Pasha 01.02.2024

CONTENTS

MASTER OF ARTS ECONOMICS

Classical Versus Keynesian

Block 1

BLOCK - 1

UNIT 1
Classical and Keynesian Theories of Employment and Output

Learning Outcomes

After completing this unit, the learner will be able to:

- understand how the labour market attained equilibrium under the classical system
- discuss output determination from Keynesian view point
- explain the effective demand under Keynesian employment theory
- distinguish between Classical and Keynesian schools of thought

Background

Classical economics arose as a groundbreaking response to the economic doctrine of mercantilism, challenging its principles and advocating a new approach. Mercantilism advocates that a nation's wealth and power are determined by the accumulation of precious metals and the necessity of State intervention to guide and control the capitalist system's development. In contrast to the mercantilists, classical economists emphasised the significance of real factors in determining a nation's wealth and advocated a laissez-faire policy. Keynes used the term "classical" to refer to most of the economists who had written on macroeconomic questions before 1936. However, in more conventional terminology, macroeconomic theory before 1930 is often divided into two distinct periods. The first, termed as classical period, is the time dominated by Adam smith (Wealth of Nations. 1776), and David Ricardo (Principles of Political Economy, 1st ed.,1848). The second, termed as neoclassical period, had as it most prominent English representatives Alfred Marshall (Principles of Political Economy, 8st ed.1920) and A. C. Pigou (The Theory of Unemployment,1933). The influence of classical economic ideas remained strong until the Great Depression in the 1930s, which signalled the initiation of their

diminishing prominence. After the Great Depression, the classical school of thought lost much of its relevance, as its most fundamental ideas were challenged. As a response to the crisis, alternative economic theories gained prominence, notably Keynesian economics. Keynes formulated his theories in direct response to the Great Depression and his ideas posed a significant challenge to classical economic concepts. Keynesian economics, as presented in Keynes' influential work 'The General Theory of Employment, Interest, and Money', introduced a new approach to understanding and managing the economy.

Keywords

Full Employment, Real Wage, Money Wage, Effective Demand, Aggregative Demand, Aggregative Supply, Involuntary Unemployment

Discussion

1.1.1 Classical Theory of Output and Employment

The classical theory builds based on certain assumptions:

1. All economic agents (firms and households) act rationally to maximise profits or utility. They do not suffer from money illusions.

2. In this system, the market system operates under perfect competition, where agents make the decision of buying and selling based on the given set of perfectly flexible prices.

3. All economic agents have perfect knowledge about market conditions and prices before engaging in trade.

1.1.1.1 Production

- Functional relationship between the input and output

In the classical model, the aggregative production function occupies a central role in determining the output and employment in an economy. The aggregative production function establishes a functional relationship between the input and output, which is based on the technology of individual firms. It is expressed as $Y = F(\bar{K}, N)$ where 'Y' is

- Output is determined by the aggregative production function

output, 'K' is the stock of capital, and 'N' is the quantity of the homogeneous labour input. In the short run, the capital stock is fixed (K), denoted by the bar over the symbol and technology and population remain constant throughout the period. The output varies with the variations in the labour input (N), which is derived from the fixed populations.

Let us explain the fundamental relationship between the labour input and the corresponding changes in output, holding the capital stock (K) constant. This relation is plotted on the following table.

Table 1.1.1 Relation between output and labour

N= Labour	Y= Output	ΔY/ΔN = MPN	Stages of production
0	0	0	
1	10	10	
2	20	10	Constant returns
3	28	8	Diminishing Returns
4	33	5	
5	34	1	
6	32	-2	Negative returns

- At the end of the production stage, a firm may avoid hiring labour due to diminishing marginal returns

The above table shows the relationship between output, fixed capital stock, and labour. When 1 unit of labour is added, output increases by 10 units, leading to a marginal productivity of labour (MPN) of 10. With 2 units of labour added, the MPN remains 10, indicating that output increases by 10 units when one additional unit of labour is added. In the early stages of production, as labour is added, output increases at an increasing rate. Adding 3 units of labour results in 28 units of output, giving an MPN of 8, indicating that output increases by 8 units when one additional unit of labour is added. With 4 units of labour and 33 units of output, the MPN is 5, indicating that output increased by 5 units when one additional unit of labour was added. When 5 units of labour are employed, resulting in 34 units of output, the MPN is 1, signifying that output increased by 1 unit when one additional unit of labour was added. Trend in MPN shows that beyond a certain point, adding more labour results in diminishing marginal returns due to the law of diminishing returns. When 6 units of labour are employed and output is 32 units, the MPN is -2, indicating that output decreased by 2 units when one additional unit was

added to six unit of labour. Considering the stages of production, adding more labour results in diminishing marginal returns. When total output decreases and marginal output becomes negative, negative returns occur. In this situation firms avoid hiring. Therefore, we can say that in the short run, the level of output is based on labour input while keeping the capital stock and technology constant.

1.1.1.2 Labour Demand and Supply

Classical economists assumed that the quantity of labour employed would be determined by the market forces of demand and supply of labour. They also assumed a well-functioning market where firms and individuals optimise, having perfect information about relevant market prices. Let us go through the classical labour demand function.

a. Labour Demand

- Demand for labour based on the Marginal Product of Labour

In the classical model, firms are perfect competitors. They determine their demand for labour based on the Marginal Product of Labour (MPN), and the real wage rate paid to the worker. MPN represents the additional output obtained by hiring one more worker. When the Marginal Product of Labour (MPN) equals the real wage rate, it signifies the profit maximisation condition for firms. Firms will continue to hire more labour until they achieve maximum profit. The firm's demand curve for labour is represented by the marginal product curve which is a downward sloping curve. The downward-sloping demand curve indicates the inverse relationship between labour demand and the real wage rate. Real wage rate is nominal wage rate (W) divided by price (P). This downward slope occurs due to the law of diminishing returns.

The aggregate labour demand curve represents the total quantity of labour demanded by all individual firms in an economy at various wage levels. For each real wage, this curve will give the sum of the quantities of labour input demanded by the firms in the economy. We can write the aggregative labour demand function as

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

In general, when the real wage rate increases, individual firms reduce the demand for labour, and the entire economy follows the same trend. Let us explain it with the help of a figure:

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

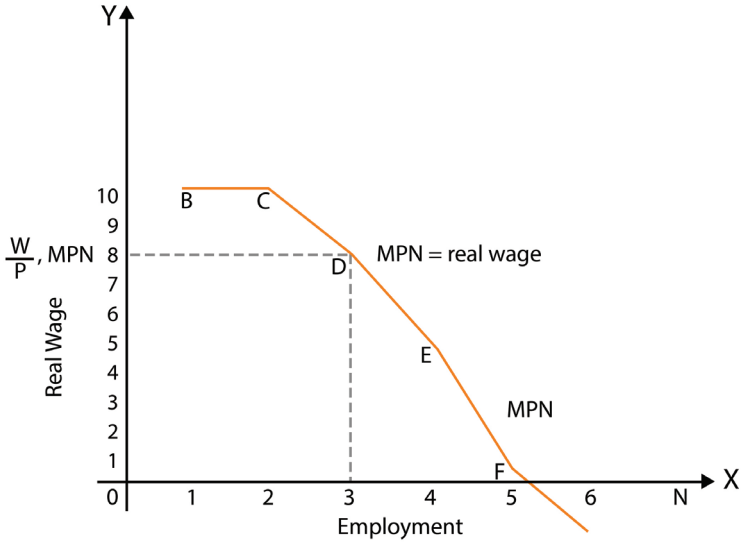

Fig. 1.1.1 Labour Demand Curve of a Firm

- Profit maximisation is achieved when the real wage rate is equal to MPN

The above diagram shows the downward-sloping labour demand curve of a firm. The firm's demand for labour is depicted by the MPN curve, showing a downward slope due to diminishing returns. At point D, the firm achieves profit maximisation. With a real wage of 8, the firm optimises profit by employing three workers, as indicated by the MPN (Marginal Product of Labour) standing at 8.0. (MPN =Real wage rate). This is illustrated at point D on the labour demand graph. Consequently, the firm can hire more labour to increase profits when the real wage falls below 8. Conversely, when the real wage exceeds 8, the firm reduces labour, since the real product is less than the wage rate to decrease the profit.

b. Labour Supply

Individual workers provide labour services. Classical economists assumed that individuals aim to maximise utility, which depends on both real income and leisure time. Therefore, there exists a trade off relationship between real income and leisure time. For instance, if people decide to work overtime, they will earn more money but have less free time for leisure. On the other hand, if they prioritise leisure, they will enjoy more free time but miss out on opportunities to earn

additional income. Thus, the labour supply curve represents the individual's choice between leisure and work. In the classical model, when the pay is higher, people are willing to work more because they can afford more things. This is the income effect. When the pay is higher, work becomes a better deal compared to free time, so people might work more even if they do not particularly enjoy it. This is the substitution effect. The classical model assumes that the substitution effect is stronger, meaning people will work more if they get paid more.

- Substitution effect is stronger than the income effect

Here, we note the two important features of classical labour supply theory: the first one, is labour supply is determined by the real wage and not the money wage, which means that people decide how much to work based on what they can buy with their earnings, not just the amount of money they receive. Hence the aggregative labour supply function can be written $N^s = f\left(\frac{W}{P}\right)$ where, N^s is labour supply, The labour supply curve slopes upward, indicating that people are willing to work more when the real wage is higher. This is because a higher real wage means giving up more leisure time results in more income, making leisure more expensive in terms of forgone earnings. Let us explain the classical labour supply curve with the help of a figure.

- Labour supply determined by real wage, $N^s = f\left(\frac{W}{P}\right)$

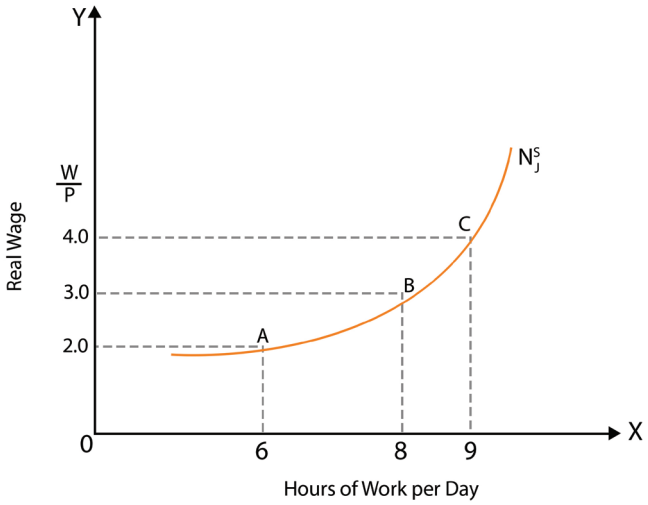

Fig. 1.1.2 Classical Labour Supply Curve

- Positively sloped aggregative supply curve

The X-axis represents the hours of work per day, and the Y-axis represents the real wage rate. At point 'A' real wage is 2, and the labour will choose 6 hours of work. At point 'B,' when the real wage is 3, the labour will choose 8 hours of work, and at

a real wage of 4, the labour will choose 9 hours of work. Here, we observe that when people work at higher wage rates, the supply curve slopes upward. This phenomenon proves that the substitution effect is stronger than the income effect.

1.1.1.3 Equilibrium of Output and Employment

- The equilibrium condition of the labour market is Nd = Ns

In the classical model, aggregative production function represents Y = F (K, N), the labour demand schedule is $N^d = f\left(\frac{W}{P}\right)$ and the labour supply schedule is $N^s = f\left(\frac{W}{P}\right)$. These relationships together with the equilibrium condition of the labour market is $N^d = N^s$, where, ' N^d' is the demand for labour and 'N^s' is the supply of labour. Let us explain the equilibrium of output and employment using the figure given below.

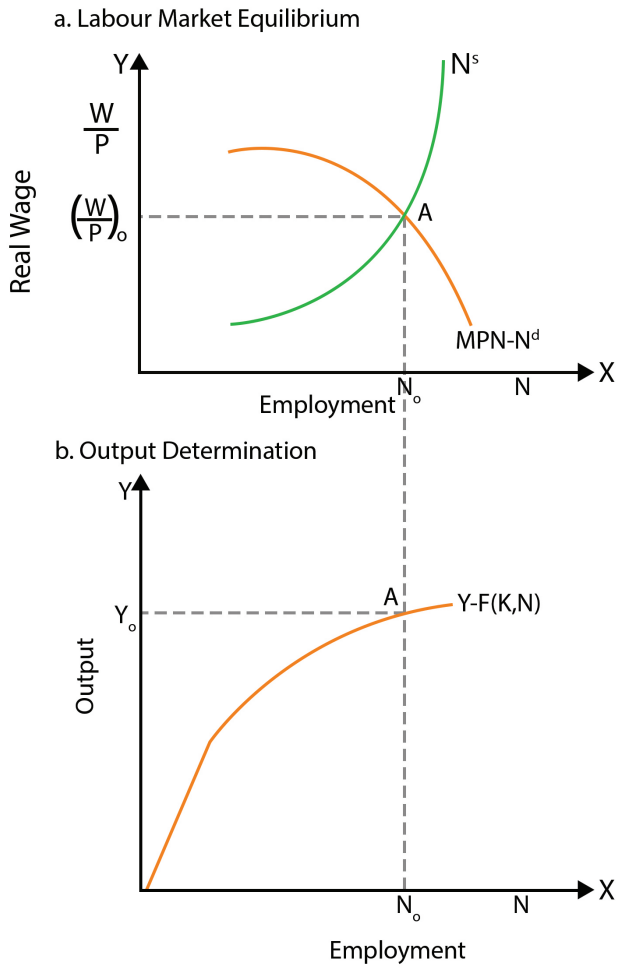

Fig. 1.1.3 Equilibrium of Employment and Output

In part a, the labour market is in equilibrium at A,when the real wage $(W/P)_0$. At this point, the aggregate labour supply (N^s) equals the aggregate labour demand (N^d), resulting in an equilibrium employment level of N_0. In part b, substituting the equilibrium employment level N_0 into the production function determines the equilibrium aggregate output, denoted as Y_0, at point A.

1.1.1.4 Classical Labour Market Equilibrium

- Money wage and real wage are directly related

The classical theory is characterised by the notable feature of a supply-determined nature in output and employment. The classical labour supply curve illustrates the amount of labour provided for each money wage at a specific price level. The classical labour supply curve slopes upward because a higher money wage is directly related to a higher real wage at the given price level. In the labour market, varying levels of labour are supplied due to different price levels, resulting in various real wages at the same money wage. Money wage refers to the nominal or actual amount of currency that a worker receives as compensation for their labour services. Real wage is the purchasing power of a worker's income and represents the quantity of goods and services that can be bought with the money wage at a given price level. It is calculated by adjusting the nominal or money wage for changes in the general price level or inflation.

Let us explain the classical labour market equilibrium with the help of following figures:

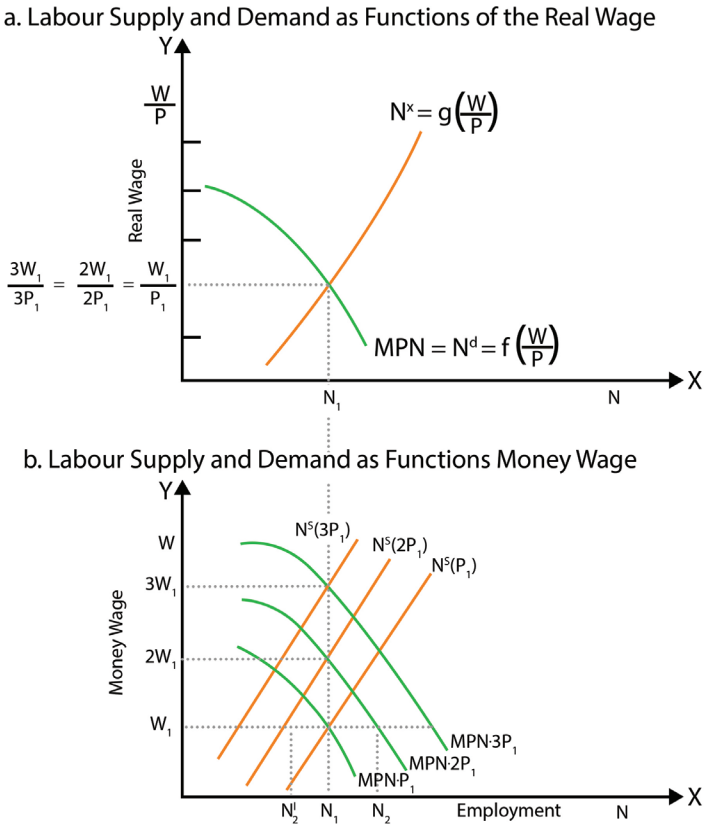

Fig. 1.1.4 Labour Demand and Supply as a Function of Money Wage and Real Wage

- Labour market equilibrium

Part a, shows the equilibrium employment at the point' N_1' where labour supply equals labour demand. Part b, represents the graphical explanation illustrating labour supply and demand as functions of the money wage. Increases in the price level from P_1 to $2P_1$ and then to $3P_1$ shift both the labour supply and demand schedules upward proportionately. Concurrently, the money wage rises in proportion to the price level from W_1 to $2W_1$ and then to $3W_1$, the real wage which is W/P remans constant. Since level of employment is based on real wages, and not on nominal wage, it remains unchanged when real wage is constant. Here, the equilibrium level of employment is N_1.

1.1.1.5 Determinants of Output and Employment

In the classical theory, employment, and output are determined by the positions of the labour supply and demand curves, as

well as the position of the aggregate production function, those are considered exogenous factors because they are determined outside the economic model. The production function can be shifted by supply-side factors such as technical changes and alterations in the capital stock over time and labour supply. Here, determinants of employment and output viz change in technology, capital stock, labour supply are factors belonging supply side therefore, under the classical system, the level of output and employment are determined by supply-side factors.

- Supply side factors affecting output- changes in tecnology and capital stock

Here, the improvement in technology and increase in capital formation enhances the productivity of labour. This increase in productivity improves the marginal product of labour which can be shown by a shift of the Marginal Product of Labour curve towards the right. Since the marginal product of the labour demand curve(MPN) is the labour demand curve, shift in the curve to the right shows increase in labour demand, this increases the level of employment and output.

1.1.1.6 Classical Aggregate Supply Function

In this section, we discuss the classical aggregate supply function in macroeconomics. The vertical shape of the aggregate supply curve implies that changes in the price level do not affect the quantity of goods and services supplied by the economy in the long run. This notion from the classical economists' belief in flexible prices and wages, where any changes in prices would be quickly offset by corresponding adjustments in wages, maintaining the real wage rate constant. According to classical economics, when the price level increases, the money wage for labour must also increase proportionately to maintain equilibrium in the labour market. This is because workers would demand higher wages to compensate for the increased cost of living. Conversely, if the price level falls, the money wage would adjust downward accordingly. Despite changes in the price level, the real wage (the purchasing power of wages) remains constant. This means that while nominal wages may change, the real purchasing power of wages remains the same. Classical economists argue that this is due to the flexibility of wages to adjust to changes in prices. When real wages remain constant and level of employment is at full employment, change in income will change aggregate demand in such a way that only price changes. At full employment level, change in demand changes price only. In the classical model, output and employment are primarily determined by supply-side factors

- Prices change while output remains unchanged at full employment

such as technology, resources, and labour productivity, rather than by aggregate demand. As a result, changes in aggregate demand (represented by changes in the price level) do not affect the long-run level of output or employment.

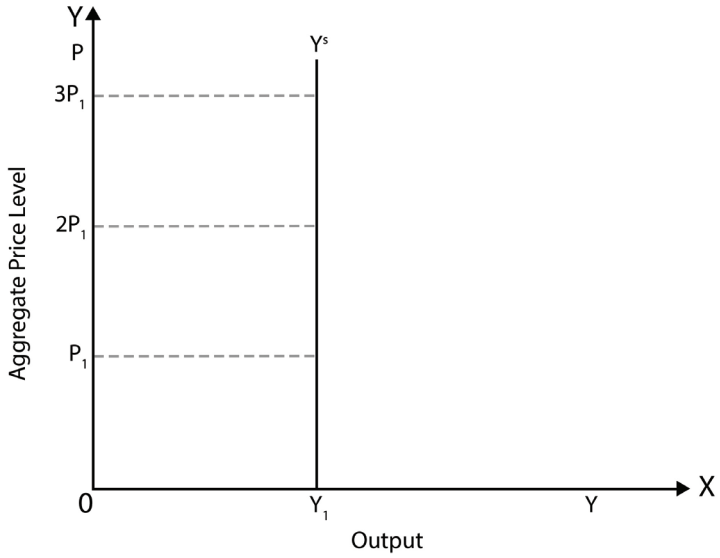

Fig. 1.1.5 Classical Aggregative Supply Curve

- Vertical aggregate supply curve

The above figure shows the classical aggregate supply function. The vertical classical aggregate supply curve shows that higher values of the price level require proportionately higher levels of the money wage for labour market equilibrium. The real wage, employment, and therefore level of output are the same at P_1, $2P_1$, and $3P_1$. The classical model shows that output and employment are determined by supply-side factors and an aggregative demand will not affect output.

1.1.2 Keynesian Theory of Employment and Output

- Effective demand

In the Keynesian theory of income and employment determination, effective demand plays a significant role. The level of aggregate effective demand determines the level of employment in an advanced capitalist economy. The higher the level of effective demand, the greater the employment within the economy. The employment decisions of an individual firm depend on the number of employees that will maximise profits for that specific firm. Similarly, at the macroeconomic level,

overall employment in the economy depends on the collective decisions of firms and entrepreneurs seeking to maximise their individual profits. The equilibrium level of employment in the entire economy is determined by the interplay between aggregate supply and aggregate demand.

1.1.2.1 Aggregate Supply Function

When entrepreneurs employ people, they incur production costs. For the employment to be worthwhile, the revenue generated from selling the output produced by these workers must exceed the associated production costs; otherwise, they will not produce and provide employment to labour. Therefore, the aggregate supply price represents the total revenue that all entrepreneurs in the economy collectively anticipate receiving from selling the output produced by the employed labour force at any given level of labour employment. Keynes's aggregate supply function (curve) shows the relationship between the number of workers employed and the receipts that all firms in the economy must get if it is just worth employing them with prices remaining constant. The ultimate determinants of the aggregate supply curve are the physical and technical conditions of production, including capital stock, the state of technology, and the nature of the production function. However, in the short run, these physical and technical conditions remain constant. Consequently, given these technical conditions, an increase in the output level can only be achieved by raising the employment of labour. However, as output and employment increase, additional costs of production are incurred. Therefore, entrepreneurs will hire more workers only if they anticipate receiving greater revenue to offset the rising costs. This is why the aggregate supply curve slopes upward to the right.

- Upward slope aggregate supply curve

Once the economy has attained full employment, signifying that all available workers are employed, any additional increase in aggregate demand or monetary expenditure becomes ineffective in boosting employment. This is because the production of goods and services cannot be further expanded when full employment is already achieved and no additional labour is available for production. Consequently, the aggregate supply curve takes on a vertical shape after reaching full employment, indicating the limit to the economy's ability to increase output and employment beyond this point.

- Vertical aggregate supply curve after reaching full employment

1.1.2.2 Aggregate Demand Function

- Aggregate demand varies with the income

In the determination of employment, the aggregate demand function plays a crucial role. Aggregate demand price refers to the total amount of money that all firms or entrepreneurs in the economy expect to receive from the sale of output produced by the employed workers at any level of employment. The expenditure anticipated when a specific number of workers is employed to produce goods and services is referred to as the aggregate demand price. Like the aggregate supply price, the aggregate demand price varies at different employment levels due to variations in income levels and expenditures, especially consumption expenditure. This is because at different levels of employment, different income levels would be generated, and at different income levels, consumption demand would be different. Therefore, the aggregate demand prices show different aggregate demand prices at different levels of employment.

- Components of aggregate demand influence output and employment level

Aggregate demand has the following four components viz: Consumption demand, Investment demand, Government expenditure, and Net Exports that is, Exports - Imports. In the short run, consumption demand is influenced by both the propensity to consume and disposable income. The community's propensity to consume tends to remain relatively stable during this period, resulting in a consistent consumption function that correlates consumption demand with income levels. On the other hand, investment demand is determined by the rate of interest and the marginal efficiency of capital. According to Keynes, the rate of interest is influenced by the supply of money and liquidity preference, while the marginal efficiency of capital depends on entrepreneurs' profit expectations and the replacement cost of capital. Keynes emphasises that, although the rate of interest tends to be somewhat fixed, it is the frequent changes in entrepreneurs' profit expectations, reflecting shifts in the marginal efficiency of capital, that lead to substantial fluctuations in investment. This high volatility in investment demand can contribute to periods of recession or depression when investment declines and periods of boom and prosperity when investment significantly increases.

1.1.2.3 Determination of Employment by Effective Demand

- Effective demand equilibrium occurs at aggregate demand and supply equals

In the Keynesian employment theory, the short - run level of employment in an economy is determined by effective demand. Effective demand is the aggregate demand price that becomes 'effective' when it aligns with the aggregate supply price, marking a point of equilibrium. Effective demand occurs, where the aggregate demand equals aggregate supply. While there are numerous points on the aggregate demand curve, effective demand is at the equilibrium point where the aggregative demand is equal to the aggregative supply. At all other points, the aggregate demand price is either greater or lesser than the aggregate supply price. A higher level of effective demand corresponds to a greater volume of employment, whereas unemployment results from a deficiency in effective demand. To address unemployment, the primary remedy is to raise the level of effective demand. Let us explain these concepts with the help of a figure:

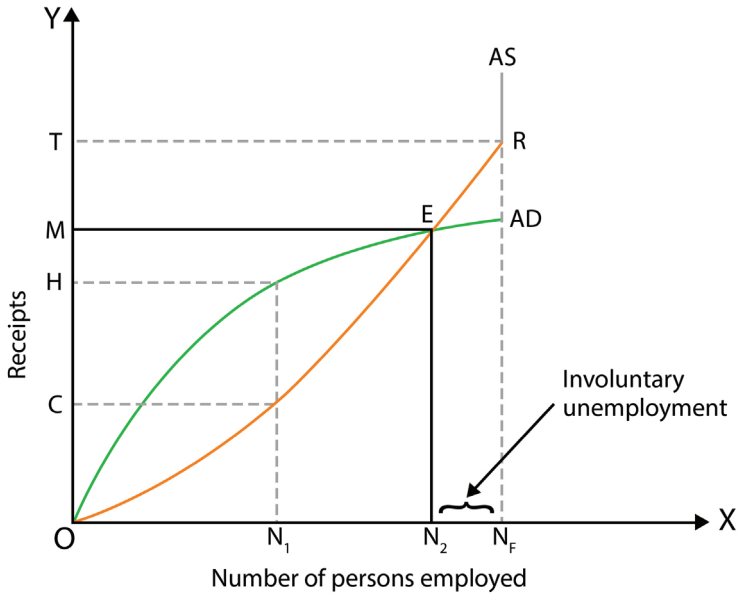

Fig. 1.1.6 Determination of Employment

The X-axis represents the amount of employment and the Y-axis represents the receipts or proceeds at various employment levels. At the level of ON_1 persons employed,

the aggregate demand price OH exceeds the aggregate supply price OC, leading entrepreneurs to continue employing additional workers. The intersection of the aggregate supply curve and aggregate demand curve at point E determines the level of ON_2 employment. Below ON_2, the aggregate demand curve AD lies above the aggregate supply curve AS, indicating profitability in expanding employment. However, beyond ON_2 employment, the aggregate demand curve AD lies below the aggregate supply curve AS, signifying that employing extra worker is no longer profitable. Hence, ON_2 is the equilibrium level of employment, determined by the intersection of the aggregate demand curve AD and aggregate supply curve AS.

- Equilibrium level of employment, determined by the intersection between the AD and AS

1.1.2.4 Underemployment Equilibrium

The level of employment at equilibrium does not always correspond to full employment. The equality between aggregate demand and supply does not always reach maximum employment. The economy can achieve equilibrium at less than full employment, indicating an underemployment equilibrium. Classical economists rejected the possibility of equilibrium below full employment, believing that supply would automatically generate its corresponding demand, eliminating any deficiency in aggregate effective demand. However, Keynes challenged this classical perspective. After the equilibrium point, if aggregate demand is less than aggregate supply, it implies a situation of excess labour supply. In this scenario, individuals are willing to work at the prevailing wage rate, but they are unable to find jobs because the aggregate demand for labour from the side of firms is not sufficient or profitable. This condition often leads to involuntary unemployment where there is an imbalance between the number of individuals seeking employment and the number of available job opportunities in the market. It is crucial to note that, according to Keynes, this unemployment arises due to a deficiency in aggregate demand. Keynes says that when investment demand falls short of the gap between full-employment income and consumption, a recession occurs, resulting in the emergence of involuntary unemployment. In his view, a decline in the inducement to invest in capitalist countries, attributed to a decrease in the marginal efficiency of capital (i.e., expected rate of profit), leads to a reduction in aggregate demand. Consequently, an equilibrium is established at a level below full employment, causing a decline in the

- Demand deficiency

output and income of the community. Let us explain with the help of a figure:

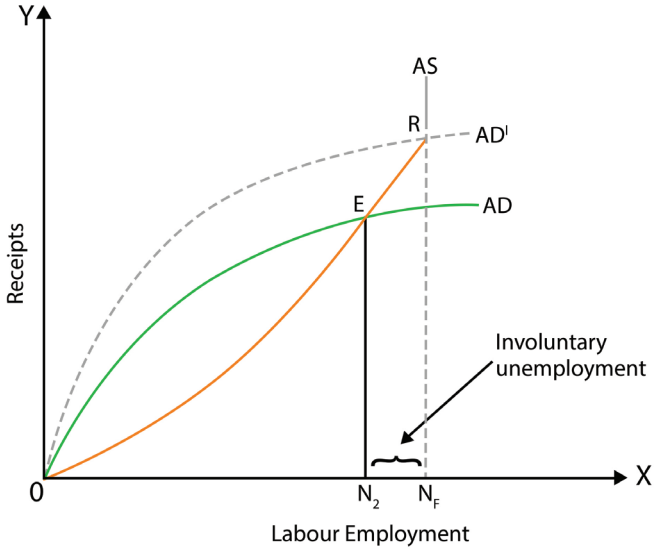

Fig. 1.1.7 Rasing Aggregate Demand for Achieving Full Employment

In the above figure, the equilibrium situation is at employment level ON_2, with N_2N_F individuals experiencing involuntary unemployment. To achieve full-employment equilibrium and eliminate this unemployment, an upward shift in the aggregate demand curve is essential. Consequently, the aggregate demand curve shifts from AD to AD', leading the economy to reach full employment where the aggregate demand curve intersects with the aggregate supply curve at point R. At this point, equilibrium is established at the full-employment level ON_F, effectively resolving the issue of involuntary unemployment in the economy.

- Solution for involuntary unemployment

1.1.2.5 Income Determination

In the short run, the levels of national income and employment in a free-market economy depend upon the equilibrium between aggregate expenditure and aggregate output. Here, we elucidate the concept of aggregate supply and the factors influencing it. It is important to note, as Keynes did, that price and wage stability is assumed in the short run.

In the Keynesian two-sector model, the equilibrium level of national income is determined through the intersection of aggregate demand and aggregate supply curves. Typically,

goods and services are produced by firms based on their anticipation of selling them in the market. Equilibrium in the goods market is attained when the total output of goods and services equals the total demand for output. Aggregate demand for them is represented by aggregate expenditure. In equilibrium, aggregate expenditure (which is denoted by AE) must equal aggregate output (GDP). Since aggregate output or GDP equals national income (Y), we have the following condition for equilibrium:

$$AE = GDP = Y$$

When aggregate demand exceeds aggregate supply, resulting in excess demand, firms address this situation by selling goods and services. This process continues until reaching the equilibrium level of national income. Conversely, if the aggregate demand falls short of aggregate supply, leading to a deficiency in demand, firms respond by reducing production to maintain their inventories at desired levels. This reduction in output, driven by deficient demand, continues until the equilibrium level of national income is reached, where aggregate expenditure (C + I) equals the value of aggregate output. Now, let us explain how the equilibrium level of national income is determined in Keynes's two-sector model through the intersection of aggregate demand and aggregate supply curves with the help of diagram:

- Equilibrium level of national income occured at the intersection point of AD and AS

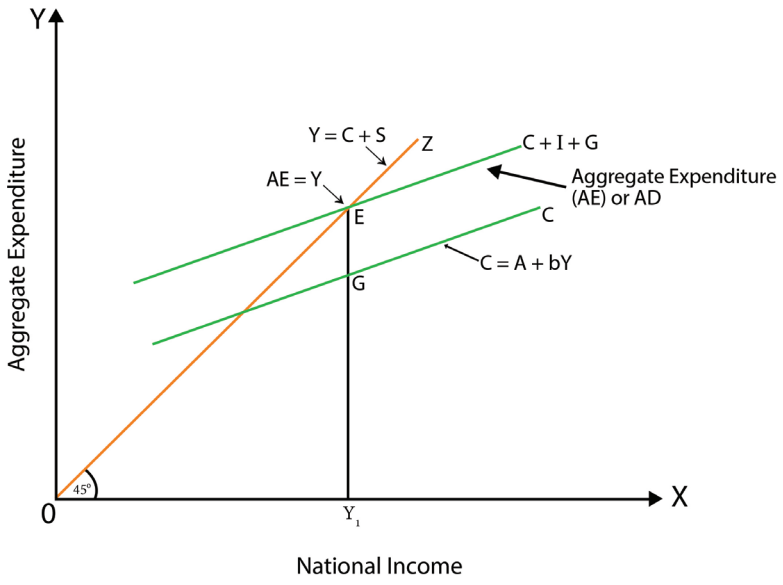

Fig. 1.1.8 Determination of National Income or Output of Simple Keynesian two Sector Model

- Aggregate expenditure equals aggregate output

In the depicted figure, the C + I curve symbolises aggregate expenditure (AE), while the 45° 0Z line signifies aggregate supply of output. The intersection of the aggregate expenditure curve (AE) or C + I curve with the 45° line occurs at point E, fulfilling the equilibrium condition. At this equilibrium point, corresponding to the income level OY_1, aggregate expenditure equals aggregate output. Therefore, E marks the equilibrium point, and OY_1 designates the equilibrium level of national income. National income cannot be in equilibrium at levels below OY_1, as the aggregate expenditure surpasses the aggregate supply of output, illustrated by the C + I curve lying above the 45° line. This excess demand is addressed by firms by selling goods and services, a process that continues until reaching the national income level OY_1. Conversely, the equilibrium level of national income cannot exceed OY_1; at levels beyond OY_1, aggregate expenditure or demand (C + I) falls short of aggregate output. In response, firms reduce production to maintain their inventories at desired levels. Therefore, a deficiency in aggregate demand relative to aggregate supply leads to a decline in national income and output until reaching the equilibrium level OY_1, where aggregate expenditure (C + I) equals the value of aggregate output. Thus, OY_1 stands as the equilibrium level of national income.

Summarised Overview

In the classical model, the aggregative production function holds a central role in determining output and employment in an economy. In the short run, the capital stock is fixed, and technology and population remain constant throughout the period. The output varies with variations in labour input, with the quantity of labour employed determined by the market forces of demand and supply in the labour market. The assumption is of a well-functioning market where firms and individuals optimise, having perfect information about relevant market prices. Therefore, there are no barriers to adjusting money wages. In the labour market, the demand for labour is based on the Marginal Product of Labour. Firms will continue to hire more labour until they achieve maximum profit. Profit maximisation is attained when the real wage rate equals MPN. Regarding labour supply, it is determined by the real wage. People are willing to work more when the real wage is higher. This is because a higher real wage means giving up more leisure time, resulting in more income, and making leisure more expensive in terms of forgone earnings. The classical theory suggests that the Equilibrium of Output and Employment is determined at the point where the demand for labour equals the supply of labour. Supply-side factors determine output and employment levels. The classical theory of

output and employment was severely criticised by Keynes who formulated a new one. The Keynesian theory of employment and output emphasizes the role of effective demand in determining the level of employment in an economy. Unlike classical economists who believed in the automatic adjustment of supply and demand, Keynes argued that the equilibrium level of employment could fall below full employment. The level of aggregate effective demand determines the level of employment. Equilibrium occurs when aggregate demand equals aggregate supply. The economy can reach equilibrium at less than full employment, leading to underemployment. This challenges the classical assumption of full employment equilibrium. To address unemployment, the primary solution is to increase effective demand. This can be achieved through government intervention, such as fiscal policy or monetary policy. Keynes introduced the concept of involuntary unemployment, where individuals are willing to work but cannot find employment due to insufficient demand from firms. In the Keynesian two-sector model, equilibrium national income is determined by the intersection of aggregate demand and aggregate supply curves. Equilibrium in the goods market is achieved when total output equals total demand

Assignments

1. Discuss the implications of the Classical and Keynesian theories for economic policy-making. Which theory provides a more suitable framework for managing employment and output in modern economies? Justify your answer.

2. Describe the Classical theory's perspective on the role of government intervention in managing employment and output levels.

3. Explain the Classical view of wage flexibility and its role in achieving full employment.

4. Compare and contrast the Classical and Keynesian theories of employment and output, highlighting their main points of disagreement.

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1. Richard T. Froyen, *Macro Economics; Theory and Policy*, Macmillan Publishing Co., New York, 1990.

2. Rosalind Levacic and Alexander Rebmann, *Macro Economics: An Introduction to Keynesian-Neoclassical Controversies*, The Macmillan Press Ltd, London.

3. Snowdown B, H. R. Vane and F. Wynarczyk, *A Modern Guide to Macroeconomics: An Introduction to Competing Schools of Thought*.

4. Mankiw, N. Gregory. (2016). *Macroeconomics*. New York: Worth Publishers.

Suggested Reading

1. Ackley G., *Macro Economics; Theory and Policy*, Macmillan, New York, 1978

2. Andrew B. Paul and Ben S. Bernanke, *Macro Economics*, Pearson Education, NewDelhi.

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4. Dasgupta, A. K. and Hagger, A. J., *The Objectives of Macro Economic Policy,* Macmillan, London, 1971.

5. Denberg, Thomas. F., *Macroeconomics: Concepts, Theories and Policies,* McGraw-Hill, New York, 1985.

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 2
IS-LM Model

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the concept of the Neoclassical synthesis
- explain the equilibrium under the IS-LM model
- grasp the effectiveness of monetary and fiscal policy in the IS-LM model.
- know the IS-LM four-sector model
- understand the importance of AD-AS Framework

Background

The Neoclassical economists made efforts to integrate Keynesian macroeconomic ideas into the Neoclassical theoretical framework. They recognised the significance of Keynesian insights regarding aggregate demand, fiscal policy, and the role of government intervention in stabilising the economy. By incorporating these ideas, Neoclassical economists aimed to refine and expand their theoretical framework to explain and analyse real world macroeconomic phenomena. This integration known as the Neoclassical synthesis, marked a significant development in the evolution of economic thought. The Neoclassical synthesis, also referred to as Neoclassical Keynesian synthesis, represents a fusion of fundamental aspects from both Keynesian and classical macroeconomics.

Neo-classical synthesis introduced the IS-LM model which effectively integrated key principles of Keynesian macroeconomics with foundational concepts from classical economics. The Hicks-Hansen IS-LM model, when incorporating the government sector, facilitates an examination of the stability in both the goods market and the labour market. The basic IS-LM model traditionally neglects the role of foreign trade. However, after the

process of globalisation, the importance of international trade has increased significantly, and it has had a notable impact on economic stability. Recognising this, the IS-LM model has been extended to incorporate the foreign trade sector, resulting in a four-sector model.

The simple open economy model developed by Robert Mundell and J. Marcus Fleming extends the basic IS-LM framework to include the foreign trade sector. The model allows economists and policymakers to analyse the interactions between exchange rates, interest rates and output in an open economy and to test the effectiveness of different fiscal and monetary policies, considering the exchange rate system in place. In macroeconomics, the IS-LM model is used to understand the behaviour aggregate demand (AD) and aggregate supply (AS) in the economy. The IS-LM model provides a framework for analysing the equilibrium levels of income, interest rates, and output in an economy. When considering issues related to the price level or inflation and their relationship to unemployment, the AD-AS framework is a useful tool.

Keywords

Neoclassical, IS-LM, Aggregate demand, Aggregate Supply, Exchange Rate, Fiscal Policy, Monetary Policy

Discussion

1.2.1 Neoclassical Synthesis

- Address the dynamic nature of short run equilibrium in the long run

The Neoclassical theory emerged as a response to the classical and Keynesian approaches and it integrated the ideas of both schools of thought that is the short-term insights from Keynesian economics with the long-term perspectives of classical economics. The Neoclassical synthesis provides a balanced framework capable of addressing both the dynamic nature of short-term economic fluctuations and the equilibrium conditions in the long run. Before the Neoclassical synthesis, two main schools of thought prevailed; they are the Classical and the Keynesian. Classical Economics mainly focuses on the idea that the economy would naturally reach full employment in its way without any government interference. The government is not involved in the decision-making process of private entrepreneurs. While Keynesian Economics suggests that sometimes the economy could be stuck with

high unemployment, and in those situations, the government should step in to boost demand and make policies to get back on track. Then, a new approach called the neoclassical synthesis came along. It combined the useful parts of both classical and Keynesian ideas. It said: let us take the short-term thinking from Keynes and the long-term thinking from classical economics and put them together.

- Neoclassical synthesis emphasises the role of government in addressing the problems of economic imbalance

The Neoclassical synthesis recognises that markets may experience short-term fluctuations, but in the long run, they tend to enhance the efficiency of free markets. From this perspective, the Neoclassical synthesis suggests that, especially during recessions, the government should intervene to stimulate the economy and address economic imbalances. This may involve implementing measures such as fiscal stimulus and adjusting monetary policies to reduce the negative impacts of economic downturns. The Neo-Classical synthesis blends ideas from both classical and Keynesian theories, recognising potential issues like rigid wages, inelastic investment demand and income fluctuations.

Neoclassical believed in two core ideas of the classical school:

1. The economy is considered inherently stable, and any deviations from full employment are viewed as temporary and correctable.

2. Full employment is both achievable and maintainable in the long run, given the functioning of free markets and the self-adjusting mechanisms of the economy.

- Integrating Classical and Keynesian ideas

The Neoclassical synthesis was developed by economists John Hicks, Franco Modigliani, and Paul Samuelson. They interpreted and formalised Keynes' concepts within the framework of classical economics. Their work, known as the Neoclassical synthesis, involved integrating Keynesian ideas with classical economic models. The central theoretical work of the Neo-classical synthesis was the famous IS-LM model.

1.2.2 IS-LM Model for Three Sector

The ISLM model is first introduced by John R. Hicks in 1937 and was further developed by Alvin Hansen. "IS" represents the relationship between investment and savings and deals

with the goods market equilibrium while "LM" represents the relationship between liquidity preference and the money supply and represents money market equilibrium. Hicks developed the initial framework, and later, Alvin Hansen further developed and refined the IS-LM model. Overall, the IS-LM illustrates the interplay between various economic factors in determining aggregate demand and equilibrium output. The IS-LM model represents a general equilibrium framework as it explains how the labour market and money market simultaneously reach equilibrium through the interaction of income and the interest rate.

- Simultaneous equilibrium attained in the labour and goods market

1.2.2.1 Money Market Equilibrium: LM Schedule

In the Keynesian model, the demand for money has a positive relationship with income due to transactional needs, while the speculative demand for money varies inversely with the rate of interest. This relation can be written as

$$M_d = L\ (Y, r)$$

where 'M_d' is the demand for money,' Y' is the income, and 'r' is the rate of interest. The LM (Liquidity Preference - Money Supply) schedule in the Keynesian model effectively describes the different combinations of interest rates (r) and income levels (Y) that lead to an equilibrium in the money market with a fixed money supply (M_0). The positive slope of the LM schedule is well-explained, linking the increase in income to higher interest rates due to changes in money demand. This can be explained with the help of a diagram:

- Combinations of interest rates and income result in money market equilibrium

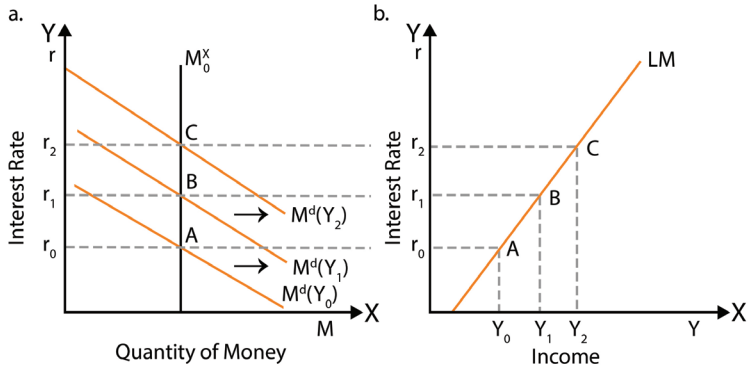

Fig 1.2.1 Equilibrium in the Money Market and the LM Schedule

- Money market equilibrium: demand for money =supply of money

In the above figure, three separate demand-for-money schedules are given corresponding to three higher levels of income, Y_0, Y_1, and Y_2. As income increases from 'Y_0 to Y_1' and then from 'Y_1 to Y_2', Demand for money increases respectively. Here, interest rate rises to equate increased demand for money with the constant supply of money. Income–interest-rate combinations at which equilibrium occurs, (Y_0, r_0), (Y_1, r_1), and (Y_2, r_2), are points along the LM, or money market equilibrium, schedule. These points are plotted in Figure 'b'. Arranged in this manner, we can find the equilibrium value of the interest rate for each level of income and construct the complete LM schedule shown in Figure 'b'.

- Upward sloping LM schedule

We get the upward slopes LM schedule to the right when we connect the income and rate of interest points, which means that at higher income levels, equilibrium in the money market occurs at higher interest rates.

A. Slope of the LM Schedule

The slope of the LM curve is determined by two main factors. They are:

1. Income elasticity
2. Interest rate elasticity

- Steep and flat LM curve

In the context of the LM (Liquidity-Money) schedule, the term Income elasticity refers to the responsiveness of money demand to changes in income. A greater responsiveness of money demand to changes in income indicates a higher income elasticity, resulting in a steeper slope of the LM curve. Conversely, lower responsiveness of money demand to changes in income indicates lower income elasticity, leading to a flatter slope of the LM curve.

The slope of the LM curve is influenced by interest elasticity. If interest elasticity is low, it means that even small changes in the demand for money require a large change in interest rates and we get the steeper LM curve. On the other hand, if interest elasticity is high, the LM curve is flatter, indicating that changes in the demand for money are more responsive to smaller variations in interest rates and we get the flatter LM curve.

B. Shift of the LM Schedule

Two factors can shift the LM schedule: the first one is changes in the fixed money supply determined exogenously and the second one is change in the money demand function.

i. Changes in Fixed Money Supply

The LM curve shifts to the right with an increase in the quantity of money. On the other hand, the LM curve shifts to the left with a decrease in the quantity of money.

ii. Change in the Demand Function

The LM schedule shift with a change in the money demand function at a given level of income and rate of intrest. The LM schedule shift upwards to the left with an increase in the demand for money. On the other hand, the LM schedule shifts downward to the right with a decrease in the demand for money.

1.2.2.2 Product Market Equilibrium: IS Schedule

The IS (Investment-Saving) schedule represents the equilibrium in the product market. The equilibrium condition is given by the equation:

$$Y = C + I + G$$

- Product Market Equilibrium

which is an equivalent form of the equation,

$$I + G = S + T$$

The equation expresses equilibrium in the product market through the combination of interest rates and income. To begin, we consider a simplified case that omits the government sector (i.e., G and T equal zero). For this simple case, we can rewrite as

$$I (r) = S (Y)$$

The above equation shows that the investment (I) depends on the interest rate (r) and savings (S) depends on income (Y). Then we find the combinations of the interest rate and income that equate investment with savings with the help of figures.

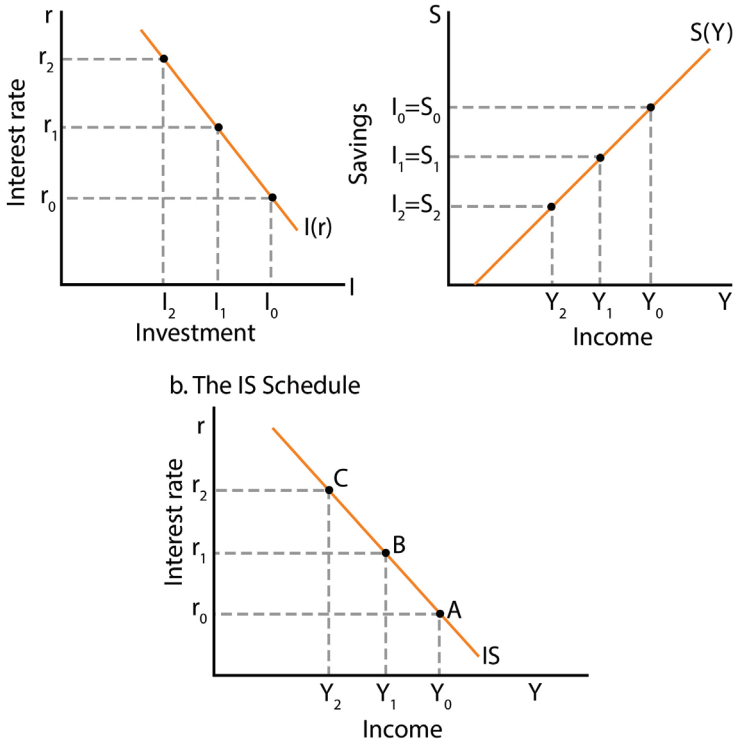

Fig 1.2.2 Construction of the IS Schedule (T = G = O)

- Downword sloping IS curve

The above figure represents the construction of the IS schedule. In the upper panel figure, the investment is a negatively sloped function of the interest rate, signifying that a decrease in the rate of interest leads to an increase in investment expenditures. On the other hand, savings is described as a positively sloped function of income, with the slope representing the positive marginal propensity to save (MPS). Let us focus on a specific interest rate, denoted as 'r_0'. At this interest rate level, the amount of investment is 'I_0', Simultaneously, an amount of savings equal to 'I_0'is depicted as 'S_0 'along the savings function. This level of savings is attained when income is at 'Y_0. Consequently, for the interest rate 'r_0 a point of equilibrium in the product market is reached at Y_0 .This specific interest-rate–income combination, denoted as Y_0 r_0 serves as one point on the IS schedule and is marked as point A in Figure b. This graphical representation elucidates the relationship between interest rates and income that characterises equilibrium in the product market. At interest rates r_0, r_1, and r_2, investment

levels will be I_0, I_1, and I_2, respectively. To generate savings equal to these levels of investment at income levels Y_0, Y_1, and Y_2, respectively, in the upper panel. In part B of the figure (lower panal) interest-rate–income combinations (r_0, Y_0), (r_1, Y_1), and (r_2, Y_2) represent points A, B, and C, respectively. These points depict the equilibriums in the product market and Joining these points we get the downward-sloping IS curve.

A. Slope of the IS Schedule

- Slope of IS curve related to the interest elasticity of investment demand and MPS

The steepness of the IS schedule is closely related to the interest elasticity of investment demand. If the investment is not very sensitive to changes in the interest rate, it means that the interest elasticity of investment demand is low. In this case, we get a very steep IS curve. If the investment is highly responsive (high-interest elasticity), the IS schedule will be flatter. An extreme case is when the interest elasticity of investment is zero, making the investment schedule and IS schedule vertical. In this case, a change in the interest rate does not affect investment, and the product market equilibrium requires the same savings and income levels at different interest rates. The presence of another factor affecting the slope of the IS schedule is the saving function. A higher Marginal Propensity to Save (MPS) results in a steeper saving function. If the MPS is relatively high, a smaller increase in income is needed to generate this additional savings compared to a scenario with a lower MPS.

B. Shift of the IS Schedule

The IS schedule's position is changed when any or all of the components of autonomous expenditures change: taxes (T), investment (I) and government spending (G).

i. Autonomous Change in Investment

- Higher investment shift the IS to right

Autonomous changes refer to shifts in the investment schedule against the interest rate. For instance, if there is a positive change in expectations about the future profitability of investment projects, it results in an increased demand for investment at each interest rate, pushing the investment and government spending schedule to the right. This rightwards shift in the I(r) schedule, equivalent to the autonomous increase in investment, has a similar impact on the IS schedule.

ii. Change in Taxes

- Higher tax shift the IS curve into the left

When the government changes the tax rate, it influences disposable income and, consequently, savings and consumption. An increase in taxes leads to decreases in the disposable income by the amount of the tax increase. This reduction in disposable income leads to a decrease in savings, moderated by the marginal propensity to save (MPS). Therefore, the decline in savings is less than the increase in taxes, resulting in a net reduction in savings. This reduction in savings implies a decrease in overall demand in the economy, affecting the equilibrium level of income and output. A rise in taxes leads to a leftward shift of the IS curve.

iii.Changes in Government Spending

- Decrease the government spending shift the IS curve to the left

When an increase in government spending can lead to an upward shift in the IS curve, reflecting the relationship between real output (or income) and the interest rate. Higher government expenditures contribute to increased overall demand in the economy, leading to a higher level of real output at any given interest rate. Conversely, a decrease in government spending might lead to a downward shift in the IS curve, as reduced government expenditure contributes to a decrease in overall demand and a lower level of real output at any given interest rate. Therefore, increase in the government spending shifts IS curve to the right and vice versa

1.2.2.3 General Equilibrium Model

The attainment of equilibrium in both the money and capital markets occurs at the intersection of the IS and LM curves through the interaction of income and the interest rate. This intersection represents a simultaneous balance in both markets, indicating a state of general equilibrium. Let us explain it with the help of a figure:

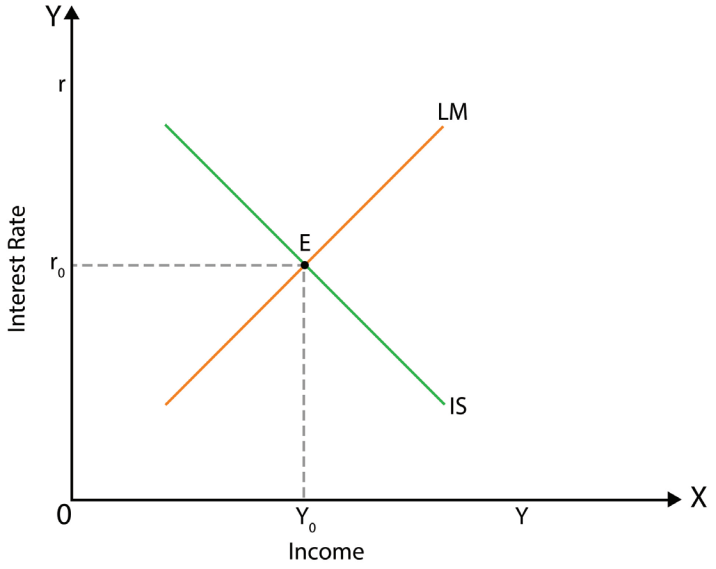

Fig 1.2.3 General Equilibrium

- General equilibrium represents the simultaneous equilibrium at goods and money market

The upward-sloping LM schedule represents equilibrium points for the money market, while the downward-sloping IS schedule represents equilibrium points for the product market. The intersection of these two schedules, labelled point E in the figure, signifies the sole point of general equilibrium for both markets. If the money market is in equilibrium, the bond market must also be in equilibrium. Therefore, the interest rate as r_0 and the income level as Y_0 at the intersection of the IS and LM schedules in the figure create simultaneous equilibrium for the money market, product market, and bond market.

1.2.3 Relative Effectiveness of Monetary and Fiscal Policy

The IS curve represents the equilibrium in the goods market and shows the combinations of interest rates and output levels at which aggregate demand equals aggregate supply. The LM curve represents the equilibrium in the money market and shows the combinations of interest rates and output levels at which the demand for money equals the supply of money. The effectiveness of monetary and fiscal policies explains the changes in monetary and fiscal policy and its impact on the equilibrium level of income or output in the economy. The slopes of the IS and LM curves play a crucial role in

determining the effectiveness of these policies. Monetary Policy involves changes in the money supply or interest rates by the central bank. The effectiveness of monetary policy depends on the slope of the LM curve. If the LM curve is relatively flat, indicating that changes in interest rates have a small effect on output, monetary policy may be less effective. Fiscal Policy involves changes in government spending or taxation. The effectiveness of fiscal policy depends on the slope of the IS curve. If the IS curve is relatively steep, indicating that low interest elasticity of demand, fiscal policy may be more effective. In this section, we can explore the specific conditions under which each policy is more or less effective, considering the slopes of the IS and LM curves.

- Slope of IS and LM shows effectiveness of monetary and fiscal policy

1.2.3.1 Policy Effectiveness and the Slope of the IS Schedule

First, let us examine how the slope of the IS schedule influences the effectiveness of monetary and fiscal policy. One of the major factors determining the slope of the IS schedule is the interest elasticity of investment. The relatively flat IS schedule means that the investment demand is highly responsive to changes in interest rates, meaning that a given increase in the interest rate leads to a considerable reduction in investment. Conversely, the IS schedule will be steeper which means that the interest elasticity of investment demand is low, indicating that changes in the interest rate have a smaller impact on investment. Now let us compare the effects of monetary and fiscal policy on income under conditions of both a steep and a flat IS schedule. For this comparison, the monetary policy action involves an increase in the money supply, while the fiscal policy action entails an increase in government spending. Let us explain them one by one.

- Policy effectiveness of IS schedule

A. Monetary Policy Effectiveness and the Slope of the IS Schedule

First, we consider the consequences of an increased money supply, the expansion in the money supply causes a shift in the LM schedule. If the IS schedule is steep, it indicates a low interest elasticity of investment. In this situation, monetary policy is relatively ineffective because the increase in income is minimal in response to the expanded money supply.

- Steep IS schedule

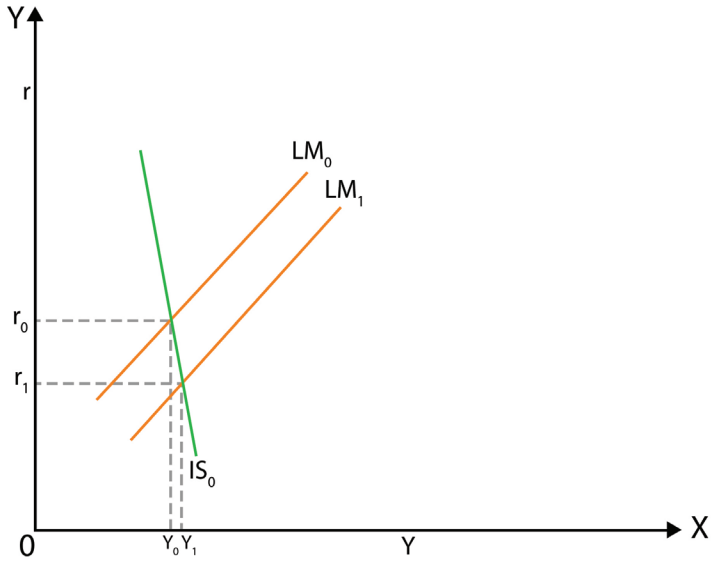

Fig 1.2.4 Steep IS Curve

- Monetary policy ineffective when the IS curve is steep

The above figure explains the case of a steep IS curve in the IS-LM model. When the monetary authority implements a monetary policy that results in increasing the money supply, the LM curve shifts from LM_0 to LM_1. However, due to the steepness of the IS curve, this results in a notable increase in the interest rate from r_0 to r_1 but only a small change in income from Y_0 to Y_1. Even though the interest rate moves significantly, the impact on income is not as large. This suggests that when the IS curve is steep, changes in monetary policy may not affect income.

- Monetary policy is more effective when IS curve is flatter

Secondly, we describe the case of the IS curve being flatter. Here the relationship between the interest rate and the level of investment is more elastic, which means that changes in the interest rate have a greater impact on investment. Under monetary policy, when the monetary authority increases the money supply, it typically leads to a decrease in the interest rate. If the IS curve is flatter, it means that even a relatively small change in the interest rate can result in a more substantial change in investment. So, we can say that monetary policy is more effective in this situation.

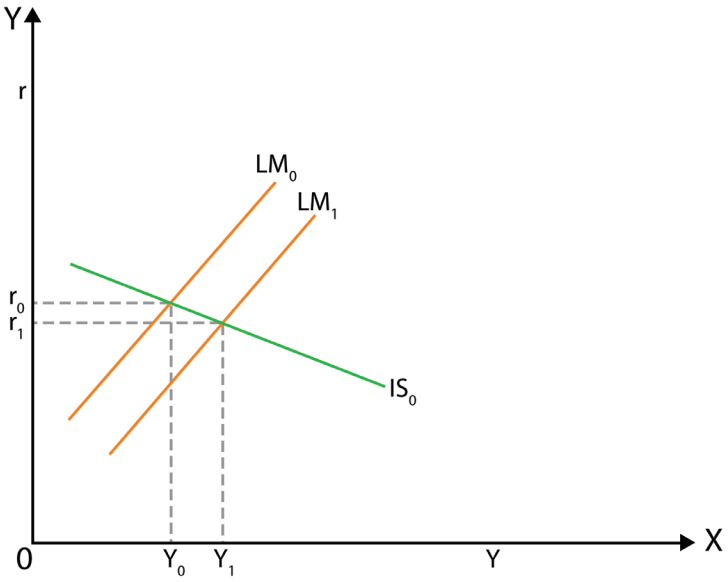

Fig 1.2.5 Flat IS Curve

- Small changes in interest rate leads to greater change in income

Due to the increased money supply, the LM curve shifts to the right from LM_0 to LM_1. In the context of a flatter IS curve, monetary policy is directly related to the degree of interest elasticity of investment. Consequently, even a slight change in the interest rate, shifting the rate of interest from 'r_0' to 'r_1', can have a greater impact on income from 'Y_0' to'Y_1'. Therefore, we can assert that monetary policy is more effective in the case of a flatter IS curve.

- Vertical 'IS' curve

In the case of a vertical IS curve, where the interest elasticity of demand is zero, it signifies that investment is entirely unresponsive to changes in the interest rate. If the IS schedule is vertical and the monetary authority raises the money supply, the interest rate falls until the increased money demand restores equilibrium in the money market. However, there is no subsequent change in income. To enhance income, the increase in the money supply and the resulting decline in the interest rate must stimulate investment.

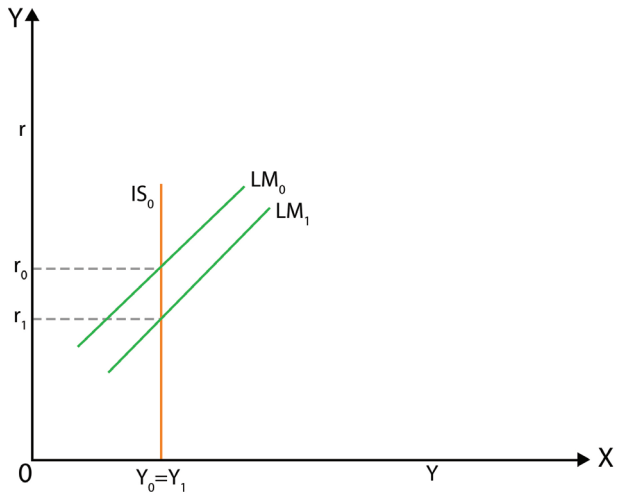

Fig. 1.2.6 Vertical 'IS' Curve

- Monetary policy is ineffective when IS curve is vertical

As a result of the monetary policy, the LM curve shifts to LM_1, and the interest rate falls from r_0 to r_1; however, there is no subsequent change in income. In the case of a vertical IS curve, where the interest elasticity of demand is zero, it indicates that investment is entirely unresponsive to changes in the interest rate. Therefore, monetary policy is ineffective in stimulating a change in income under these conditions.

B. Fiscal Policy Effectiveness and the Slope of the IS Schedule

Fiscal policy refers to government actions related to taxation and spending to influence the economy. The effectiveness of fiscal policy is influenced by the shape of the IS (Investment - Saving) curve. Fiscal policy tends to be more effective when the IS curve is steep, but its impact diminishes when the IS curve is flat.

- Fiscal policy and Steep IS curve

When the IS curve is steep, indicating a low interest elasticity of investment, meaning that investment is less responsive to changes in interest rates, fiscal policy becomes more effective. This is because changes in government spending have a significant impact on income and the economy is less influenced by fluctuations in interest rates. The rise in interest rates resulting from increased income leads to a decline in private investment, partially offsetting the expansionary effect of government spending. This effect, known as "crowding out," occurs when increased government spending reduces

private investment. When IS is steep and investment is not very sensitive to change in interest rate, interest rate rise will cause small dropping investment and income increases all most full amount of shift in IS schedule. Therefore, fiscal policy is most effective in the case where the IS curve is steep.

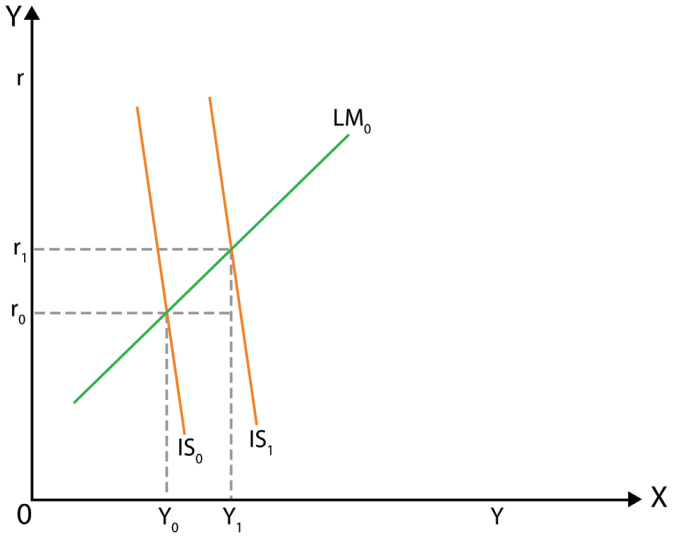

Fig. 1.2.7 Steep 'IS' Curve

- Fiscal policy more effective where the IS schedule is steep

In the figure, an increase in government spending shifts the IS schedule to the right from IS_0 to IS_1. Here, where the IS schedule is steep, indicating a low-interest elasticity of investment. This expansionary fiscal policy action leads to a notably large increase in income from Y_0 to Y_1. The steepness of the IS curve suggests that investment is less responsive to changes in interest rates, making fiscal policy more effective in influencing overall income.

A flat IS curve means that investment is highly responsive to small changes in interest rates. In this scenario, fiscal policy becomes less effective. When the government increases spending, it boosts overall demand in the economy. However, the flat IS curve suggests that this increased demand might lead to higher interest rates. The sensitivity of investment to interest rates can partially offset the planned impact of fiscal policy. For instance, higher government spending may increase demand, but if it also starts a notable rise in interest rates, it could discourage private investment. This highlights the challenge of achieving the full intended effects of fiscal policy in an environment with a flat IS curve.

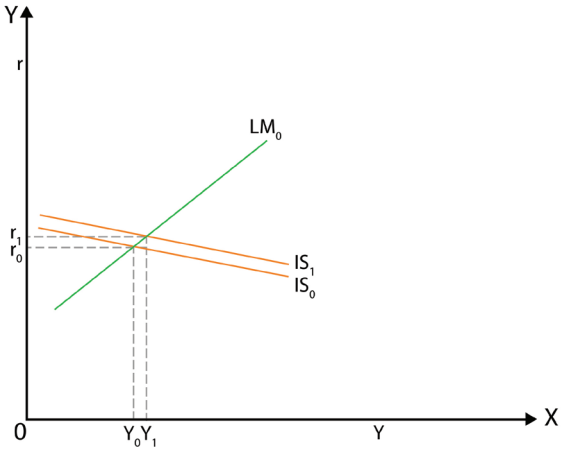

Fig 1.2.8 Flat 'IS' Curve

- Fiscal policy less effective when there is a flat IS curve

The above figure illustrates the impact of fiscal policy effectiveness when the IS curve is relatively flat. The 'IS' curve shifts to the right from 'IS_0' to 'IS_1' due to increased government spending, leading to a subsequent rise in interest rates from 'r_0' to 'r_1'. In this scenario, crowding out occurs as private investment decreases, resulting in a very small increase in income from 'Y_0' to 'Y_1'.

- Fiscal policy is most effective IS curve is vertical

In a situation with a vertical IS curve, investment is entirely insensitive to changes in interest rates, meaning that changes in interest rates have no effect on investment levels. Consequently, an increase in government spending directly stimulates aggregate demand by injecting money into the economy, leading to higher levels of consumption and investment. Therefore, increased government spending can fully stimulate economic activity without negatively impacting private investment under a vertical IS curve, which means there is no crowding-out effect. Thus, fiscal policy is considered effective in this scenario.

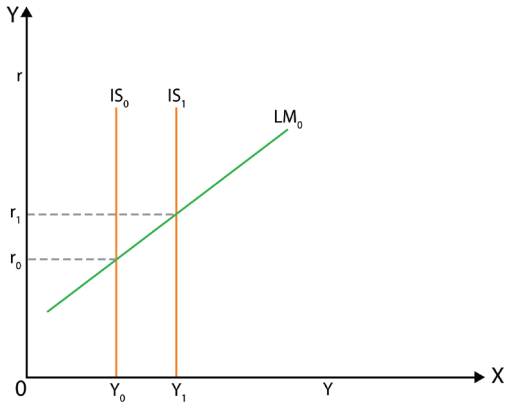

Fig. 1.2.9 Vertical 'IS' Curve

In the case of a vertical IS schedule, investment is entirely insensitive to changes in interest rates. When government spending increases, IS curve shift to IS_1 the interest rate rises from r_0 to r_1, and there is no crowding out of the investment. Income increases by the same amount of the rate of interest that is Y_0 to Y_1. So, we can say that Fiscal policy is the most effective.

1.2.3.2 Policy Effectiveness and the Slope of the LM Schedule

In this section, we explore how the effectiveness of fiscal and monetary policies depends on the slope of the LM schedule and in that way emphasising its dependence on the interest elasticity of money demand.

A. Fiscal Policy Effectiveness and the Slope of the LM Schedule

In analysing the effectiveness of fiscal policy, we mainly focus on the relationship between shifts in government spending and the slope of the LM schedule. In this study there are three distinct situations reflecting varying degrees of interest elasticity of money demand.

- Fiscal policy is considered effective when LM curve is flat

In the first case, a flat LM curve indicates a higher interest elasticity of money demand, where the quantity of money demanded is more responsive to changes in interest rates. In the context of fiscal policy and the LM curve, higher interest elasticity of money demand implies that adjustments in interest rates have a more significant impact on the demand for money, affecting the overall effectiveness of fiscal policy. Due to the expansionary fiscal policy having a considerable impact on income, the rise in income leads to an increase in the interest rate, causing only a small decline in investment. Consequently, income rises significantly, and the crowding-out effect on private investment is minimal. Therefore, fiscal policy is considered effective in this scenario.

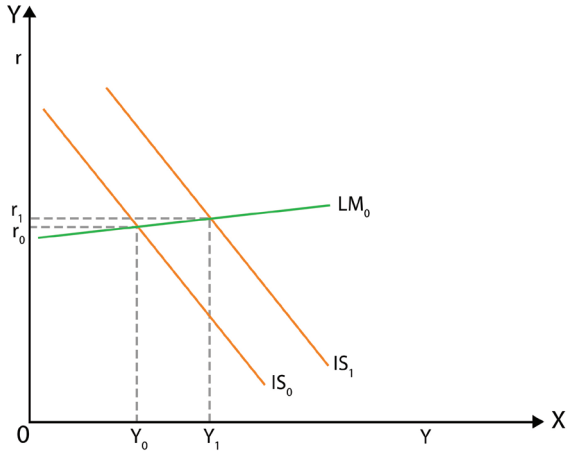

Fig. 1.2.10 Flat 'LM' Curve

- Fiscal policy is effective in the case of a flatter LM curve

When the government increases expenditure, the IS_0 curve shifts to IS_1, resulting in a small rise in the interest rate from r_0 to r_1. Accompanied by this, there is an increase in income from Y_0 to Y_1. Here, the crowding out effect is minimal, so the increased income is larger than the increased rate of interest. So, we can say that the fiscal policy is effective in the case of a flatter LM curve.

- Fiscal policy is ineffective if LM schedule is Steep

In the next case the LM schedule is steeper, it indicates a lower interest elasticity of money demand where the quantity of money demanded is less responsive to changes in interest rates. In this case, the fiscal policy is less effective. The steeper LM schedule requires a more significant rise in the interest rate. This heightened increase in the interest rate induces a more substantial decline in investment and there is a small increase in the rate of income is smaller than the increased rate of interest so we can say that fiscal policy is ineffective.

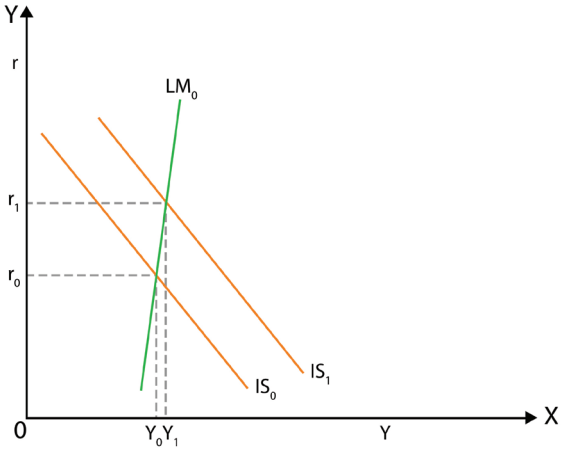

Fig. 1.2.11 Steep 'LM' Curve

- Fiscal policy is ineffective if LM schedule is steep

The above figure shows that due to the expansionary fiscal policy the IS curve shifts to the IS_1. Here the LM curve requires a higher rate of interest to maintain the money market equilibrium; so, the rate of interest rises from 'r_0 to r_1 and enhances the income level from 'Y_0 to Y_1'. However, the increased income is less than the increased rate of interest. Therefore, the fiscal policy is ineffective.

- Vertical LM schedule

If we have a vertical LM schedule, the demand for money is completely interest elastic, where money demand is entirely insensitive to interest rate changes. In this scenario, increase in government spending does not affect equilibrium income due to complete crowding out.

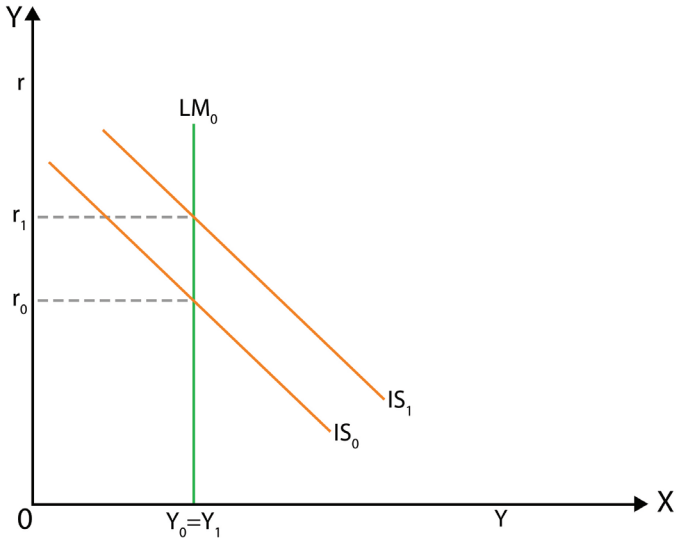

Fig. 1.2.12 Vertical 'LM' Curve

- Fiscal policy is ineffective when LM curve is vertical

The above diagram shows that in the case of the vertical 'LM' curve, the authority uses the expansionary fiscal policy that will shift the IS curve from 'IS_0 to IS_1. As a result, the interest rate rises from 'r_0 to r_1, but the income lies at the initial stage. So, we can say that fiscal policy is ineffective in the case of a vertical 'LM' curve.

B. Monetary Policy Effectiveness and the Slope of the LM Schedule

When the money supply increases, it creates an excess supply of money. At the initial level of income and interest rate, this excess money causes the interest rate to fall. As a result, the

investment rises and consequently, the level of income is increased. The interest rate declines to a particular point where the combination of lower interest rates and higher income levels leads to an increased demand for money, balancing out the initial increase in the money supply. In this section, we illustrate the consequences of an increase in the money supply when the LM schedule is relatively flat, steeper and vertical.

- LM schedule is relatively flat

When the 'LM' schedule is relatively flat, it indicates a high-interest elasticity of money demand. This means that the quantity of money people want to hold is very responsive or sensitive to changes in the interest rate. When the money supply increases, the interest rate falls, leading to increased investment and, consequently, a higher level of income in the economy. So we can say that monetary policy is less effective.

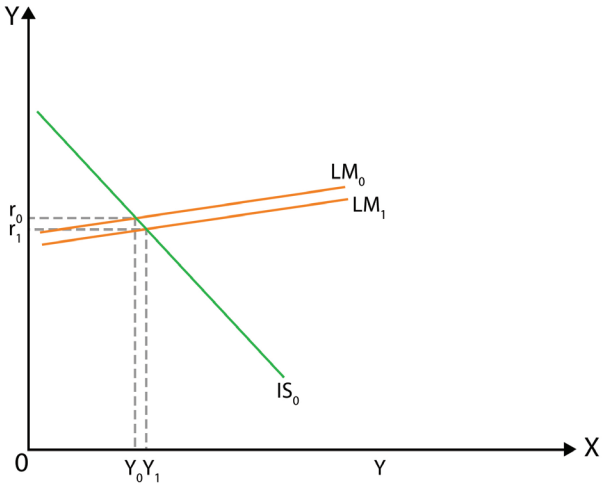

Fig. 1.2.13 Flat 'LM' Curve

- Monetary policy is less effective when LM schedule is relatively flat

When the money supply increases, shifting the LM_0 curve to LM_1, the interest rate falls from r_0 to r_1. This decrease in interest rates stimulates increased investment, causing the level of income to shift from Y_0 to Y_1. Monetary policy is less effective in this scenario.

- Steep LM schedule

When the LM schedule is steeper, indicating lower interest elasticity, people desire to hold a smaller quantity of money and are less responsive to changes in the interest rate. With lower interest elasticity, a more significant drop in the interest rate is necessary to restore equilibrium in the money market following an increase in the money supply. Consequently, there is a greater increase in investment that leads to a higher level of income. Here the monetary policy is more effective.

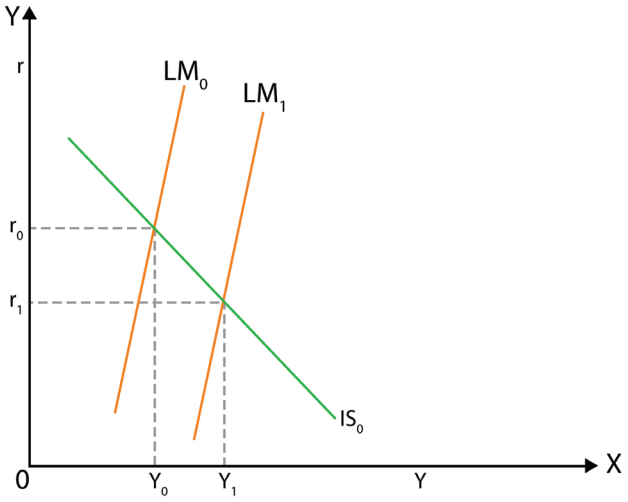

Fig. 1.2.14 Steep 'LM' Curve

- Monetary policy is effective when the LM schedule is steeper

When the money supply increases, causing the LM curve to shift to LM_1, the interest rate falls from r_0 to r_1. This, in turn, results in an increase in income from Y_0 to Y_1. Therefore, we can conclude that monetary policy is more effective in the case of a steep LM curve.

- Vertical LM schedule

When the LM schedule is vertical, indicating interest elasticity of money demand is zero, people's desire to hold money does not change at all in response to changes in the interest rate. But, in this case, the fall in the interest rate does not make people want more money because their demand for money does not depend on the interest rate. However, the lower interest rate does encourage more investment and boosts income. Therefor we can say that monetary policy is effective.

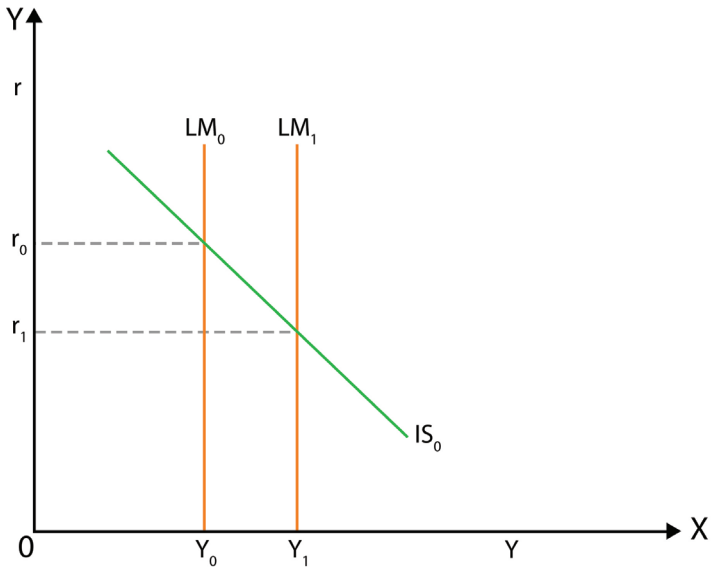

Fig. 1.2.15 Steep 'LM' Curve

- Monetary policy is most effective when the LM schedule is vertical

When the monetary authority increases the money supply, it shifts the LM curve from LM_0 to LM_1. In the case of a vertical LM curve, the interest rate falls from r_0 to r_1 due to the increase in the money supply. As a result, there is a higher level of investment, leading to a rise in income from Y_0 to Y_1. Therefore, we can conclude that monetary policy is most effective when LM is vertical.

1.2.4 IS-LM Four Sector Model

- IS-LM four-sector model associated with the name of Mundell and Fleming

In this section, we explain how economies interact with each other and explore the impact of policies, such as spending and money management. We aim to understand how things change when countries trade and move money around. To guide us through this, we will be using the Mundell–Fleming model. This model is named after its creators Robert Mundell and Marcus Fleming. Robert Mundell authored 'Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates,' published in the Canadian Journal of Economics and Political Science. Marcus Fleming contributed with 'Domestic Financial Policies Under Fixed and Under Floating Exchange Rates,' published in the International Monetary Fund Staff Papers.

1.2.4.1 IS-LM and BOP Schedules

The closed economy IS-LM model includes only two equations which are:

$$M = L(Y\, r) \text{.....} (1)$$

$$S(Y) + T = I(r) + G \text{.....} (2)$$

Equation (1) shows the money market equilibrium (LM) and Equation (2) represents the goods market equilibrium (IS schedule). The model simultaneously determines the nominal interest rate (r) and the level of real income (Y), assuming a constant aggregate price level. When we consider the open economy model, some changes may be added. It is important to note that the LM schedule remains unchanged. Equation 1 is about real money supply. Here we assume that the real money supply is controlled by the domestic policymakers and the equilibrium condition is that real money supply must be equal with the real demand for money. The nominal money supply

is that the policy maker controls, but with the assumption of a fixed price level, which means that alterations in the nominal money supply correspond to changes in the real money supply as well.

The equation for the IS schedule, as denoted by Equation 2, is typically derived from the goods market equilibrium condition, particularly for a closed economy:

$$C + S + T = Y = C + I + G \quad \text{.....(3)}$$

Where C is consumption, S is saving, T is tax, I is investment, Y is income and G is government expenditure

- Closed Economy model

which, when C is subtracted from both sides we get

$$S + T \equiv I + G \quad \text{.....(4)}$$

If we add imports (Z) and exports (X) to the model, equation (3 is replaced by is

$$C + S + T = Y = C + I + G + X - Z \quad \text{.....(5)}$$

and the IS equation becomes

$$S + T = I + G + X - Z \quad \text{.....(6)}$$

Where (X-Z) is net exports, is the foreign sector's contribution to aggregate demand. If we move imports to the left side and specify the variables depends on which each element in the equation. The open economy IS equation can be expressed as follows:

$$S(Y) + T + Z(Y,\pi) = I(r) + G + X(Y^f, \pi) \quad \text{..... (7)}$$

- Relationship between income, exchange rates, and imports

Equation 7 illustrates that savings and investment remain the same as in the closed economy model. Imports are positively dependent on income but it is inversely related to the exchange rate ((π). Imports are positively dependent on income, meaning that when income increases, people gain higher purchasing power, leading to increased purchases of goods and services, including those from other countries. That is higher imports at high levels of income. The exchange rate (π) represents the value of one currency relative to another. When the exchange rate is high, indicating that the domestic currency is strong

relative to foreign currencies, imports become relatively cheaper for domestic consumers. This is because they can exchange their domestic currency for more units of foreign currency, enabling them to purchase more imported goods and services. Conversely, when the exchange rate decreases, indicating the domestic currency weakens imports become more expensive, leading to a decrease in imported goods and services.

- Downward sloping IS schedule

In an open economy, the IS (Investment-Saving) schedule represents the combinations of interest rates and levels of income where the goods market is in equilibrium. The downward slope of the IS schedule, as depicted in Figure 1.2.16 indicates that the interest rate and investment are inversely related. When constructing the open economy IS schedule, we should keep four variables constant: taxes, government spending, foreign income, and the exchange rate. These variables can shift the schedule. Due to expansionary shocks, like an increase in government spending, a tax cut, an increase in foreign income, or a rise in the exchange rate, the' IS' schedule shifts to the right. . Conversely, changes in the opposite direction in these variables shift the IS schedule to the left.

In our open economy model, along with the IS and LM schedules, we integrate a balance of payments equilibrium schedule. This schedule illustrates interest rate–income combinations that lead to a balance of payments equilibrium under a specific exchange rate. Balance of payments equilibrium signifies that the official reserve transaction balance is zero. The equation for the BOP schedule can be written as:

$$X(Y^f,\pi) - Z(Y,\pi) + F(r - r^f) = 0 \text{.....(8)}$$

The first two terms within the above equation 8 shows the trade balance (net exports) and the third term (F) accounts for the net capital inflow. The net capital inflow is influenced positively by the difference between the domestic interest rate and the foreign interest rate ($r - r^f$). The foreign interest rate is considered exogenous, which means that the domestic interest rate only determines the demand for money and not the foreign rate of interest.

As income increases, import demand rises, while export demand remains constant. A higher capital inflow is required

- Balance of Payment curve

to maintain the balance of payments equilibrium. This equilibrium is achievable through a higher interest rate. Therefore, the BP schedule is positively sloped as shown in figure 1.2.16. The shift of the BP schedule occurs when there are changes in the exchange rate. An increase in the exchange rate shifts the BP schedule horizontally to the right. This means that a higher income level is necessary for the balance of payments equilibrium due to the stimulating effect of the higher exchange rate on exports and discouragement on imports at a given interest rate (which determines the capital flow). Additionally, exogenous changes such as an increase in export demand (Y^f) or a decrease in import demand will shift the BP schedule to the right. If exports rise, a higher income and increased imports are needed to restore balance of payments equilibrium. Similarly, a fall in the foreign interest rate would shift the BP schedule to the right, as it increases the capital inflow at a given domestic interest rate (r). For balance of payments equilibrium, imports and therefore income, must be higher. The open economy IS-LM model can be explained with the following figure:

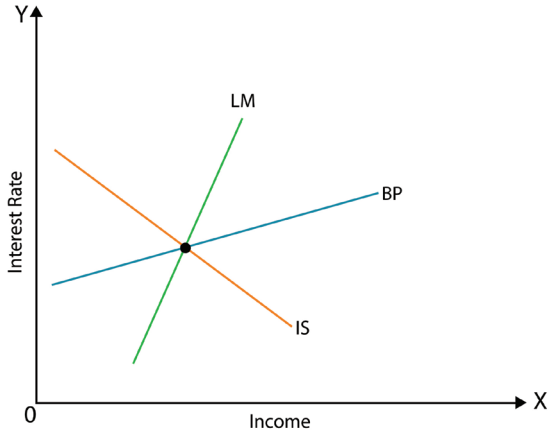

Fig. 1.2.16 Open Economy IS-LM Model

The LM schedule illustrates points of equilibrium for the money market at various combinations of r (interest rate) and Y (income). Conversely, the IS schedule depicts combinations of r and Y that balance the goods market. The BP schedule represents combinations of r and Y that equalize supply and demand in the foreign exchange market at a given exchange rate.

In a situation where capital can move freely between countries (perfect capital mobility), the interest rates in both the

- Perfect and imperfect capital mobility

domestic and foreign markets will be equal. This equilibrium condition leads to a horizontal Balance of payment (BP) curve because there is no preference for investing in one country over another based on interest rate differentials. However, when capital mobility is imperfect, meaning there are barriers or constraints to the flow of capital, such as capital controls or transaction costs, the domestic and foreign interest rates may differ. In this case, the BoP schedule becomes upward sloping because investors are more likely to shift capital to the country offering higher interest rates. This creates a positive relationship between the interest rate differential and the quantity of capital flows, resulting in an upward sloping BP curve.

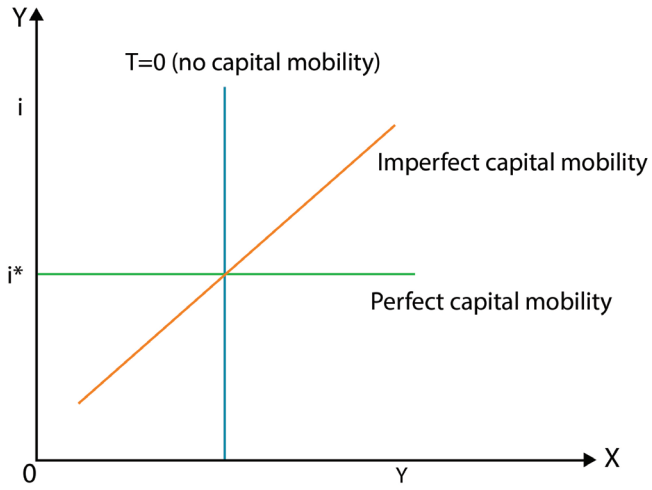

Fig. 1.2.17 Shape of BOP Curve

In the above diagram, the horizontal BOP curve represents perfect capital mobility, the vertical BOP curve indicates no capital mobility, and the upward-sloping BOP curve reflects the imperfect capital mobility of a nation.

1.2.4.2 Imperfect Capital Mobility

Here we examine the effectiveness of monetary and fiscal policy under both the fixed and flexible exchange rate systems in the case of imperfect capital mobility.

A. Monetary Policy Under Fixed Exchange Rate System

We analyse the case of monetary policy under fixed exchange rate system with the help of a figure:.

- Monetary policy is inffective under fixed exchange rate system

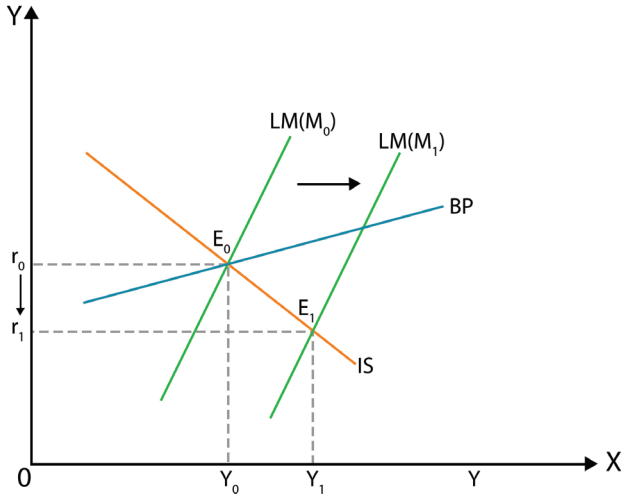

Fig. 1.2.18 Monetary Policy with a Fixed Exchange Rate

When the money supply increases from M_0 to M_1, the LM schedule shifts to the right, transitioning from LM (M_0) to LM (M_1). This change leads to a shift in the equilibrium point from 'E_0 to E_1'. Consequently, there is a decrease in the interest rate from r_0 to r_1' and an increase in income from 'Y_0 to Y_1'. Here we note that the points situated below the BP schedule represent a balance of payments deficit, while points above the schedule denote a surplus. In the figure, the position of the new equilibrium point (E_1) lies below the BP schedule after the increase in money supply and the balance of payments shifts into deficit. As a result of the expansionary monetary policy, by boosting income, imports increase. Simultaneously, the lowering of the interest rate induces a capital outflow. Therefore, the combined effects of income stimulation and interest rate reduction contribute to a deficit in the balance of payments.

B. Fiscal Policy Under Fixed Exchange Rate System

- Fiscal policy is effective under fixed exchange rate system

When the government increases spending (expansionary fiscal policy), the savings and investment rise. This leads to a new equilibrium in the economy with higher income and interest rates. In this new equilibrium, the economy is in surplus because the increase in income overcomes the negative effects of rising imports caused by higher interest rates. Even though interest rates are very high, foreigners are attracted to invest at a perfect equilibrium, leading to an increase in the foreign exchange reserves.Under fixed exchange rate regime, a fiscal expansion leads to a short-term increase in interest rates and

income, creating a surplus in the balance of payments. In the long run, income further increases, and interest rates decline from their initial high levels, resulting in an overall balanced foreign exchange reserve and an expanded current account. Therefore, we can say that in a fixed exchange rate regime with imperfect capital mobility, fiscal policy tends to be more effective than monetary policy and is often linked to a current account deficit. We analyse the case of fiscal policy under fixed exchange rate system with the help of a figure.

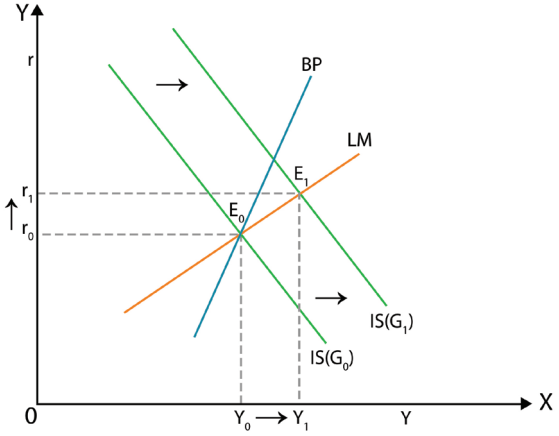

Fig. 1.2.19 Fiscal Policy with a Fixed Exchange Rate

The above figure illustrates the impact of an increase in government spending in a fixed exchange rate system. As government spending rises, the IS schedule shifts from IS (G_0) to IS (G_1), and the equilibrium points move from E_0 to E_1, resulting in increase in both income and the interest rate. The new equilibrium point is situated above the BP schedule, indicating that under a fixed exchange rate system where the BP schedule is flatter than the LM schedule and the outcome of an expansionary fiscal policy is a surplus in the balance of payments. Therefore, we can assert that fiscal policy proves effective under a fixed exchange rate system, particularly in the context of imperfect capital mobility.

C. Monetary Policy with a Flexible Exchange Rate System

- Monetary policy is effective under flexible exchange rate system

A flexible exchange rate system, or floating exchange rate system, is a scenario where the exchange rate is determined by market forces such as demand and supply, and there is no government intervention. When the monetary authority increases the money supply, banks may lower the rates they

charge for lending money. This is because the increased availability of money makes borrowing less expensive, leading to lower interest rates. As a result of lower interest rates, businesses and individuals find borrowing to be more affordable and it encourages increased investment activities. However, there is also a potential for an increase in imports. If the rise in imports is greater than the increase in exports, it can result in a trade imbalance.

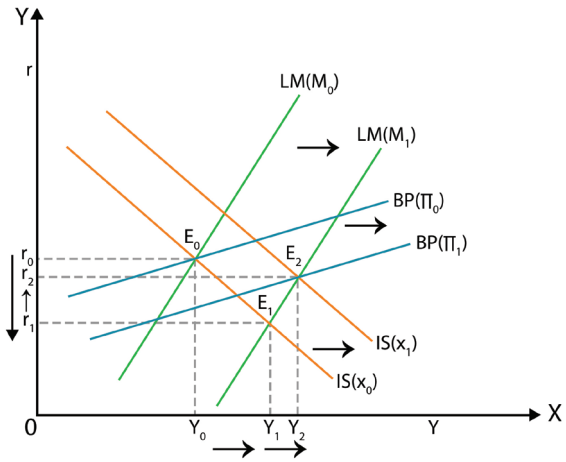

Fig. 1.2.20 Monetary Policy with a Flexible Exchange Rate

In the scenario of an expansionary monetary policy within a flexible exchange rate system, the central bank initiates an increase in the money supply from M_0 to M_1. Consequently, the interest rate declines from r_0 to r_1, and income experiences an upward shift from Y_0 to Y_1. This adjustment leads to a new equilibrium point, shifting from E_0 to E_1, and the new equilibrium positions of the economy lies below the Balance of Payments (BP) schedule which shows the balance of payments deficit. To counterbalance this deficit, the exchange rate adjusts, rising from r_0 to π_1, thereby clearing the foreign exchange market. This adjustment causes a rightward shift in both the BP and IS schedules from BP_0 to BP_1 and IS_0 to IS_1 respectively which leads to increased exports and decreased imports associated with higher exchange rates. The ultimate outcome is the attainment of a new equilibrium at point E_2, where the interest rate is denoted as r_2, income as Y_2, and the balance of payments is attainted at re-equlibrium. More importantly, this situation underscores the effectiveness of monetary policy as a stabilising tool in a flexible exchange rate regime, with the rise in income being notably more than in a fixed exchange rate system.

- Monetary policy is effective under a flexible exchange rate system

C. Fiscal Policy with a Flexible Exchange Rate System

When the government uses the expansionary fiscal policies, such as increasing government expenditures or cutting taxes, it results in increased planned expenditures. This, in turn, leads to an increase in the country's interest rates and income. The rise in both interest rates and income attracts substantial capital inflows, causing the country's currency to appreciate. This appreciation discourages exports and encourages imports. The decline in net exports effectively counteracts the impacts of the expansionary fiscal policy, keeping the income level unchanged. Let us explain it with the help of a figure:

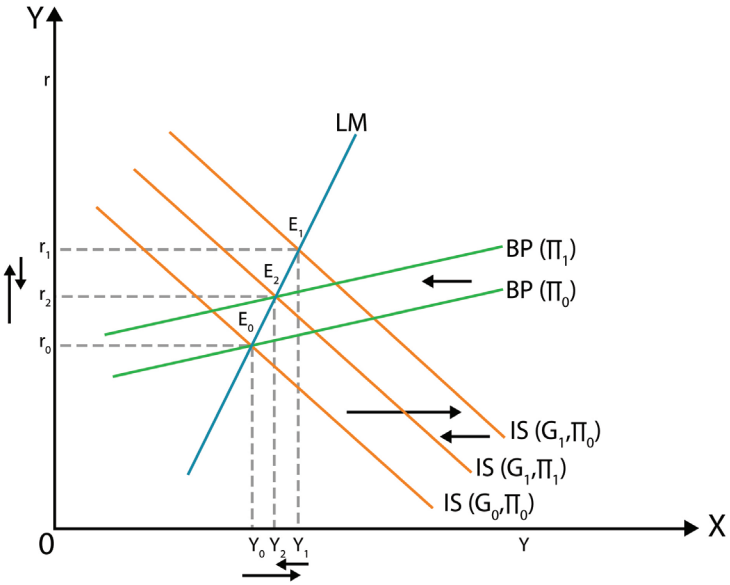

Fig.1.2. 21 Fiscal Policy with Flexible Exchange Rate System

Due to the implementation of expansionary fiscal policy, the IS schedule shifts from IS (G_0 $\pi_{0)}$ to IS (G_1 $\pi_{1)}$ consequently moving the equilibrium points from E_0 to E_1. In this context, the flatter slope of the Balance of Payments (BOP) schedule distinguishes it from the steeper LM schedule. Notably, the new equilibrium points lie above the BOP schedule, indicating a balance of payments surplus in the economy. After the exchange rate adjustments, the BOP schedule shifts to the left, from BP_0 to BP_1, and the IS schedule shifts from IS_0 to IS_1. The final equilibrium point, denoted as E_2, clearly illustrates a decrease in income from Y_1 to Y_2. This observation suggests that the fiscal policy's impact is less pronounced under a flexible exchange rate system, as the income falls.

- Fiscal policy is ineffective under flexible exchange rate system

1.2.4.3 Perfect Capital Mobility

In a scenario of perfect capital mobility, where capital can move freely between countries, the domestic and foreign interest rates tend to equalise. For example, if the interest rate on domestic bonds is slightly higher than that on foreign bonds, there will be a substantial flow of capital from foreign to domestic until both interest rates become equal. This condition is graphically represented by a horizontal Balance of Payments (BP) schedule. In essence, the assumption of perfect capital mobility suggests that balance of payments equilibrium can only be achieved when the domestic interest rate matches the foreign interest rate.

When examining the policy effectiveness under perfect capital mobility, mainly three assumptions are important. Firstly, the domestic country is assumed to be small in comparison to the global economy. This means that the implementing policies such as monetary or fiscal policies, have minimal to no impact on world financial market conditions. As a result, the domestic interest rate is forced to equal the exogenously given foreign interest rate. Secondly, the domestic country's policies do not affect world interest rates or income in foreign countries and thirdly capital is assumed to be highly mobile across borders. Investors can easily move funds between countries to take advantage of differences in interest rates.

- Capital moves freely between countries

A. Monetary Policy Effects Under Fixed Exchange Rate System

When a country implements an expansionary monetary policy, increasing its money supply and temporarily reducing interest rates, it leads to capital outflows as investors seek higher returns. This result will be deficit in the BOP. To restore equilibrium, the central bank allows interventions to reduce the money supply, leading to a rise in domestic interest rates until they align with foreign rates. This process stops the capital outflows. Despite adjustments in interest rates and capital flows, the final outcome sees the money supply, interest rates and income returning to their initial levels. Consequently, the expansionary monetary policy proves ineffective in the fixed exchange rate system within a perfect capital mobility scenario. Let us explain with the help of a figure:

- Monetary policy is ineffective under a fixed exchange rate system

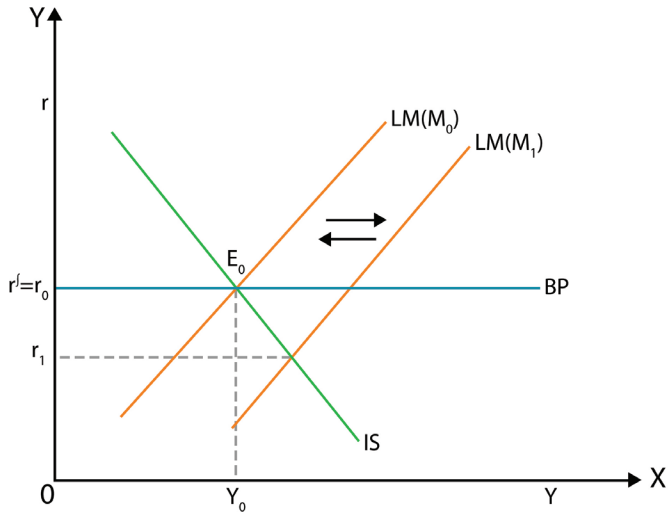

Fig. 1.2.22 Monetary Policy with a Fixed Exchange Rate System

Due to the expansionary monetary policy the money supply increases which leads to a shift in the LM schedule from LM (M_0) to LM (M_1). As a consequence, the domestic interest rate (r_1) falls below the foreign interest rate (r^f-r_0), and the results in outflow of capital. Central bank efforts to maintain the fixed exchange rate cause the money supply to fall back to the initial level, M_0. This process restores equilibrium, bringing the domestic interest rate back in line with the foreign interest rate and income returns to its initial level.

B. Fiscal Policy Effects Under Fixed Exchange Rate System

When the government implements an expansionary fiscal policy, it employs upward pressure on interest rates in the domestic market. As interest rates in the domestic market rise, they may exceed the prevailing foreign interest rates which will prompt foreign investors to seek higher returns. Consequently, capital starts flowing into the domestic market. Due to the capital inflow, the domestic currency appreciates relative to foreign currencies. In response to this capital inflow and to maintain the fixed exchange rate, the central bank intervenes in the foreign exchange market. The central bank sells domestic currency and buys foreign currency to offset the appreciation. While this intervention helps to stabilise the exchange rate, it comes with consequences, such as an expansion of the domestic money supply. This process aims to restore equilibrium between domestic and foreign interest rates.

- Fiscal policy is effective under fixed exchange rate system

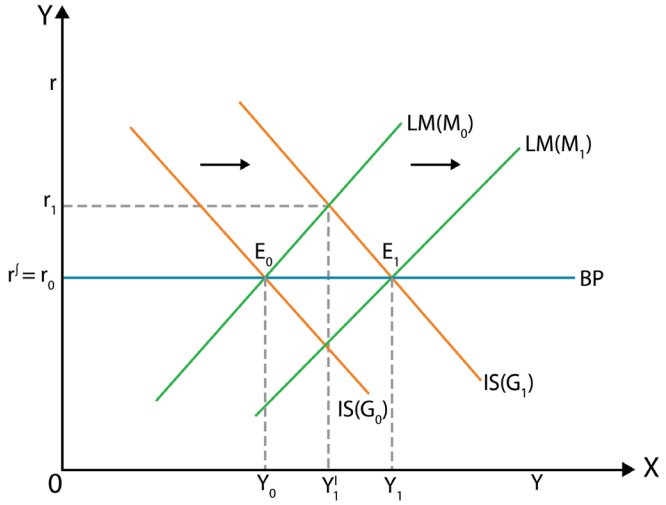

Fig. 1.2.23. Fiscal Policy with a Fixed Exchange Rate System

An expansion in the government spending shifts the IS schedule from IS (G_0) to IS (G_1). Consequently, the domestic interest rate r1 exceeds the foreign interest rate $r^f=r_0$, resulting in capital inflow. To uphold the fixed exchange rate, the central bank intervenes in the market leading to an increase in the money supply. This will shift the LM schedule moving from LM (M_0) to LM (M_1). The domestic interest rate is then restored with the foreign rate, with the E_1 equilibrium. Due to this process the income increases from Y^1_1 to Y_1.

C. Monetary Policy Effects Under Flexible Exchange Rate System

Due to the expansionary monetary policy resulting in an increased money supply, the initial effect is the domestic interest rate temporarily dropping below the foreign interest rate, instigating a substantial capital outflow. This scenario is similar to the fixed exchange rate situation. However, in a flexible exchange rate system, there is no option for the central bank in the country to intervene in the market. Instead, as domestic investors sell assets, leading to a reduction in the internal monetary value, this results in an increase in the country's exchange rate, which will ensure increased exports and reduced imports. The selling of internal assets continues until the exchange rate rises sufficiently. At this point, the internal interest rate has been restored to parity with the foreign interest rate, ultimately resulting in higher level of income. Thus, it can be concluded that with perfect capital mobility and flexible exchange rates, monetary policy proves highly effective.

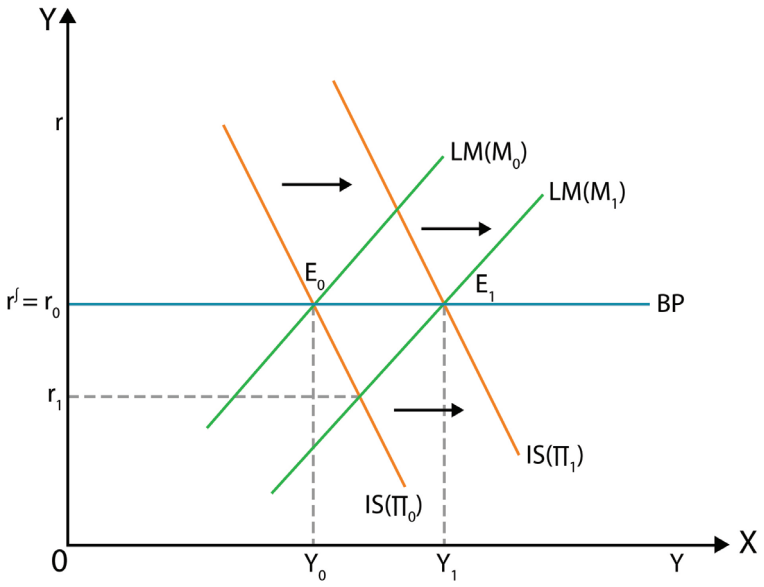

Fig. 1.2.24 Monetary Policy with a Flexible Exchange Rate System

- Monetary policy is effective under a flexible exchange rate system

The expansion of the money supply leads to a shift in the LM schedule from LM (M_0) to LM (M_1). Subsequently, the domestic interest rate 'r_1' falls below the foreign interest rate $r^f = r_0$, initiating a significant outflow of capital. This capital outflow results in the appreciation of the exchange rate, causing the IS schedule to shift from IS (π_0) to IS (π_1). Consequently, the domestic interest rate is restored to equality with the foreign interest rate, which leads to income rises from Y_0 to Y_1.

D. Fiscal Policy Effects Under Flexible Exchange Rate System

Due to the expansionary fiscal policy, the domestic interest rate rises above the foreign interest rate. This process leads to a capital inflow, resulting in the fall of the exchange rate (appreciation of the domestic currency) due to the flexible exchange rate. Consequently, the nation's exports decrease, and imports reach higher levels. Equilibrium is re-established when the domestic interest rate returns to equality with the foreign interest rate. At this point, the capital inflow ends, along with the downward pressure on the exchange rate. Additionally, income comes backs to its initial level. In this scenario, fiscal policy proves to be entirely ineffective.

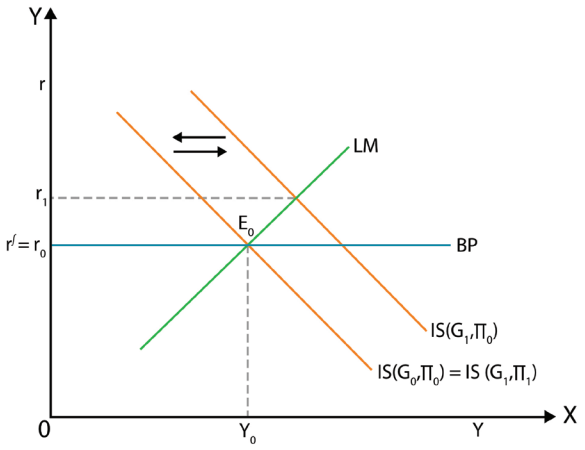

Fig. 1.2.25. Fiscal Policy with a Flexible Exchange Rate System

- Fiscal policy is ineffective under flexible exchange rate system

Due to the government spending the IS schedule is prompted to shift from the IS (G_0, π 0) to IS (G_1, π_0). Consequently, the domestic interest rate exceeds the foreign interest rate, leading to a substantial inflow of capital. This capital inflow results in a decline in the exchange rate from 'r_1 to $r^f=r_0$.' The decrease in the exchange rate shifts the IS schedule back to IS (G_0, π_0) = IS (G_1, π_1). At this point, the domestic interest rate is re-adjusted with the foreign interest rate and income returns to its initial level at Y_0.

1.2.5 AD-AS Framework

In this section, we will see the characteristics of aggregate demand and aggregate supply in both the short run and long run, illustrating their derivation from the IS and LM curves. Subsequently, learners will come across the interaction between aggregate demand and aggregate supply, illustrating how they collaborate to establish equilibrium in a closed economy both in the short run and long run.

1.2.5.1 Aggregate Demand

The aggregate demand (AD) explains the relationship between the total quantity of goods and services demanded in an economy and the general price level. This connection is upheld by maintaining certain factors at a constant level, specifically

- Relationship between the total quantity of goods and services and general price level

the nation's money supply, government expenditure and taxes. The AD curve is comparable to an individual's demand curve for a product, with the difference that the AD curve refers to the total quantity demanded of domestic goods and services in the nation in relation to the general price level or GDP deflator. Notably, the AD curve is a downward-sloping curve; it shows that the higher the price level, the lower the total quantity of domestic goods and services demanded in the nation. Let us see the derivation of the AD curve from the IS-LM model.

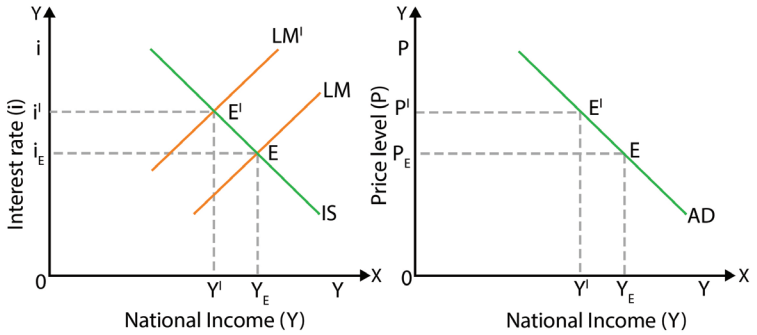

Fig. 1.2. 26 Derivation of the AD Curve from IS-LM Model

The point where the IS and LM curves intersect at a specific price level determines the equilibrium interest rate (iE) and national income (YE) at point E in the left panel. This, in turn, corresponds to point E on the aggregate demand curve (AD) in the right panel, defined by the price PE and income YE. If the price increases from OPE to OP', it reduces the real value of the nation's money supply, causing the LM curve to shift to the left to LM'. This results in a lower income level of Y' at point E' in the left panel and on the AD curve in the right panel.

1.2.5.2 Short run and Long run Aggregate Supply

- Relation between the total quantity of goods and services and general price level

The Aggregate Supply (AS) curve shows the relationship between the total quantity of goods and services supplied in an economy and the general price level. This relationship varies based on the time horizon under consideration, leading to the formation of both a long-run aggregate supply curve (LRAS) and a short-run aggregate supply curve.

The long-run aggregate supply curve is independent of price level while it depends on the quantity of labour, capital,

- Long-run aggregate supply curve

natural resources and technology available to the economy. The availability of these inputs to an economy in the long run is determined by the natural output level (Y_N) of a nation. The more inputs are available to the economy, the larger is its natural level of output and income in the long run. In the long run, aggregate supply curves do not impact prices; therefore the only way to increase the output over the long run is by enhancing the supply of inputs or resources. The LRAS curve is vertical at the natural level of output when plotted against prices, as shown in the figure 1.2.27.

- Short-run aggregate supply curve

In the short run, due to imperfect information or market imperfections, the aggregate supply curve slopes upward. For instance, if firms realise, they can sell products at higher prices without immediately recognising that input prices have also increased proportionately, they may temporarily expand output. Consequently, aggregate output increases in the short run at a higher price. Once, the firm realises that the cost of production also increases proportionately with the level of output. The firm will decide to cut down production, bringing the output back to its original position. As a result, aggregate output returns to its long-run natural level at a higher price level. Due to imperfect information or market imperfections, the short-run output level may exceed the nation's long-run natural level. This can be achieved by utilising overtime work and extending factory shifts. In this manner, output increases continuously, making production more challenging and expensive. As a result, the short-run aggregate supply curve becomes steeper and eventually vertical. In the long run, the firm recognise that all prices, including the cost of production, have also increased proportionately, so they reduce their production to the original level. This will cause the nation's output to return to its lower level in the long-run but at a higher prevailing price level. Similarly, the reverse can occur, if a firm recognises that the price of the product received from sales has declined but does not immediately realise that prices, including their inputs, have fallen proportionately and that production costs remain unchanged, they may decide to reduce production. Consequently, the nation's output temporarily falls below its natural level. Later, the mistake is recognised by the firm, leading them to increase the output to its original long-run natural level. This situation arises due to imperfect information in the labour market. Let us explain both short-run and long-run aggregate supply curves with the help of figures:

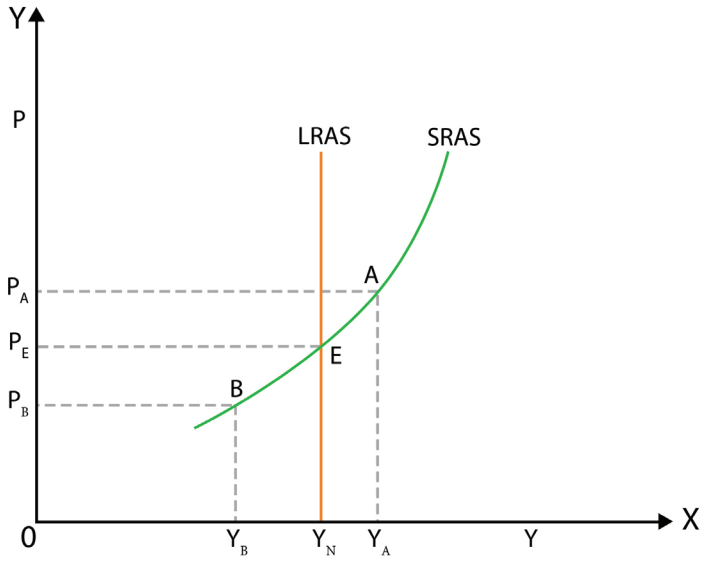

Fig. 1.2.27. The Short-Run and Long-Run Aggregate Supply Curve

The figure depicts the relationship between price levels (shown on the vertical axis) and the natural level of output (shown on the horizontal axis). The long-run aggregate supply curve is represented as vertical, indicating its independence from price levels and dependence on factors such as the availability of labour, capital, natural resources and technology in the nation. At the nation's natural level of output, the curve holds a vertical shape. In contrast, the short-run aggregate supply curve slopes upward. At point 'E,' the short-run output aligns with the natural level. However, when the short-run output is at point 'B,' the nation's output can temporarily exceed the natural level. Conversely, when the short-run natural level of output is below the natural level, it lies at point 'A' on the curve. In both the cases, where output exceeds or falls below the natural level, such deviations occur due to imperfect information or market imperfections.

1.2.5.3 Short Run and Long Run Equilibrium

We can examine the short-run and long-run equilibrium in a closed economy with the help of the given aggregate demand and short-run and long-run aggregate supply. Let us explain the following figures.

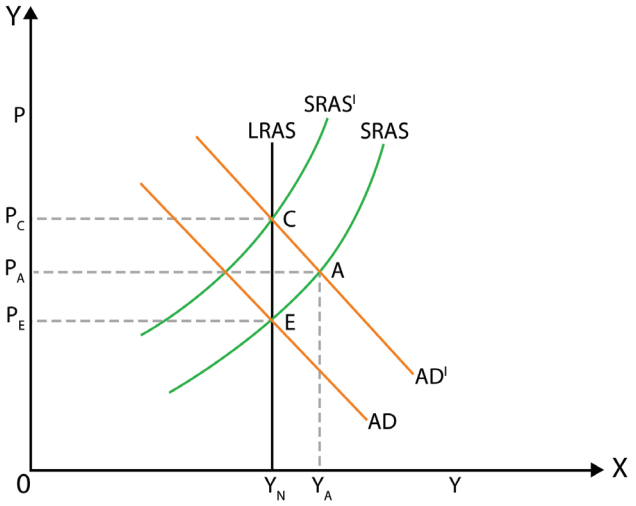

Fig. 1.2.28 Equilibrium in a Closed Economy

- A rightwards shift in the aggregate demand curve

In the above figure, (Y_N) represents the natural level of output, and (P_E) signifies the price level. The Aggregate Demand Curve (AD), Long-Run Aggregate Supply Curve (LRAS) and Short-Run Aggregate Supply Curve (SRAS) are also shown separately. At point E, the economy is in both short-run and long-run equilibrium. Now, let us consider an unexpected rightwards shift in the aggregate demand curve, moving from AD to AD^1. This shift results in a rise in prices. If firms mistakenly believe that only the prices of the products they sell are increasing and not all prices, they may increase output. This leads to a new short-run equilibrium at point A, where AD' intersects the SRAS curve. At point A, the price is PA, and the nation's output level is YA, exceeding the natural level of output (Y_N).

- Long run adjustment process

When the firm realises that all prices, including production costs, have increased, the Short-Run Aggregate Supply curve (SRAS) will shift up to SRAS'. The point where AD' intersects with SRAS' on the LRAS curve establishes the new long-run equilibrium point C at the higher price (P_C) and the natural level of output (Y_N). While the price level is now higher, the output has returned to its long-run natural level. The output increases in the short run due to imperfect information or market imperfection, which is eliminated in the long run. As firms recognise that all prices and costs have increased proportionately, they cut down production back to the long-run natural level. In the long run, as expected prices rise to match actual prices, the Short-Run Aggregate Supply (SRAS) curve shifts up due to the increase in the price level, and the nation's output returns to its lower long-run natural level.

- Changes in aggregative demand

Another way of explaining this is that an unexpected increase in aggregate demand (AD) paves the way for an unexpected rise in prices and temporary increases in output. Prices increase in the long run to align with the actual price increments. As a result, the short-run aggregate supply curve shifts upward until it intersects with the new and higher aggregate demand curve on the given long-run aggregate supply curve. Consequently, the economy once again attains simultaneous short-run and long-run equilibrium at the natural level of output. Thus, a particular SRAS is based on expected prices. When an increase in expected prices in the long run matches with actual prices, the short-run aggregate supply shifts upward by the increase in expected prices. The right-side point of the LRAS denotes that actual prices exceed expected prices. Subsequently, expected prices increase, leading to an upward shift in the SRAS curve until expected prices equal actual prices. This adjustment helps the economy return to its long-run natural level of output equilibrium. It should be noted that the economy is in short-run equilibrium at the intersection of any aggregate demand (AD) and SRAS curve. For the economy to be in long-run equilibrium, the AD and SRAS curves must intersect on the LRAS curve.

- Results of the absence of market imperfections

Due to the absence of imperfect information or market imperfections, which means that, if firms immediately realised that an increase in aggregate demand results in an equal increase in all prices, price expectations would always match actual prices. The nation's equilibrium point would shift from 'E' to 'C' without the intermediate movement to equilibrium point 'A' in the short run. In this scenario, the nation's output level consistently aligns with its long-term natural level, and the nation's short-run aggregate supply curves are vertical, coinciding with the long-run aggregate supply. Short-run deviations from the long-run natural level in the real world only occur due to imperfect information and market imperfections. Naturally, a downward shift in the aggregate demand curve leads to a temporary reduction in output and a permanent decrease in price.

Summarised Overview

The Neoclassical theory emerged as a response to Classical and Keynesian approaches, representing a synthesis that integrates short-term insights from Keynesian economics with the long-term perspectives of classical economics. Core principles of the Neoclassical school include a belief in the inherent stability of the economy and the view that deviations from full employment are temporary and correctable. The Neoclassical approach asserts that full employment is achievable and maintainable in the long run through the self-adjusting mechanisms of free markets. The IS-LM model, a crucial element of the Neoclassical synthesis, stands as a significant landmark in economic thought. Developed by economists such as John Hicks, Franco Modigliani, and Paul Samuelson, this model successfully integrates Keynesian ideas with Neoclassical economic frameworks. It serves as a powerful analytical tool for understanding the dynamics of short-term economic fluctuations and the impacts of monetary and fiscal policies. The open economy IS-LM model is a vital extension of the original IS-LM framework, providing a comprehensive understanding of economic dynamics in the context of international trade and capital flows. It incorporates the interactions between domestic and foreign markets, offering valuable insights into the impact of fiscal and monetary policies on an open economy. The Mundell-Fleming model and the characteristics of aggregate demand and aggregate supply in both the short run and long run provide an understanding of economic dynamics. The derivation of the aggregate demand (AD) curve from the IS-LM model highlights the relationship between the total quantity of goods and services demanded and the general price level. In contrast, the short-run aggregative supply curve slopes upward due to imperfect information or market imperfections, allowing temporary deviations in output from the long-run natural level. Overall, this comprehensive analysis contributes to a deeper understanding of the complexities of economic systems.

Assignments

1. Describe the components of the IS-LM model and how it illustrates the equilibrium in the goods and money markets.
2. Explain the concept of aggregate demand (AD) and aggregate supply (AS) in the AD-AS framework and their relationship to price levels and real output.
3. Discuss the implications of this Neoclassical Synthesis for economic policy-making.
4. Discuss the effects of fiscal and monetary policy changes on the equilibrium levels of income, interest rates, and output.

5. Discuss the AD-AS framework and its usefulness in analysing short-run and long-ru macroeconomic fluctuations. How does the framework help policymakers understand the effects of fiscal and monetary policies on price levels and output?

6. Discuss the concept of aggregate supply and aggregate demand in the AD-AS framework. How does this framework explain inflationary and recessionary gaps in the economy

7. How does government expenditure affect the equilibrium output and interest rates?

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Suggested Reading

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2. Ackley G, *Macroeconomics: Theory and Policy*, Macmillan, Newyork,1978

3. Keynes. J.M ., *The General Theory of Employment, Interest, and money,* Macmillian, London,1961

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 3
Case Studies on Effectiveness of IS-LM Models

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the theoretical applications of IS-LM Model
- explain how the monetary and fiscal policies are used by the policymakers at the time of financial crisis
- know the overall impact of the 2008 financial crisis

Background

IS-LM model is also known as Neoclassical synthesis. IS-LM is a macroeconomic tool that shows the equilibrium in the money market and capital market. Hence the model is a general equilibrium where the supposed simultaneous equilibrium is attained through the interaction between the rate of interest and income. The effectiveness of the IS-LM model lies in its ability to capture the interactions between the real and financial sectors of the economy. By considering the investment-saving (IS) curve represent goods market and the liquidity preference - money supply (LM) curve, represent money market the model illustrates how changes in government spending, taxes and the money supply affect interest rates and the aggregate output. One key aspect of the IS-LM model is the concept of equilibrium, where the IS and LM curves intersect. This equilibrium represents a state where the goods market and the money market are in balance. Overall, the IS-LM model provides a useful framework for understanding the macroeconomic implications of policy changes and the interplay between interest rates and income levels. It helps policymakers and economists analyse the potential outcomes of different policy interventions in an economy. This unit deals with the theoretical applications of the IS-LM model.

Keywords

IS-LM, Liquidity Trap, Financial Crisis, GDP Deflator

Discussion

1.3.1 Relative Effectiveness of IS-LM Model

- Falling tendency of rate of interest

The Keynesian perspective argues that both monetary and fiscal policies effectively impact the economy. However, a significant challenge arises when interest rates drop extremely low, approaching or reaching the "zero bound." This scenario can result in a liquidity trap, where conventional policy tools lose their effectiveness. During the Great Depression of the 1930s, many economists believed that the U.S. economy encountered a liquidity trap, with short-term interest rates falling below 1 percent. While discussions on the liquidity trap effect in the 1970s and early 1980s were going on, when major economies had double-digit interest rates, renewed interest has emerged as interest rates dropped to very low levels in recent years, notably in countries like Japan. In such circumstances, policymakers may find it challenging to use traditional monetary measures to stimulate economic activity.

In the middle of the 1980s, Japan had a fast-growing economy. Just like how people are concerned about China's economy now, back then, many were worried that Japan, often seen as a big business team "Japan Incorporated", would become even stronger than the United States in terms of economy.

The United States faced a substantial trade deficit with Japan, and Japanese products, such as automobiles and appliances, were replacing their American counterparts. However, in the 1990s, following a cycle of economic boom and bust in Japanese property and financial markets, the Japanese economy entered a prolonged slump. This period of economic downturn was marked by deflation which indicated the decline in overall price levels. These trends can be seen in the following figure.

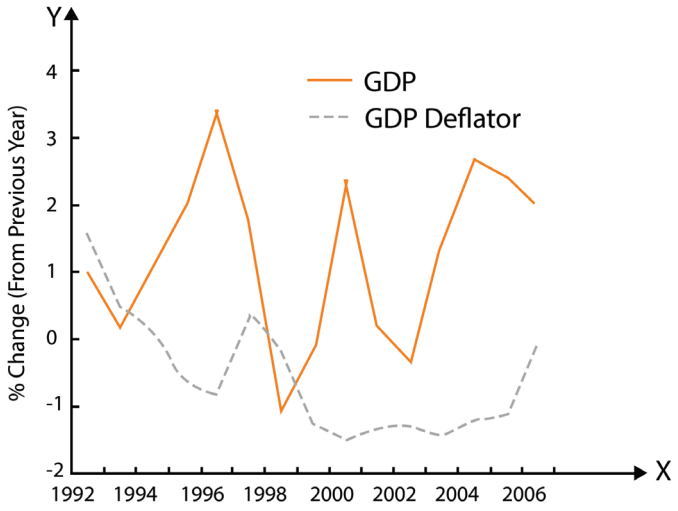

Fig. 1.3.1 Japan's GDP and GPD Deflator

The graph above shows the percentage rate of growth in Japanese GDP and the GDP deflator. GDP deflator is a price index, which measures the changes in the prices for all goods and services produced in the economy. Between 1981 and 1990, the real GDP grew by an average of 4.8 percent. However, after 1992, there was a significant slowdown in growth, with GDP declining in three of those years. During most of the post-1992 period, the GDP deflator showed a decrease, indicating a deflationary slump in Japan. In the aftermath of the economic boom and subsequent bust in the early 1990s, Japan faced a challenging economic situation. The short-term interest rate experienced a rapid decline, ultimately reaching the zero bound and persisting at this historically low level after 2003. This trend is clearly depicted in the following figure.

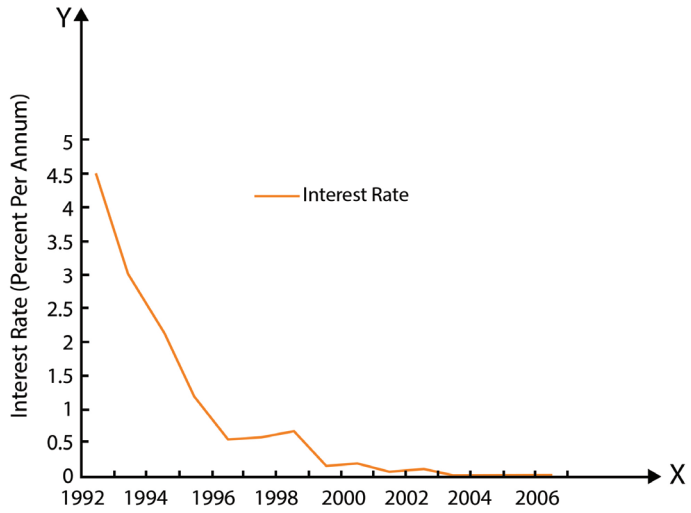

Fig. 1.3.2. Japan's Short-term Interest Rate

As depicted in the above Figure, the short-term interest rate rapidly declined, reaching the zero bound and remaining there after 2003. This decline was a consequence of the economic slump.

The Bank of Japan's implementation of an expansionary policy aimed at revitalising the economy, but the monetary policy is ineffective in a liquidity trap situation. This can be explained in the following figure.

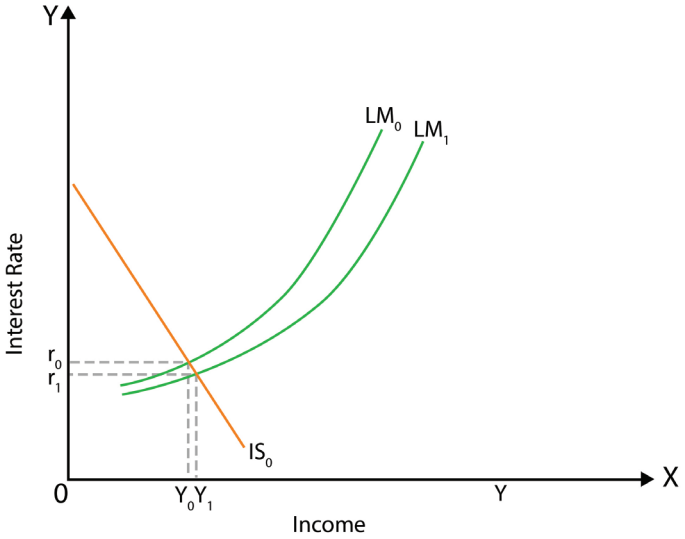

Fig. 1.3.3. Monetary Policy Ineffectiveness in a Liquidity Trap

The above figure depicts the limitations of monetary policy in a liquidity trap scenario. Japan faced the challenges of low interest rates. Therefore, the LM schedule appears highly flat, indicating a substantial interest elasticity of money demand. This is attributed to the extremely low interest rate level, causing the speculative demand curve for money to become nearly horizontal. In such situations, a consensus arises that anticipates future interest rate increases leading to expected capital losses on bonds. Consequently, any increase in the money supply would likely be absorbed with only a minimal decrease in the interest rate, providing little stimulus to investment. Notably, in the recent Japanese situation where the short-term interest rate has hit zero, any further decline seems questionable. This reinforces the challenges policymakers face in using traditional monetary tools to stimulate economic activity under such circumstances.

The Keynesian belief suggests that in a liquidity trap, fiscal policy should be highly effective, especially when the LM schedule is flat, indicating minimal crowding-out effects. In the case of Japan, despite the government's implementation of an expansionary fiscal policy in the post-1992 period, with the budget deficit rising to over 6 percent of GDP due to increased government spending and some tax reductions, the country stayed stuck in a long economic downturn. Economists think this continued slump happened because of deeper issues in Japan, including an inefficient banking system, weak regulatory oversight, insufficient infrastructure, low labour mobility and an excessive reliance on export demand.

- Monetary and fiscal policies are ineffective

Fiscal policies in Japan have faced criticism for being influenced more by political considerations than economic needs and they have been labelled as both delayed and inefficient. The institutions that played a crucial role in Japan's recovery and rapid expansion in the post-World War II years were deemed inadequate for the economic stage the country had reached by 1990. As short-term interest rates approached near-zero levels after 2008, the United States seemed to find itself in a liquidity trap. Policymakers sought monetary and fiscal strategies to steer the United States away from a prolonged slowdown.

1.3.2 Response of the Federal Reserves to the 2008 Financial Crisis

The financial crisis in 2007-2008, also known as the global financial crisis or subprime mortgage crisis, emerged gradually in the US market due to the cascading impact of the housing market collapse. This crisis had severe repercussions on the international financial system, leading to substantial losses for commercial banks, mortgage lenders and insurance companies. The crisis resulted in millions of people becoming unemployed and investor confidence plummeted. It stands as one of the most severe economic disasters experienced by the U. S. economy since the Great Depression.

The period from 2000 to 2006 witnessed a substantial increase in housing prices, followed by a sharp decline thereafter. One of the reasons behind this was the prevalence of low-interest rates during that time, which stimulated the demand for housing, leading mortgage lenders to be more willing to offer loans to risky borrowers through subprime mortgages. Starting in 2006,

many homeowners found themselves in a situation where the value of their mortgages exceeded the value of their houses, commonly known as being "underwater." As a consequence, lenders faced significant losses due to the growing number of mortgage defaults. Banks were highly leveraged during this period as they likely underestimated the risks involved. Bank managers had incentives to pursue high expected returns without fully considering the potential risks of bankruptcy. To circumvent financial regulations, banks utilised structural investment vehicles (SIVs). The complexity of financial products and lack of transparency in risk exposure made it difficult for investors and institutions to accurately assess the risks they were taking. Credit rating agencies assigned high ratings to many complex financial products, giving investors a false sense of security about the risks involved.

- Subprime mortgage crisis

The financial crisis had a profound impact on confidence, leading to a substantial decline that continued in 2009. This decrease in confidence, along with high borrowing costs, lower stock prices and reduced demand for goods, caused the IS curve to shift to the left. In response to this significant drop in demand, policymakers implemented measures to stimulate the economy. These included expansionary fiscal policies such as increased government spending and tax cuts, as well as accommodative monetary policies involving interest rate reductions and quantitative easing. These policy responses aimed to counteract the decline in demand, restore confidence and promote economic recovery.

1.3.2.1 Response of the Federal Reserve

Financial policies

Federal Deposit Insurance was increased from $100,000 to $250,000 to provide greater protection to depositors and enhance confidence in the banking system. The Federal Reserve implemented liquidity facilities to provide widespread liquidity support to the financial system, allowing financial institutions to access necessary funds. Additionally, the Federal Reserve expanded the range of assets that could be used as collateral, thereby increasing the availability of eligible collateral for borrowing. In response to the crisis, the government introduced the Troubled Asset Relief Program (TARP). This program aimed to stabilise financial markets and support troubled financial institutions by purchasing and

managing troubled assets. The objective was to improve the overall health of the financial system and restore stability.

Monetary Policy

By 2008, the Federal Reserve had brought down the federal funds rate to near-zero levels. To further stimulate the economy, the Fed implemented unconventional monetary policy measures. One of these measures was the purchase of various assets, including government bonds and mortgage-backed securities. This approach aimed to directly influence borrowing rates faced by borrowers. Through these asset purchase programs, commonly referred to as quantitative easing, the Federal Reserve sought to reduce long-term interest rates and inject additional liquidity into the financial system. By increasing the demand for these assets, the Fed aimed to lower their yields and subsequently lower borrowing costs for businesses and individuals.

Fiscal Policy

- Responses-liquidity support, interest rate reduction, tax reductions and increased government spending

The American Recovery and Reinvestment Act of 2009 called for a substantial amount of $780 billion in tax reductions and increased government spending. This act was implemented as a response to the economic challenges faced during the financial crisis. The American Recovery and Reinvestment Act aimed to provide a boost to the economy by increasing consumer and business spending, creating employment opportunities and promoting long-term economic development. The act played a significant role in the recovery efforts following the financial crisis of 2008.

1.3.2.2 The Financial Crisis and IS-LM Model

The financial crisis resulted in a leftwards shift of the IS curve. This shift occurred due to various factors such as decreased consumer and business confidence, higher borrowing costs and declining asset prices. consequently, aggregate demand decreased, leading to a contraction in the economy. The leftwards shift of the IS curve signifies a reduction in overall spending and investment in the economy. It indicates a decrease in real GDP and a potential decline in employment levels. The negative impact on economic activity caused by the financial crisis contributed to the downwards shift of the IS curve. Monetary policy actions led to a downwards shift in the LM curve. The central bank implemented measures such

as interest rate reductions and liquidity injections to stimulate lending and increase the money supply. These actions aimed to lower borrowing costs, encourage investment and promote economic activity. While monetary policy played a role in shifting the LM curve downwards, it was not enough on its own to avert a major recession. A comprehensive and coordinated approach involving both monetary and fiscal policies, along with other supportive measures, was necessary to address the challenges posed by the financial crisis and promote economic recovery.

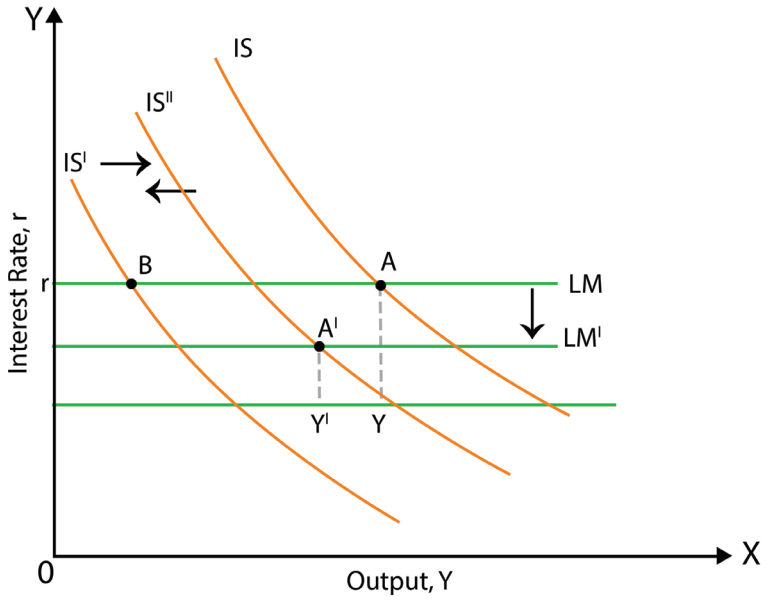

Fig. 1.3.4. Shift of the IS-LM Curve due to Fed Policies

- Combination of policy measures was insufficent to prevent a significant drop in output

The financial crisis caused a significant leftward shift of the IS curve, moving from IS to IS'. Without any policy changes, the equilibrium point would have shifted from point A to point B. However, financial and fiscal policies were implemented to counteract some of the shift. Instead of shifting to IS', to IS''. Monetary policy also led to a downwards shift of the LM curve, from LM to LM'. The new equilibrium point was at point A'. At this point, the zero lower bound on the nominal policy rate meant that the real policy rate could not be decreased any further. As a result, there was a decrease in output from Y to Y[1]'. The initial shock was so significant that the combination of financial, fiscal and monetary measures was not enough to prevent a substantial decline in output. The U. S. GDP fell by 3.5% in 2009 and recovered slowly thereafter.

Summarised Overview

The IS-LM model serves as a general equilibrium framework, showing the equilibrium in the goods and money markets through the interaction of interest rates and income. It proves useful in interpreting economic scenarios, such as the 2001 and 2008 financial crises. In the 2001 crisis, a stock market decline, particularly in the technology sector, triggered a reduction in investment and consumer spending, shown by a leftwards shift in the IS curve. The Federal Reserve responded by lowering interest rates, leading to a rightward shift in the LM curve and stimulating borrowing and investment. Fiscal policies, like increased government spending, could further shift the IS curve rightwards. In the 2008 crisis, a housing market decline shifted the IS curve leftwards, coupled with a tightening of credit conditions, shifting the LM curve leftwards. Policy responses involved central banks lowering interest rates (LM curve rightwards shift) and governments implementing fiscal measures (IS curve rightwards shift).

The IS-LM model simplifies the real nature of the 2008 crisis, which involved complex interactions among financial institutions, global interdependencies and specific regulatory issues

Assignments

1. How can the theoretical version of the IS-LM model be practically applied to analyse and understand real economic situations?
2. What was the overall impact of the 2001 financial crisis on the economy, considering its effects on various sectors and aspects of the financial system?
3. What were the key aspects of the 2008 financial crisis, and how did the Federal Reserve respond to address the crisis?
4. How can the IS-LM model be utilised to analyse economic issues in the Indian economy, particularly in the liberalisation period.
5. What was the response of the Reserve Bank of India (RBI) to the 2008 financial crisis, and how did the IS-LM tool help in understanding and analysing their actions?

Reference

1. Rosalind Levacic and Alexander Rebmann, *Macro Economics: An Introduction to Keynesian-Neoclassical Controversies,* The Macmillan Press Ltd, London.

2. Richard T Froyen, *Macro Economics; Theory and Policy*, Macmillan Publishing Co., New York, 1990.

Suggested Reading

1. Mankiw, N. Gregory author. (2016). *Macroeconomics*. New York: Worth Publishers

2. Salvatore, D, *International Economics*, Macmillan, New York, 1990

3. Rudiger Dornbusch, Stanley Fisher and Richard Startz (2007) 7th Ed: *Macroeconomics*.

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

MASTER OF ARTS ECONOMICS

Theories of Consumption and Investment

Block 2

BLOCK - 2

UNIT 1
Theories of Consumption Function

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the basic concept of consumption demand
- to explain how households allocate their income among consumption, saving, and investment.
- explore the different theories of consumption function
- predict the economic trends based on consumer behaviour

Background

Consumption is a significant component of total demand in an economy, accounting for about two-thirds of the Gross Domestic Product (GDP). This makes it capable of causing fluctuations in the economy. Consumption plays a crucial role in both the short and long run. In the short run, it determines the overall demand for goods and services, whereas, in the long run, it contributes to economic growth. One of the major factors determining consumption is income. Therefore, most consumption theories explain the relationship between income and consumption both in the short run and long run. All consumption function theories provide an excellent illustration of a typical sequence in the development of knowledge in Economics. Within this evolutionary sequence, Keynes introduced his ground breaking theory in 1936, He explains the income consumption relations in the short run. In the next step of this sequence, more rigid and elaborate theories were developed that could deal with the income-consumption relationship explained with the help of statistical tools. In this unit, we will learn about different theories suggested by Dusenbery, Friedman, Smithies, Ando, Modigliani *etc*. There are similarities and differences between these theories, but while these theories share certain similarities, they differ in their implications for economic stabilisation.

Keywords

Consumption, Absolute Income, Consumption Puzzle, Relative Income, Demonstration Effect, Ratchet Effect, Permanent Income

Discussion

2.1.1 Consumption Demand

According to Adam Smith, the purpose of all production is consumption. Consumption accounts for approximately two-thirds of the GDP, making any variation in consumption potentially leading to cyclical fluctuation in an economy. Consumption plays a significant role in connecting production and income generation when people have reduced consumption of goods. As a result, further production would be reduced by the entrepreneur.

- Role of consumption in economic activities

In the words of Keynes, some factors would influence consumption. He refers to them as subjective and objective factors. In the General Theory, Keynes mentioned some of the subjective factors that influence consumption such as enjoyment, shortsightedness, generosity, miscalculation, ostentation and extravagance. Some objective factors include the rate of interest, sales effort, relative prices etc. In the case of the rate of interest, people tend to save more rather than they consume at a higher rate of interest, while with a low rate of interest, people are more likely to increase their consumption. Income is one of the most significant factors in influencing the consumption behaviour of a person. He emphasised the importance of income to determine consumption rather than any other factor.

2.1.1.1 Consumption Function

J. M. Keynes conducted extensive empirical research on household consumption patterns. He found a crucial relationship between income and consumption. The functional relationship between current income and current consumption is called the consumption function, which can be expressed as

- Consumption is a function of income

C = f (Y), where 'C' is consumption and 'Y' is income. Here, C is a dependent variable, and 'Y' is an independent variable. The consumption function holds some properties that can be explained with some technical tools which are Average Propensity to Consume (APC), Average Propensity to Save (APS), Marginal Propensity to Consume (MPC) and Marginal Propensity to Save (MPS).

1. Average Propensity to Consume

Average Propensity to Consume (APC) is defined as the ratio of consumption to total income. Thus, APC can be calculated by dividing the amount of consumption by the income. We can write this relation in the form of $APC = \frac{C}{Y}$

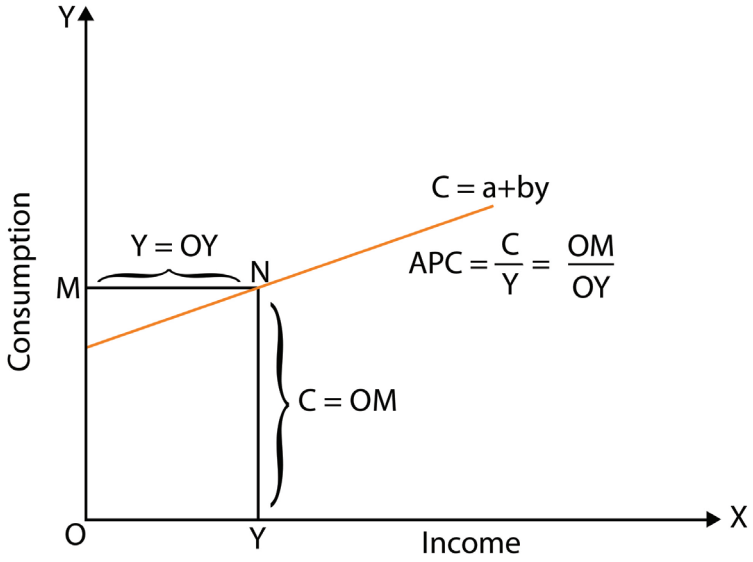

Fig. 2.1.1 APC

- APC is the ratio of consumption to the total income

In the above diagram, the X axis represents income and Y axis denotes consumption. APC refers to the ratio of consumption to the corresponding level of income. Graphically APC is at any point on the consumption curve and it is denoted on the graph as $\frac{OM}{OY}$

2. Marginal Propensity to Consume

The Marginal Propensity to Consume (MPC) defines the ratio of the change in consumption to the change in income. Thus,

$MPC = \frac{\Delta C}{\Delta Y}$ where ΔC being change in consumption, and ΔY, change in income.

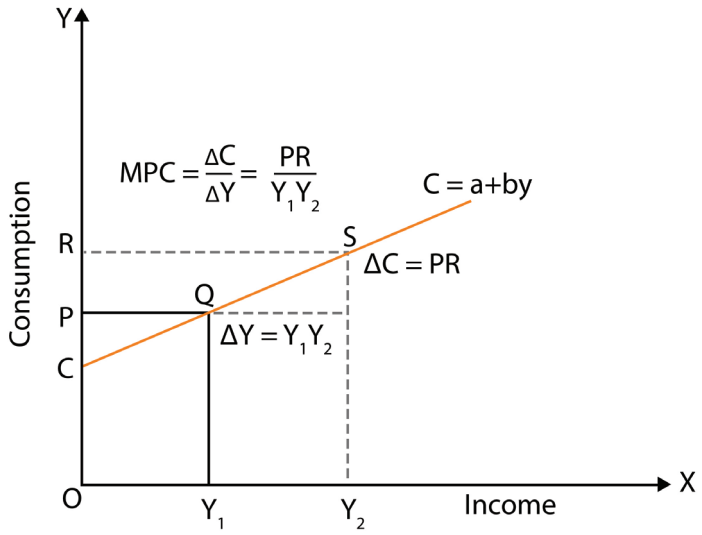

Fig. 2.1.2. MPC

- MPC is the ratio of change in consumption to the change in income

The above diagram shows the change in consumption in relation to the change in income, which is MPC (Marginal Propensity to Consume). In this graph, consumption rises from Y_1 to $Y_2$and as a result, the consumption changes from 'P' to 'R'. So,

the MPC in the graph is represented by the ratio $\frac{PR}{Y_1Y_2}$

- Savings is a portion of disposable income

In the examination of consumption theories, Keynesian psychological law asserts that as income increases consumption also increases, but the rise in consumption is less than the increase in income, as individuals tend to save a portion of their additional income. Consequently, variations in saving behavior contribute to patterns like those observed in consumption. Savings refers to the portion of disposable income that is set aside and not used for immediate consumption. Thus, Y_d = C+S or S = Y_d- C, where 'Y_d' is disposable income, 'C' is the consumption, and 'S' is the savings. The income-savings relation can be explained with the help of technical tools such as APS and MPS.

3. Average Propensity to Save

The average propensity to save is defined as the ratio of

total savings to the total income. APS can be written as $\frac{S}{Y}$ where S is total savings and Y is total income. An important relationship can be derived between the average propensity to consume (APC) and the average propensity to save (APS) by restating the fundamental notion that income is either consumed or saved.

$$C + S = Y$$

- APS is the ratio of total savings to total income

Dividing both sides by disposable income Y we get,

$$\frac{C}{Y}+\frac{S}{Y}=\frac{Y}{Y} \; OR \; \frac{C}{Y}+\frac{S}{Y}=1$$

As $\frac{C}{Y}$ is APC and $\frac{S}{Y}$ is APS, we have **APC + APS = 1 or APS = 1 - APC.**

4. Marginal Propensity to Save

- $MPS = \frac{\Delta S}{\Delta Y}$

The marginal propensity to save (MPS) indicates the portion of additional income that is allocated towards saving. Therefore, the MPS represents the change in savings resulting from a change in disposable income. Thus $MPS = \frac{\Delta S}{\Delta Y}$

- Ratio of change in savings to change in income

Since the additional income is either consumed or saved, the sum of the Marginal Propensity to Consume (MPC) and the Marginal Propensity to Save (MPS) is equal to one, which can be mathematically proven. From C + S = Y

It follows that any change in income (ΔY) must induce either a change in consumption (ΔC) or a change in saving (ΔS). Thus, ΔC + ΔS = ΔY.

Dividing both sides by ΔY, we have $\frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y} = 1$.

As $\frac{\Delta C}{\Delta Y}$ is MPC and $\frac{\Delta S}{\Delta Y}$ is MPS, MPC + MPS = 1

2.1.2 Kuznets' Consumption Puzzle

Kuznets conducted a study about savings and consumption in the U. S. economy for the period of 1869 -1938. The results of the study revealed that the APC ratio varied inversely with the level of income; so the MPC < APC in the short run,

- In the short run, MPC < APC while MPC =APC in long run

while in the long run, APC is never falling downwards so that APC = MPC. Thus, the conflict between short-run and long-run consumption functions is called the consumption puzzle. Kuznets' study suggested that during the cyclical fluctuations, the APC ratio varied inversely with the income which means that when the APC ratio was below the long-run average during the boom, while in the economic slump period, APC was above the average. So, empirical studies would show that the slope of the consumption function is like that of the short-run function of the figure 2.1.3 than the long-run. By the late 1940s, it became evident that a comprehensive theory of consumption was needed to address the three observed phenomena.

1. The cross-section budget studies reveal that the $\frac{S}{Y}$ increases as income rises; therefore **MPC < APC.**

2. The cross-section budget studies reveal that in the business cycle or short run, the APC ratio is smaller than average income during the boom period and greater than average during the depression. Therefore, in the short run, income change with consumption so the **MPC < APC.**

3. In the long run, there is no tendency for the APC to change. Therefore**, MPC = APC.**

This is explained with the help of the figure given below.

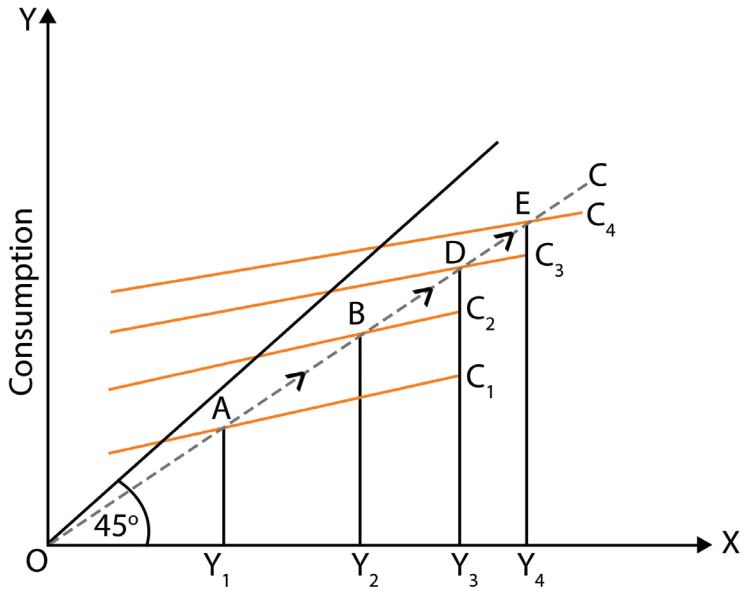

Fig 2.1.3 Kuznets' Consumption Function

In the above figure, the X axis shows the income and the Y axis shows the consumption. The line starting from the origin represents the long-run consumption function. When an income increases consumption does not fall, therefor APC=MPC in the long run. During the short run and cyclical period, consumption changes with the level of income, hence, the slope of the short run consumption function compared to the long run.

2.1.3 Absolute Income Hypothesis

- Absolute income determines the consumption

In the general theory, Keynes emphasized that disposable national income is a chief determinant of aggregative consumption expenditure. He assumes that consumption is proportionately related to income which means that when income increases consumption also increases. The hypothesis states that consumption is a function of current income regardless of whether the relationship is linear or nonlinear, which is known as the absolute income hypothesis. The absolute income hypothesis has been derived from his psychological law which states that when income increases consumption also increases but the increased consumption is less than the increased income.

Keynes has suggested that the income-consumption relationship is based on three facts:

1. The current absolute consumption is determined by the current absolute income.

2. The nature of income consumption relation is reversible. This means that when income increases people increase their consumption, in the same way when income falls, people would reduce their consumption.

3. The spending habits of the people are completely different from others which means that the independent consumption pattern is followed by each consumer.

2.1.3.1 Keynesian Short-Run Consumption Function

Keynesian studies show that consumer expenditure behaviour may fluctuate with changes in income in the short run and in the cyclical period. He states that people keep their

- Non-proportional income and consumption relationship in the short run

consumption expenditure by not reducing the consumption proportionally when an income falls. On the other hand, as income increases, consumption does not rise in proportion; however, the proportion of income saved also increases, particularly among the wealthy. The feature of the Keynesian short-run consumption function can be explained with the help of the following figure.

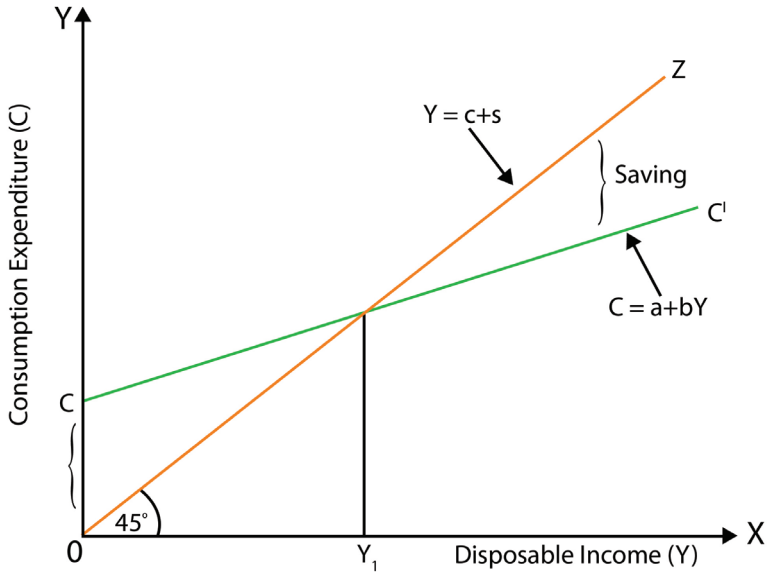

Fig. 2.1.4 Short Run Consumption Function

- Income-consumption lag results in savings

In the above figure, the X-axis denotes disposable income, while the Y-axis represents consumption expenditure. The CC′ curve is depicted as the consumption function curve. Notably, the position of the line OZ starts from the origin and it maintains equal distance from the X-axis and Y-axis. When the consumption function curve OZ line shows the amount of consumption as equal to the income (Y = C) at any given level of income, the CC′ consumption function curve diverges from the OZ line due to the Psychological Law of Consumption. Initially, the CC′ lies above the OZ line at lower income levels, indicating that consumption exceeds income. This implies that the individual may depend on savings or borrowings to support consumption. At a point when OY1 consumption equals income, resulting in zero savings. Beyond OY1, as income increases further, the CC′ curve lies below the OZ line. The widening gap between the two line represents savings.

2.1.4 Drift Hypothesis of Smithies

The drift hypothesis is suggested by Arther Smithies. One of the earlier attempts to reconcile the short-run and long-run

consumption functions was provided by Arthur Smithies. He believed that the income-consumption relationship is non-proportional and that APC falls as income rises. The non-proportional relation is shown in the short run. People's spending habits, which were initially not very sensitive to changes in income, gradually changes over the years as income rose. Over the long run, as income increases, the behaviour of consumers changes, but the APC does not fall and there is a slow and continuous upwards drift in the consumption function. In the words of Smithies, some factors are responsible for the upwards drift in the long-run consumption function. Let us examine them one by one.

- Combine the short-run and long-run consumption function

Smithies noted a continuous migration of the American population from rural to urban areas. His study reveals that, at any specific income level, farmers tend to consume less and save more compared to their urban counterparts. As the population continues to shift from rural to urban areas, individuals experience a higher consumption pattern and find themselves needing to spend more to keep up with the urban lifestyle.

- Lower consumption in rural areas as compared to urban area

A second reason for the drift in consumption is the age distribution of the population. This factor was not suggested by Smithies. More and more people were in the old age brackets, which affected consumption because older people tend to spend money but do not earn much. Since the number of old age people was increasing, the overall consumption function continued to go up.

- incresing consumption amoung old age people

Another factor suggested by Smithies was the introduction of new commodities, and people started using these products as a regular part of their lives. This also affected the consumption function. This factor is independent of income growth, but it can lead to increased spending in relation to income, especially if the available goods are more consistent.

- Incresed spending of new commodities in relation to income

Due to these drifting factors, the consumption function shifts upward in the short run. Consequently, we get the long-run consumption function curve as a straight line starting from the point of origin. That is explained with the help of the following figure.

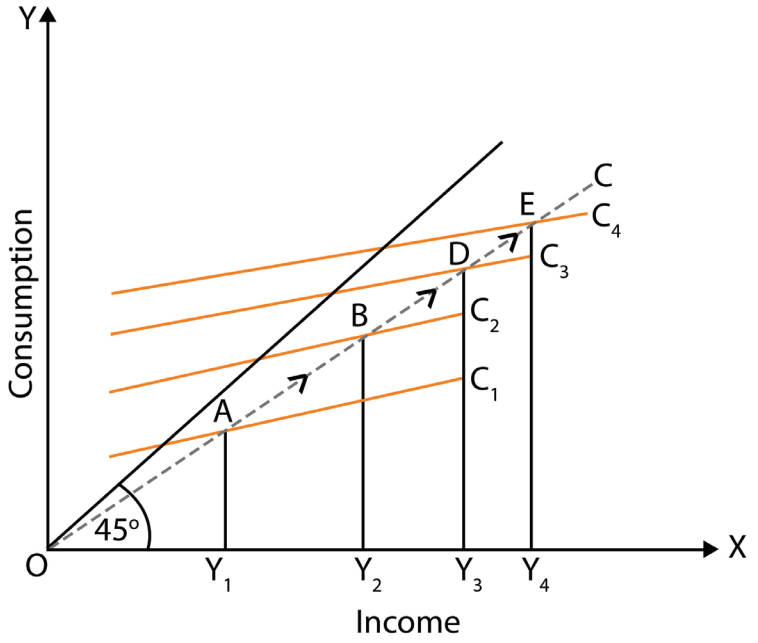

Fig. 2.1.5. Drift Hypothesis

The above figure shows the upwards drift in the long-run consumption function. The curves C_1, C_2, C_3, and C_4 represent the short-run consumption function. In the short run consumption function, which is non-proportional and OC is the long run consumption function which has a continuous upward slope. In the initial short period, the average real income Y_1 produces the average consumption expenditure equal to AY_1. When consumption function shifts from C_1 to C_2, given the level of income Y_1, the consumption spending is equal to the vertical distance between C_2 and horizontal scale at Y_1. But the shift in consumption function increase also in income up to Y_2. At this level of income consumption spending will be BY_2. Similarly, the shifts of consumption function to C_3 and C_4 make the consumption spending to approximate to DY_3 and EY_4 respectively due to the shifting factors.

- Non-proportional income consumption relationship in the short run

2.1.5 Relative Income Hypothesis

- Consumption depends on the previous income

James Dusenbery introduced the relative income theory of consumption in his 1949 publication *Income, Saving, and the Theory of Consumer Behavior*. The relative income theory of consumption is also known as the past income hypothesis. This theory suggests that current consumption is not only determined by current income but also by the income

previously earned by the community. Additionally, the theory maintains that in the short run, income consumption relation is non-proportional and in the long run the income-consumption relation is proportional.

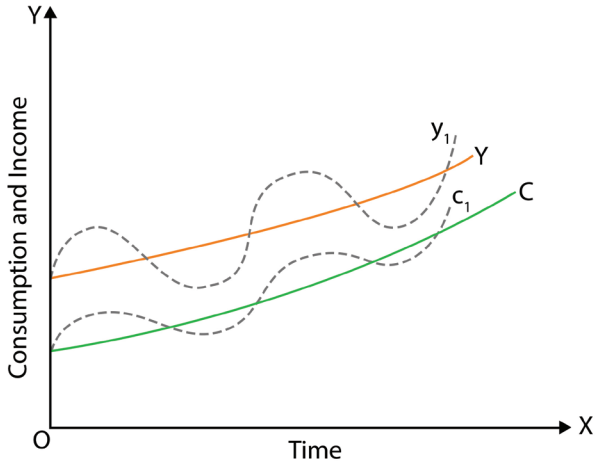

Fig. 2.1.6 Short-run and Long-run Consumption Function

In the above figure, the Y-axis shows the income and consumption, and the X-axis shows the time period. Y is the income curve, and 'C' is the consumption curve. In the long run, consumption increases as shown by 'C' along with increased income denoted by Y. In the long run, any fluctuation occurring in the income curve Y_1 will create corresponding fluctuations in consumption denoted by C_1. The short-term cyclical variations in income and consumption involve lagged adjustments between the two. During periods of economic expansion and contraction, the income and consumption curves move like a cycle, yet consumption tends to be behind income by one period. Peaks and troughs in consumption align with the highs and lows in income, but with a delay of one interval due to the adjustments between current consumption and preceding income.

- Income consumption relation is irreversible

Dusenbery claims that the income-consumption relationship is irreversible. He has written that the income-consumption relation is asymmetrical during the period of contraction and expansion. According to this theory, during the expansionary stage, when income increases consumption also increses. However during the depression period, if the income falls consumption does not fall. In this situation, people tend to

reduce their savings or resort to borrowing to maintain their living standards. This means that consumption cannot be fall when income decreses. This tendency is also referced to as the ratchet effect. The ratchet effect is a combination of short-run and long-run consumption functions. This can be explained with the help of figures.

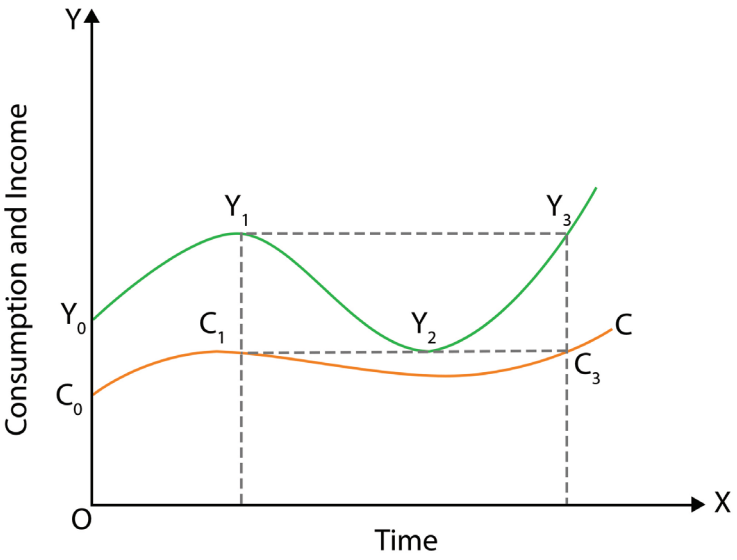

Fig 2.1.7 Ratchet Effect

In the figure C and Y denote the income and consumption respectively in the short run over one cycle. During the period of depression, consumption falls less than the fall in income but it rises in the expansionary period. Y_1 is the previous peak level of income; here the income falls from Y_1 to Y_2, and the corresponding decline of the C_1 is small when compared to income. Then the income increases from Y_2 to Y_3 during the expansionary period and the consumption also increases at a higher rate. Such a type of situation is referred to as the phenomenon where, at higher income levels, people maintain a relatively higher level of consumption even when income falls compared to the previous period. In this scenario, consumption does not decline as much as the decrease in income.

- Income falls but consumption does not fall in same proportion

The relative income hypothesis states that consumers are not concerned about their absolute level of consumption but they are concerned with the relative consumption to the rest of the world. Dusenbery assumes that the utility of a person increases when an individual's consumption rises in comparison to the average income level. Based on this assumption the positions of persons in the income distribution determine their income

consumption ratio. The position of a person with an income below the average income, consumption ratio will be higher because he is trying to keep up with a national average consumption standard which means that the people try to imitate the consumption patterns of others or try to keep up with them. This is known as the demonstration effect. it can be also explained as the individuals' or households' attempt to imitate the consumption patterns of their neighbours or other families in the community, a phenomenon often described as 'keeping up with the Joneses.' This means that people try to match or even surpass the consumption levels of those around them. These explanations clarify MPC < APC and the long-run constancy of APC. If people's incomes grow steadily over time and the income distribution remains stable, there is no need for the consumption-to-income ratio to change.

- People imitate the consumption pattern of others

2.1.6 Permanent Income Hypothesis

The permanent income hypothesis was proposed by Milton Friedman in 1957. Unlike the Keynesian theory, his theory states that the current consumption expenditure depends on the expected future income rather than the current level of income. Friedman termed the long-term expected income as the permanent income. Permanent income is the return on the household's human and non-human wealth. It may be noted that permanent income, or the expected long-term average income, is derived from both 'human and non-human wealth.' Human wealth, often referred to as human capital, encompasses the returns on income derived from selling household labor services, which represent the efforts and abilities of its labor force. This income stream is commonly known as labor income. Non-human wealth, on the other hand, consists of tangible assets such as savings, debentures, equity shares, real estate, and consumer durables. It's noteworthy that Friedman includes consumer durables like cars, refrigerators, air conditioners, and television sets as part of households' non-human wealth. According to Friedman, the imputed value of the services derived from these consumer durables is considered consumption.

- Current consumption expenditure depends on the expected future income

According to the permanent income hypothesis, the consumption is proportional to the permanent income. This relation can be written as $\mathbf{C_P = k\ Y_P}$, where 'C_P' is the permanent consumption, Y_P, is the permanent income, and 'k'

- Consumption and permanent income

is the proportion of income that is consumed, which depends on various factors. These factors are discussed below:

1. Rate of interest

Friedman states that the consumption expenditure is inversely related to the rate of interest. When the rate of interest is higher, people tend to save more instead of consuming more, and vice versa.

2. The proportion of non-human wealth to human wealth

Friedman suggests that the amount of wealth or assets held by the consumer determines their consumption expenditure. People having a higher amount of wealth will be able to achieve a higher consumption level, so we can say that a positive relationship holds between consumption and wealth.

3. Desire to add to one's wealth

Lastly, a household's consumption decisions are influenced by their preference for immediate consumption versus the desire to accumulate wealth or assets. The desire to add to one's wealth rather than fulfil immediate consumption wants is denoted by 'μ.' Then we can rewrite the permanent income hypothesis as $C_p = k\ (i, w, \mu)$. The equation implies that permanent consumption is a function of permanent income. The fraction or proportin of permanent income depends on the rate of interest (r), the proportion of non-human wealth to labour income (w), and the desire to add to stock of asset 'μ'.

- Consumption is proportional to the permanent income

In the permanent income hypothesis, Milton Friedman holds that measured income or actual income which is actually received by a person, is made up of two components that is permanent income and transitory income. Thus

$$Y_M = Y_P + Y_T$$

where Y_M is measured income, Y_P is the permanent income and Y_T is the transitory income. Permanent income may be regarded as the mean income, determined by the expected or anticipated income to be received over a long period. On the other hand, Transitory income is the difference between the current measured income and permanent income. In other words, when a person gets unexpected income from the windfall gains that will increase his total income, the

- Permenent income and transitory income

unexpected income is known as transitory income. Likewise, consumption would involve the permanent and transitory components. Hence it may be written as $C = C_{P+} C_t$ Here the C_P denotes permanent consumption and $C_{t,}$ denotes the transitory consumption. Permanent consumption refers to the planned spending on goods and services throughout a specific period of time. At the same time, transitory consumption means the unanticipated addition and subtraction of consumption. Friedman assumes that

1. There is no correlation between transitory income and permanent income.

2. There is no correlation between permanent income and transitory consumption.

3. There is no correlation between transitory consumption and transitory income.

- Permanent consumption is determined by the permanent income

Based on these assumptions, we can explain the core of Friedman's theory. The first two assumptions are non-controversial. Then the key assumption of his theory is that there is no correlation between transitory income and transitory consumption. This means that the Marginal Propensity to Consume (MPC) of transitory income is zero, and changes in consumption are driven solely by changes in permanent income. When the temporary income rises due to seasonal or cyclical factors, it leads to a rise in savings alone and can have little impact on consumption, just as when an unexpected fall in transitory income would reduce the savings but will not reduce the consumption. Therefore, there is no corelation between transitory consumption and transitory income. So we can say that permanent consumption depends only on permanent income.

- Nonproportional income consumption relationship in the short run

In the short run income consumption relationship is nonproportional where the **MPC < APC**. The reason is that the people are not sure if the increased income will persist into the future. This uncertainty influences their consumption plans. As a result, individuals do not base their consumption patterns on temporary income. Otherwise, if they expect a rise in permanent income, they adjust their consumption expenditure to the higher income level. Thus, in the long run, the income-consumption relationship is proportional so that APC is constant and equal to MPC. The diagrammatical explanation of this relationship is given below.

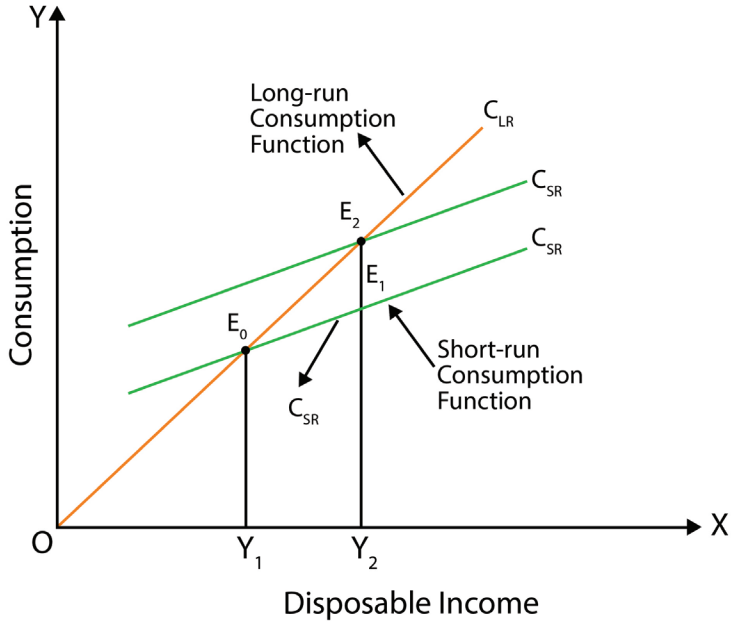

Fig. 2.1.8 Permanent Income Hypothesis

In the above figure X axis represents disposable income and the Y axis represents consumption. C_{LR} curve represents the long-run consumption function which is a straight line starting from the origin. It implies that in the long run, consumption is proportionally related to income. Therefore, APC is constant and APC is equal to MPC. The curve C_{SR} is the short-run consumption function curve which is flatter as compared to the long-run consumption curve. It implies that in the short run, the MPC is less than the APC.

- Income consumption relationship is proportional in the long run

2.1.7 Life Cycle Hypothesis

Ando-Modigliani postulated the theory of the life cycle hypothesis in the early 1950s. This theory combines long-run proportional and short-run nonproportional cyclical consumption behaviour of the people. According to the life cycle hypothesis, consumption is a function of the expected income of a person during his lifetime. The life cycle hypothesis is different from the Keynesian absolute income hypothesis. While the absolute theory states that the current consumption expenditure depends on the current absolute income, Ando Modigliani states that the current period consumption is determined by the present value of resources available to a person from all the sources over his entire life cycle. This theory is built upon certain assumptions:

- Current consumption depends on the present value of future income

1. This theory assumes that consumers behave rationally and have certainty about the future flow of income.

2. The rate of return, rate of interest, and price level are assumed as constant.

3. The net assets of the consumer are the consequence of the savings. No part of his assets is acquired by inheritance and the consumption is directly linked to the assets of a person.

- Nonproportional income and consumption relationship in the short run

The income-consumption relationship is non-proportional in the short run or cyclical period. When an economy is going through the stage of recession, unemployment will occur and redistribution of income will be against the richer section. Due to the factors such as unemployment and redistribution of income, the level of income would fall. Since the income-consumption ratio is lower for the richer section, when the distribution of income is against the richer section, income consumption ratio becomes higher. On the other hand, during an expansion, unemployment will fall and the redistribution of income favours the richer section. Due to increased employment and redistribution of income, consumption will rise, but it is slow as compared to the growth rate of income. Consequently, the income-consumption ratio or APC tends to fall.

- Income-consumption pattern

This hypothesis states that a typical individual has low income and productivity at the beginning and end of their life. While in middle age, income and productivity increase, and individuals are expected to maintain a more or, less constant, or perhaps slightly increasing, level of consumption throughout their lives. This model explains that the person is a net borrower in his early stages of life. In the middle age, he saves more than he consumes. At the end of his life, he will not save anything. He uses his early savings to repay the debt and for consumption at the end of his life. This typical income–consumption stream is explained with the help of figures.

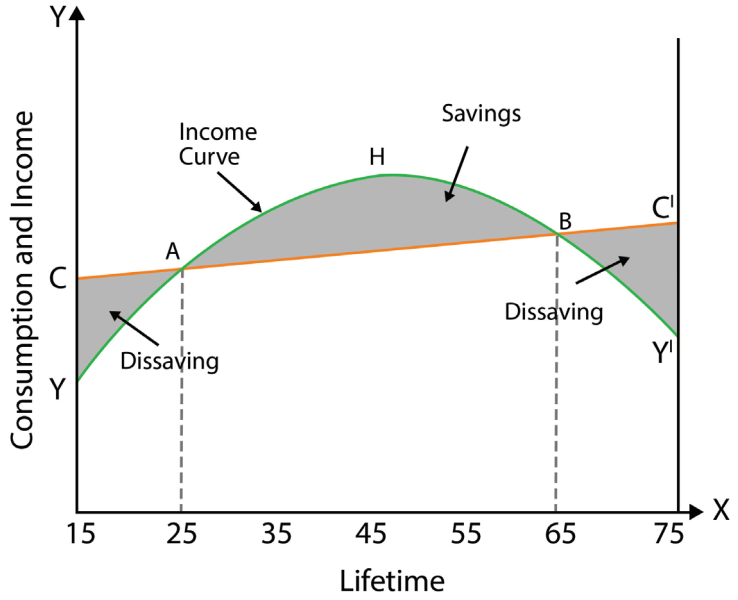

Fig. 2.1.9 Life Cycle Hypothesis of Consumption

- Relation between consumption and savings

The above figure depicts the life cycle hypothesis. This theory assumes that the typical consumer knows about his future life. According to the figure, the person's expected lifetime is around 75 years. The 'CC' represents the consumer's lifetime expected consumption curve which is slightly increasing as the persons grow old whereas the YY represents the lifetime expected income pattern of a consumer. During their early years, individuals may spend on consumption by borrowing or utilising assets inherited from their parents. So, he has no savings till the age of 15. This is shown in the 'YA' portion of the figure. During his working years, shown on the A to B on the graph, they spent less than they earned, resulting in positive net savings. These savings are then invested in assets, creating accumulated wealth that can be consumed in future years, particularly after retirement. In the later years of life, individuals can consume more than their income, yet still maintain or slightly increase their level of consumption throughout their lifetime, including the post-retirement period.

The Ando Modigliani model of consumer behaviour elucidates three fundamental consumption phenomena: 1) Cross-sectional budget studies reveal MPC less than APC, while also explaining the cyclical behavior of consumption, where the consumption is inversely related to income in the short run.2) proprtional income consumption relationship in the long run so MPC = APC. 3) The model considers asset as an explanatory variable in the consumption function.

2.1.7.1 Criticism of the Model

1. The model assumes that the consumer is rational. He can know about the future income sources. Therefore, he can make the current expenditure based on expected future income. In real life, no one is certain about his future income source. Therefore, this assumption is not valid.

2. The next assumption is that the price remains stable over the entire lifetime. In real life, price variations will occur unexpectedly. So, the price affects the consumer's consumption expenditure. Therefore, this assumption is invalid.

3. This theory assumes a direct relationship between assets and the consumption expenditure. Such a relationship is invalid because of the possibility of the consumer having cut down their consumption when they hold large assets.

4. Another assumption is the constancy of the rate of asset returns or the rate of interest. But in real life, the rate of returns on assets is a continuously changing factor.

2.1.8 Robert Hall's Random Walk Hypothesis

- Current consumption is the best indicator of future consumption

The random walk hypothesis of consumption function was set by Robert E. Hall. The hypothesis is a modern approach of consumption function which is concerned with consumer behaviour under uncertainty. Robert E. Hall was the one who envisioned the application of rational expectation theory to consumer behaviour problems. Rational Expectation means that the expectation is formed based on all relevant information available at the time. The random walk hypothesis explains that the current consumption level is the best forecast of future consumption and that consumption changes only in response to unpredictable changes in income. Empirical evidence proves that a large part of aggregative consumption follows a random walk 'consistent with the rational expectation hypothesis, but at the same time, many consumers behave as if they have static expectations. Under static expectation, the change in consumption depends on the change in the consumer's total income.

The random walk hypothesis states that the consumers receive utility from consumption in a particular period. The lifetime utility is the sum of period-by-period utility and the lifetime budget constraint, which is the sum of period-by-period consumption. The consumption decision in each period is made by consumers to maximise their lifetime utility. This optimisation is carried out when the consumer keeps the lifetime consumption equal to the lifetime resources which includes both wealth and income throughout the remaining life cycle.

Lifetime Utility = U(Ct) + U (Ct+1) +.....+U (C_{n-1}) + U (C_n)

- Consumers try to maximise their lifetime utility

Where U is the utility in the consumption, t is the current period consumption and C t+1 is the expected consumption.

And subject to constraint Ct + Ct + 1.....+ Cn = Wealth + YL1 + YL + 1 + YLn-1 + YLn.

- Observed consumption in the future can be expressed as the sum of expected consumption and a random surprise element

Consumers make choices regarding their consumption in each period with the aim of maximising their overall lifetime utility. However, consumers face a budget constraint on their consumption decisions, meaning that the total lifetime consumption must not exceed the total lifetime resources available, comprising a combination of wealth and income. This constraint ensures that individuals make realistic choices within their means. The optimal consumption decisions are determined by equalising the marginal utilities of consumption across different time periods. Marginal utility represents the additional satisfaction gained from consuming one more unit of goods. By equalising marginal utilities, individuals allocate their consumption in a way that ensures the additional satisfaction gained per unit is similar across all periods. In cases where the marginal utility in time period t is higher than in period t+1, strategically shifting some consumption from period t+1 to period t could increase lifetime utility. The rationale behind this lies in the fact that the gain in satisfaction from consuming a bit more in period t exceeds the gain from consuming the same amount in period t+1, ultimately leading to an overall increase in lifetime utility.

When introducing uncertainty into the model, it is acknowledged that consumers may lack precise information about future conditions. As a result, they make decisions based on the expected or average marginal utility of the

future.Robert Hall's random walk model of consumption posits that observed consumption in the future (C t+1) can be expressed as the sum of expected consumption E (Ct+1) and a random surprise element (e), that is C t+1 = E (C t+1) +e. The surprise element (e) is considered random and unpredictable. When incorporating the rational expectations framework and assuming that expected consumption E (C t+1) is equal to current consumption (Ct). This formulation suggests that consumption tomorrow is expected to be equal to consumption today plus a random error (e), emphasizing the unpredictable nature of the surprise element.

Summarised Overview

The absolute income theory proposed by J. M. Keynes, states that consumption depends on current income and focuses on the short-run period. Afterward, the drift hypothesis was proposed by Arthur Smithies. He reconciles the short-run and long-run consumption functions. Dusenbery's relative income hypothesis states that individuals compare their income to others in society and their consumption decisions are influenced by their position in the income distribution. The Permanent income hypothesis, put forward by Milton Friedman shows that individuals tend to smooth out their consumption over time, taking into account their long-term income prospects, including expected changes in income. The life cycle hypothesis proposed by the Ando Modigliani argues that consumption depends on the present value of an individual's income or wealth. According to this view, people plan their consumption patterns over their lifetime based on their expected future income and wealth and they maintain a stable level of consumption throughout different stages of life. The essence of these theories collectively provides a clear picture of how a consumer makes consumption decisions in financial circumstances and provides broader social comparisons and long-term financial expectations.

Assignments

1. Compare and contrast the Keynesian consumption function with the permanent income hypothesis.
2. Investigate how changes in consumption impact the overall economy and contribute to economic fluctuations.
3. How does the drift hypothesis challenge the traditional Keynesian view of consumption behaviour?

4. How does the permanent income hypothesis explain the relationship between consumption and income?

5. Discuss criticisms or limitations of various consumption theories.

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 2
Theories of Investment

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the basic ideas of investment
- know the various investment theories
- explore the Post Keynesian view of investment

Background

Investment activities play a significant role in promoting economic prosperity because they are among the foremost economic activities that can be undertaken by businesses, consumers and governments. Investment is a significant component of aggregate demand, playing a pivotal role in shaping national income and GDP. Additionally, investment is a critical determinant of employment and unemployment in an economy. Whenever the economy experiences a low level of investment, the result can be a depletion of capital stock and potential job losses. Today's investment lays the groundwork for future economic activities because the accumulation of capital resources leads the way for the production of goods and services and shapes tomorrow's economic activities. Moreover, investment does not only impact commercial entrepreneurs, it also influences the economic decisions of ordinary individuals and the economic policies of the government.

Another model related to investment is the accelerator, which explains output growth as a key determinant of fixed investment. Additionally, we explore Georgeson's model of investment theory within the neoclassical concept. Moreover, we examine the most influential version of the Q theory, which explains stock market investment fluctuations. We will also explore post-Keynesian theories of investment, exploring the perspectives of Minsky and Kalecki.

Keywords

Investment Demand, Marginal Efficiency of Investment, Tobin's q Ratio, Accelerator, Capital Stock Adjustment, Super Multiplier

Discussion

2.2.1 Investment Demand

- Accumulation of real capital over time by a firm

Investment refers to the accumulation of real capital over time by a firm. Real capital goods can be divided into fixed capital and working capital. Fixed capital consists of plants, machinery building and transportation. Fixed capital can keep its physical form throughout the operational lifespan. Working capital consists of a stock of raw materials, manufactured inputs and final goods for distribution. Each unit of working capital changes its form from the beginning of the production process to the final consumer goods.

- Components of AD

Investment is one of the major components of aggregative demand along with consumption and net exports. In the components of aggregative demand, investment is smaller than consumption and is more volatile among them. In the Keynesian analysis, investment is a crucial factor because it makes short-term changes in the aggregative demand. On the supply side, investment could change the real capital stock of the economy. The accumulation of capital is an essential factor in economic growth. This has two aspects: First, investment has positive returns when the acquisitions of capital enable the economy to produce more goods and services in the future. The Secondly, given the state of technology, when technical progress occurs it becomes a special part of capital equipment.

When an entrepreneur acquires physical, fixed capital, such as plant and machinery, it is referred to as fixed asset investment. This type of investment involves the purchase of durable assets that contribute to the long-term productive capacity of the business. Gross investment covers the total expenditure on investments and is calculated as the sum of net investment and replacement investment. Net investment represents

the increase in capital stock, while replacement investment means maintaining the existing capital stock. Additionally, entrepreneurs may undertake inventory investment, which pertains to the accumulation of working capital, including goods produced but not yet sold. Furthermore, intangible investment involves the accumulation of non-physical assets, such as technical know-how, showcasing the importance of non-material elements in contributing to the overall value and competitiveness of a business. The capital stock undergoes deterioration over time due to wear and tear in use. This decline is termed depreciation. Additionally, economic obsolescence may affect the capital stock, occurring when existing capital becomes out of work due to technological or structural changes.

- Forms of Investment

2.2.1.1 Determinants of Investment Demand

The investment is determined by various factors which can be divided into two heads; they are exogenous and endogenous factors. Let us explain how these factors influence the investment demand.

A. Endogenous factors

Endogenous factors are those directly capable of shifting investment in the short run, existing within the economic system. Such endogenous factors are given below:

1. **Level of Income**: The investment in an economy depends on the current level of returns and the expectation of higher income in the future. The investors expect higher income returns in the future which will result in rising investment as well as investment demand shifting upward. When an entrepreneur thinks that the level of returns will fall in the future, the investment expenditure will be curtailed because the current state of affairs will affect the future change in income.

- Higher income, higher investment

2. **Trend of Consumer Demand**: The existing demand for consumer goods will increase the higher aggregative spending upon these goods and the prospects of profit will get bright when additional investment occurs. On the other hand, if the demand for certain categories of goods is expected to decrease it will dampen the investment in those goods.

- Higher demand, higher investment

- Supply price rise results in investment falls

3. **Price Level:** During a period of inflation, the product price becomes higher. This situation would give opportunities for windfall profit to investors and so, the investment rises in an economy. When the price rises after a certain point, it adversely affects the investment because the supply price of capital rises and it affects the profit margins of firms. During a deflationary period, which will adversely affect investment because the price of the product falls, it affects the profit margin of the firms; so, the firm curtails investment.

- Money wage rate determines investment

4. **Money Wage Rate:** The classical economist view is that when the money wage rate rises, the cost of production becomes higher; therefore, the entrepreneur may reduce further investment. According to the Keynesian view, when the money wage rate rises, the aggregative demand becomes higher, which will enable producers to enhance their production.

- Speculative activities may influence investment

5. **Speculative Activities:** The optimistic and pessimistic views of speculators about the future will affect the investment schedules. If the short-run stock prices are unfavorable, the speculators think that this situation will continue in the future. The result of this anticipation will reduce further investment. Taking this into account Keynes says that "the capital development of a country becomes a byproduct of the activities of a casino."

B) Exogeneous Factors

In the long run, some factors greatly influence the level of investment which are independent of the level of income. They are known as the exogenous factors. Some of the exogenous factors are discussed below.

- Technological innovations enhance investment

1. **Technological Developments:** Technical development will encourage entrepreneurs to enhance investment spending in various fields. Technological innovations and inventions such as improvements in old products, machinery and equipment and organizational change would open the way for new markets that raise investment opportunities. For instance, the invention of artificial intelligence has been significantly shifting the investment in different fields.

- Discovery of new natural resources raises the long-run investment

2. **Natural Resources:** Natural resources are an asset of each economy. The discovery of new sources of raw materials and change in the exploitation of potential resources will greatly influence the long-run investment plan of the entrepreneur. For instance, the discovery of unconventional fossil fuels might increase the production of other raw materials at low cost and instill greater confidence among entrepreneurs.

- Labour market trouble will decrease investment

3. **Labour Movements:** The labour market conditions greatly influence the investment behavior of the economy. Continuous strikes and lockouts could change the attitude of the entrepreneurs and they would withdraw investment from the market. So, the investment schedule may shift downwards.

- Political conditions will influence the investment

4. **Political Environments:** A nation which is peaceful, orderly and free from internal disorder and external aggregation will be the investment source over a long-run period. The possibilities of political disturbance, violence and uncertain circumstances will reduce the investment in a nation.

- The optimistic nature of economic policies enhances the investment

5. **Monetary and Fiscal Policy:** The nature of the tax structure as well as the regulations of money supply and credit will influence new investments. When the new economic policies of the government are optimistic it will be able to encourage new investment undertaken by the entrepreneurs because it ensures larger profit margins.

2.2.1.2 Investment Demand Curve

- Inverse relationship between the rate of interest and investment

The investment demand curve serves as a tool for economists to illustrate the relationship between interest rates and investment. The rate of interest stands as a key determinant significantly influencing investment decisions. The rate of interest and investment are inversely related. Suppose you are an entrepreneur; you may initially use your savings to fund your business. However, if the funds from these sources are insufficient, you may turn to a bank for a loan. The amount and terms of the loan will depend on rate of interest. If the current interest rate is high, you will hesitate to take a loan because the cost of borrowing is higher. Conversely, when the interest rate is low, the cost of borrowing decreases. You will

then be able to get the loan at a lower cost which will increase the investment. Due to the inverse relationship between the rate of interest and investment, we get a downwards-sloping investment. This inverse relation is shown in the figure given below.

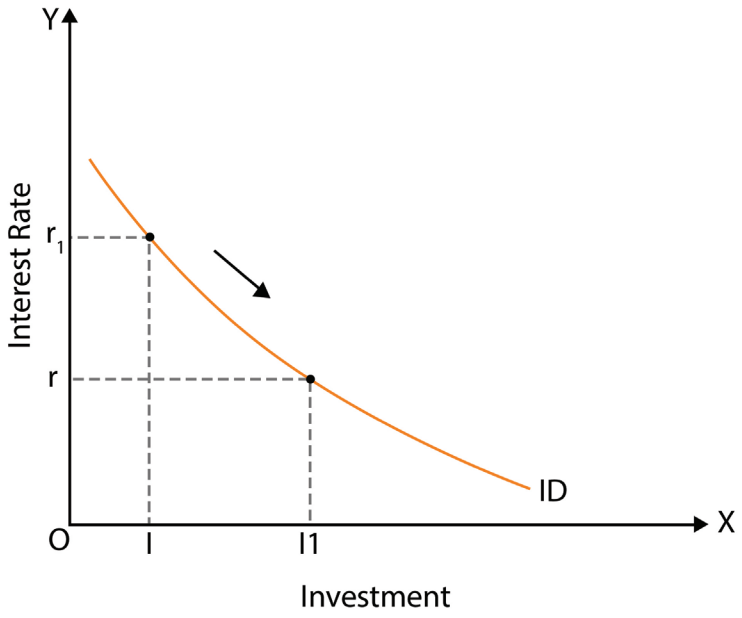

Fig 2.2.1 Investment Demand Curve

The initial interest rate is r, here the rate of investment lies at I1. When the rate of interest rises from r to r1, the level of investment falls from I1 to I because of the higher cost of investment. The graph gives us proof of the inverse relationship between the rate of interest and investment. On the basis of this inverse relationship, we get the downward slope of the investment demand curve.

2.2.2 Keynesian Approach to Investment

Keynesian Investment Theory explains how investment decisions are shaped within an economy and emphasises the role of factors such as the Marginal Efficiency of Capital (MEC) and the prevailing rate of interest in influencing the decisions of investors. These factors ultimately impact economic activity, employment, and overall macroeconomic stability.

2.2.2.1 Marginal Efficiency of Capital

- MEC is directly related to investment

Keynes states that the Marginal Efficiency of Capital (MEC) is the key determinant of investment, explaining the expected profitability of an investment. The MEC represents the discount rate that makes the present value of an investment's expected future returns (demand price) equal to its current replacement cost (supply price). In making investment decisions, a rational investor or firm compares the MEC with the prevailing interest rate. If the MEC is greater than the interest rate, it suggests that the investment is potentially profitable, and the investor may decide to undertake the investment. Conversely, if the MEC is low, showing less attractive expected returns, businesses may be less interested to invest.

2.2.2.2 Rate of Interest

- Rate of interest is inversely related to investment

Keynes suggests that interest rates play a significant role in investment decisions. Keynes introduces the liquidity preference theory to explain the behavior of interest rates. According to this theory, individuals and businesses have a preference for holding liquid assets, such as money, due to their convenience and certainty. This preference affects the demand for money and, consequently, interest rates. Keynes argues that factors such as the liquidity premium (the additional return required to hold less liquid assets) and transaction costs influence interest rates, preventing them from falling to zero. Keynes emphasizes the impact of expectations about future economic conditions, particularly future interest rates, on investment decisions. If entrepreneurs anticipate a decrease in interest rates in the future, they may delay current investments because they expect better returns on investment in the future when borrowing costs are lower. Conversely, expectations of rising interest rates may prompt investors to accelerate investment to lock in lower borrowing costs now.

2.2.2.3 Keynesian Investment Demand Schedule

Keynes utilises the investment demand schedule as a tool to investigate the relationship between the Marginal Efficiency of Capital (MEC), interest rates and investment decisions. Keynes constructs the investment demand schedule by aggregating the MEC schedules for various types of capital goods. He argues

that the Marginal Efficiency of Capital (MEC) for a specific type of capital tends to decrease with increased investment. This decline is influenced by two primary factors: first, a reduction in prospective yield due to an augmented supply and falling market prices and second, the application of the law of diminishing returns. These factors collectively contribute to shaping the MEC and, consequently, influence investment decisions in the economy. Let us explain this with the help of a graph:

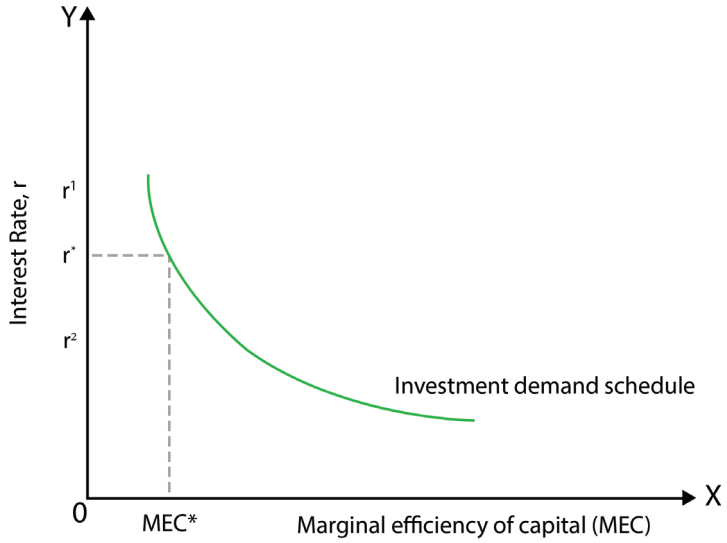

Fig. 2.2.2 Keynesian Investment Demand Schedule

- Downward sloping investment demand curve

The horizontal axis represents the MEC, and the vertical axis represents the rate of interest. The downwards-sloping line represents the Investment Demand Schedule, which aggregates the MEC schedules for various types of capital goods. Investment is determined where the MEC, in general, equals the prevailing interest rate (MEC* = r*), at this equilibrium point is where the prospective yield from a marginal investment exactly equals its supply price.

2.2.3 Marginal Efficiency of Capital

The marginal efficiency of capital is set forth by John Maynard Keynes. Marginal efficiency of capital may be defined as the expected rate of profit from an additional unit of investment in certain capital goods. The MEC is measurable. Suppose an entrepreneur invests money in a particular type of goods. He or she can estimate the expected rate of profit from it. For this

- MEC depends on supply price of capital and prospective yield of capital

estimation, he or she should know the supply price of capital or cost of capital and the prospective yield of capital assets. The supply price refers to the cost incurred by an entrepreneur when acquiring a specific factor of production or capital goods, encompassing expenses like wages, raw materials, and the cost of capital. Additionally, the entrepreneur should anticipate how much yield is obtained from the sale of the specific capital goods, which is known as prospective yield from the investment. It can be said that the Marginal Efficiency of Capital is determined by the supply price and prospective yield from capital assets.

- MEC on investment decision

In the words of Keynes, "I define the marginal efficiency of capital as being equal to that rate of discount which would make the present value of the series of annuities given by the returns expected from the capital asset during its life just equal to its supply price." Thus, MEC is the discounted rate that equates the present value of capital assets and expected future cash flows to the cost of those assets. Therefore, we can obtain MEC in the following way:

$$C = \frac{R_1}{1+r} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} ..... + \frac{R_n}{(1+r)^n}$$

In the above equation 'C' refers to the supply price of capital or replacement cost of capital. R_1, R_2, R_3 and Rn denote the prospective yield from the capital assets, and 'r' is the rate of discount which renders the annual prospective yield or equal to the supply price of capital assets.

The MEC can be explained for particular types of capital assets as well as in general terms. We have already explained the MEC for a particular type of capital asset. Now, let us explain the MEC in more general terms. The MEC in the general case shows the scope of investment opportunities in any economy at a particular point in time. In other words, MEC in general represents the highest expected rate of return to the economy from an extra unit of capital assets which yields the maximum profits that could be produced.

When we invest more in a given capital asset, the MEC will vary accordingly. If an entrepreneur undertakes more investment in a particular capital asset, the MEC will be decreased because the expected yield from capital assets decreases when more

- MEC will slope downwards as the stock of capital increases

units are installed for production. Prospective yield declines because producing more goods with a larger amount of capital asset can lead to lower prices. Another reason for the decrease in MEC is that the cost of producing capital assets may go up due to increased demand, causing a rise in production costs.

2.2.4 Lags in Investment

- Lag between investment and output growth

The lag in investment refers to the time delay between investment decisions and the corresponding response of investment activities. Various lags are involved in investment for several reasons: gestational delays arise between identifying investment opportunities, planning projects, making investment decisions, ordering, delivering, and paying for investment expenditures, as well as initiating new investment projects.

- Flexible accelerator theory

The concept of lag in the investment process can be effectively explained through the framework of the flexible accelerator theory of investment. The flexible accelerator theory posits that there are various lags between investment and output growth. This theory suggests that investment and output growth do not immediately occur due to the influence of various lags. These distributed lag structures include decision-making, planning, ordering, delivery, installation of new investment projects, and the formation of expectations. Goodwin and Chenery developed the 'flexible accelerator' models. Goodwin (1948) introduced a basic flexible accelerator model, illustrating how entrepreneurs gradually adjust their desired capital stock over several periods.

- Periodic additions of capital, fill the gap between existing and desired capital

The Flexible Accelerator Theory explains how firms bridge the gap between their existing and desired capital stock through an incremental approach, resulting in a lag in investment. Unlike an immediate adjustment, the process involves gradual steps over multiple periods to reach the desired capital stock, essential for optimal production and efficiency. The desired capital stock is influenced by factors such as the real rental cost of capital and output levels. However, due to the complexity of these adjustments, they don't occur instantaneously, leading to lags in capital stock modifications. Firms typically opt for partial adjustments or periodic additions of capital, progressively narrowing the gap between existing and desired capital. The pace of these adjustments is contingent upon various factors including credit availability, interest rates,

and tax policies. Lower interest rates, for instance, often spur increased investment, contributing to the gradual reduction of the gap. Thus, the concept of lag in investment arises from the incremental nature of adjustments, reflecting the intricate process firms undergo to align their capital stock with optimal levels over time.

2.2.5 Accelerator Theory of Investment

- Demand for Capital goods is derived from the demand for consumer goods

The accelerator theory of investment, developed by J. M. Clark's, posits that the demand for capital goods is derived from consumer goods. Specifically, when income increases, individuals' consumption rises, leading to a greater demand for goods and services. This heightened demand for consumer goods necessitates additional investment in capital goods, thereby increasing investment opportunities. The theory suggests that changes in consumption or income can lead to proportional changes in investment.

J. M. Clark's acceleration principle is based on certain assumptions:

1. The capital-output ratio remains constant. The capital-output ratio (COR) represents the quantity of capital required to produce a one unit of output.
2. The lack of additional capacity in the consumer goods industry.
3. Capital goods industries hold the surplus productive capacity.
4. The change in the demand for output is permanent.
5. Absence of time lag between the production, demand and the supply of output.
6. Fund supply is perfectly inelastic.

To produce a given amount of output (Y_t), a certain amount of capital is required. If v represents the capital-output ratio, the necessary amount of capital (K_t) to produce Y_t output can be calculated using the following equation:

$$K_t = vY_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Here Kt stands for stock of capital, Y_t for the level of output or income, and v for capital-output ratio. The accelerator theory assumes that the capital output ratio is constant. Under the assumption of a constant capital output ratio, changes in output are attributed to variations in the stock of capital.Thus, Y_t represents the output or income. The required stock of capital to produce this output is $K_t = vY_t$. When the output or income is equal to Y_{t-1}, the required stock of capital is

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

It is clear from above that when output or income increases from Y_{t-1} in period t–l to Y_t in period t, the stock of capital to produce it will increase from K_{t-1} to K_t. As seen above, K_{t-1} is equal to v Y_{t-1} and K_t is equal to vY_t. Hence, the increase in the stock of capital in period t is given as in the following equation:

- Constant capital output ratio

$$K_t - K_{t-1} = vY_{t-1}\ vY_{t-1}\text{.....(2)}$$

Since the increase in the stock of capital in a year ($K_t - K_{t-1}$) represents an investment in that year, the above equation (2) can be written as below:

$$I_{tl} = v(Y_t - Y_t - 1)\text{.....(3)}$$

- Investment will vary with the income

Equation (3) reveals that due to an increase in income in any given year t compared to the preceding year t−1, investment or the rise in capital stock will be v times greater than the increase in income. Hence, it is v that is capital output ratio, which represents the magnitude of the accelerator. For instance, if the capital-output ratio is 3, indicating an accelerator value of 3, a certain increase in income will result in a threefold rise in investment. This underscores the idea that investment depends on changes in income. When income or output rises over time (i.e., Y_t is greater than Y_{t-1}), investment is positive. Conversely, if income declines (*i.e.*, Y_t is less than Y_{t-1}), disinvestment occurs. If income remains constant (*i.e.*,$Y_t = Y_{t-1}$), investment is zero.

2.2.6 Capital Stock Adjustment Principle

The capital stock adjustment principle explains how a firm plans to adjust its capital stock over time. The core concept of this model is that the larger the gap between the existing capital

- Exiting capital stock and desired capital stock

stock and the desired capital stock, the more rapid the firm's rate of investment. The term "desired capital stock" refers to the level of capital that a firm aims to maintain or achieve for optimal production and operational efficiency. The "existing stock of capital" refers to the quantity of capital goods and other physical assets currently available in an economy at a given point in time.

- Capital stock adjustments require time to occur

The desired capital stock depends on the real rental cost of capital and the level of output. Any change in the rental cost of capital and the level of output will affect the desired capital stock. Then any gap that arises between the existing actual capital stock and the desired capital stock will emerge and it takes time for firms to adjust their capital stock to achieve desired levels. This means that the capital stock adjustments cannot occur immediately, so there are lags in the adjustment of actual capital stock to the level of desired capital stock. Hence in each period, the firm makes some adjustments in the capital stock to finally attain the desired capital stock over time.

- The speed of the partial adjustment is determined by the firm

There are several hypotheses concerning the speed at which firms aim to make adjustments in their capital stock over time. One significant hypothesis is known as the flexible accelerator model. According to this model, firms intend to invest by adding capital periodically, making partial adjustments to bridge the gap between the desired and existing capital. In line with the flexible accelerator model, explains that the rate of investment per period by the firm is higher when there is a larger gap between the current and desired capital stock. Partial adjustments or investments, denoted as a fraction (let's call it λ), represent the portion of the total gap between the existing and desired capital stock that a firm decides to address in each period. The aim is to gradually reach the desired stock of capital over time. The speed at which these adjustments or investments occur becomes a variable choice for the firm. It is influenced by factors like the availability of credit, interest rates, corporate tax rates and investment tax credits. For instance, when interest rates are lower, firms tend to be more involved in increased investment, with the goal of narrowing the gap between the desired and existing capital stock. Empirical evidence supports the findings of the flexible accelerator model, indicating that while investment can be volatile, it is not very unpredictable. Let us explain this with the help of a chart:

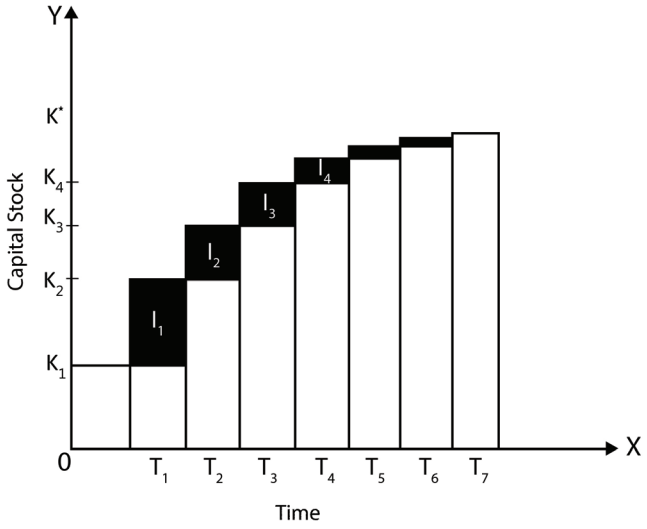

Fig. 2.2.4. Adjustment of Capital Stock and Investment

The above figure illustrates the adjustment of capital stock through investment over time. The horizontal axis represents time and the vertical axis represents capital stock. At the beginning of time period 1 (T_1), the capital stock is denoted as K_1. Let us assume that the desired capital stock is achieved through an investment equal to 0.5 times the difference between the desired capital stock (K*) and the initial capital stock (K_1), which shows the investment (I_1) in period 1. In period t_2, the existing capital stock will be denoted as K_2, and with a given fraction $\lambda = 0.5$, the firm will undertake an investment of 0.5 (K* – K_2), represented by I_2 in the shaded rectangle. The depicted figure reveals that the investment I_2 in period t_2 is less than the investment I_1 in period t_1. This difference arises from the fact that, as net investment or additions to the capital stock occur in period t_1, the gap between the desired and current capital stock diminishes. Consequently, the additional adjustment in capital stock in period t_2 becomes less in absolute terms.

- Rental cost of capital is inversely related to investment

The capital stock continues to undergo further adjustments through additional net investments in subsequent periods. In each period, one half (i.e., 0.5) of the remaining gap is filled until period t_7, when almost the entire gap between the desired and existing capital stock is completely closed. It is noteworthy that a higher value of λ results in a faster filling of the gap between the investment function that depends on both the desired capital stock and the existing capital stock.

- The gap between the desired and existing capital stock is filled by the firm through partial adjustments

Any factor contributing to an increase in the desired capital stock will subsequently enhance the rate of investment. Therefore, an anticipated rise in output and a decrease in the rental cost of capital will lead to an increase in investment. Notably, the rental cost of capital is influenced by variables such as the nominal rate of interest, expected rate of inflation, corporate income tax and the investment tax credit. These crucial factors that determine the rental cost of capital also impact on investment within the economy.

2.2.7 Interaction of Multiplier and Accelerator

- Multiplier and the accelerator interact with each other and are able to influence the economy

Economists such as P. A. Samuelson, J. R. Hicks, R. F. Harrod and A. Hansen have made fairly successful attempts to integrate the multiplier and accelerator concepts and have introduced significant improvements. Acting individually, neither the multiplier nor the accelerator has the capability to influence the economy. Instead, the two tools combine in a series of endless possibilities, depending on the values of the accelerator and the magnitude of the multiplier. In other words, this relationship can be expressed as follows.

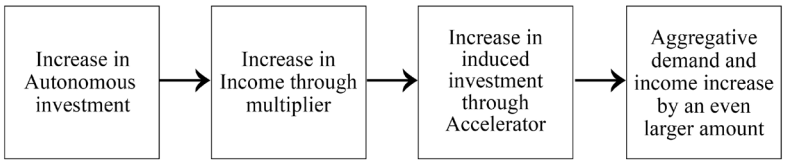

Fig 2.2.5. Interaction Between the Multiplier and the Accelerator

- Super multiplier effect

When autonomous investment increases, it triggers a multiplier effect that leads to an increase in income. This, in turn, affects induced investment through the accelerator, causing even greater changes. As a result, we witness a continuous cycle of action and interaction that leads to further increases in income. This process is known as super-multiplier.

Suppose the government increases its spending on infrastructure projects such as building roads and schools. This autonomous investment injects money into the economy, leading to increased construction activity and employment (multiplier effect). As incomes rise, individuals and businesses

may feel more confident about future economic prospects, prompting firms to invest in expanding production capacity to meet anticipated demand (induced investment through the accelerator effect). The increased production capacity further boosts economic activity, leading to even greater income growth. This cycle of increased government spending, followed by multiplier and accelerator effects, perpetuates the process of economic expansion. Hansen named the total effect of the initial increase in investment on income (caused by the multiplier and accelerator interaction) the leverage effect. The multiplier and accelerator principles reinforce each other, which leads to substantial changes in income. Furthermore, J. R. Hicks has combined the multiplier and accelerator principles to form the super multiplier, which has a greater impact than the simple multiplier.

- Leverage Effect

2.2.8 Jorgenson's Neoclassical Theory of Investment

- Emphasizes the role of user cost of capital

The Jorgenson's neoclassical theory of investment elucidates the significance of the user cost of capital for firms in determining their optimal production levels. When the user cost of capital is equivalent to the marginal product of capital at which the firm achieves profit maximisation level. The neoclassical theory of investment builds on certain assumptions. They are given below:

1. Labour and capital are perfect substitutes for each other.
2. The capital equipment of the firms is either purchased or rented.
3. Linear homogeneous production function.
4. The firms aim to maximise the present value of net profits within the various market and non-market constraints.
5. Both the product and labour market face perfect competitive conditions.
6. The economy faced a full employment situation.
7. The depreciation of capital takes place at a constant rate, δ per period.

- Firms maximize profit when the marginal product of capital equals the rental cost of capital

Jorgenson's Neoclassical theory of investment emphasizes the user cost of capital. User cost means the rental cost paid by the firm for hiring capital services. Or it is the net cost of keeping a unit of capital stock for a particular period. Generally, the capital is purchased in one period and used several times, therefore, the supply price of capital cannot equal the value of marginal productivity of capital. Sometimes the firm, takes on rent instead of buying the unit of capital assets, so the firm should be paid a rental cost. The rental cost we call as user's cost. Under these circumstances, the profit-maximising firms would be buying capital services on rent up to a point where the marginal product of the firm becomes equal to the rental cost of capital.

- Determining factors of user cost of a firm

The user cost of capital (C) depends on various factors. They are the supply price of a unit of capital (C_r), interest rate (r), depreciation rate of capital (δ), the corporate income tax (tc), the speed of depreciation (d) and the proportion of current investment expenditure permitted to be deducted from the tax liabilities of the firm (k)

$C = f [Cr, r, tc, d, k, \delta]$.

Here the user cost (C) is directly related to Cr, r, δ, and tc and is inversely related to the depreciation (d) and the tax liabilities (k).

- user cost (C) is a direct related to Cr, r, δ, and tc.

Now, let us see how these variables are connected with user cost in the words of Jorgens. Here, the user cost (C) is a direct function of $C_{r,}$ r, δ, and $t_{c..}$ The user cost is directly related to the supply price of capital assets. The higher the supply price of capital, the higher the user cost, and *vice versa*. Likewise, the user cost and rate of interest are directly related. Here we consider the rate of interest to be a real rate of interest rather than a nominal rate of interest. The real rate of interest can be calculated by deducting the rate of inflation from the nominal rate of interest. Nominal intrest rate is the stated intrest rate actually paid for a loan. The depreciation is also directly varying with the user cost of capital. The higher the rate of depreciation, the higher the maintenance and replacement cost per unit of capital, and *vice versa*. The corporate income tax influences the user cost of a firm. When the corporate income tax is higher, the result is the net return from the user cost of capital becomes lower or the extra cost of using the capital is higher and *vice versa*.

The user cost of capital is inversely related to the depreciation (d) and the tax liabilities (k) of the firm are also inversely related to the user cost of capital. If a firm allows its capital to depreciate quickly, the present value of the deduction due to depreciation increases, it results in a lower user cost of capital and *vice versa*. In other words, the user cost of capital will increase with the increase in C_R,r, δ, and tc; on the other hand user cost of capital will be lower if 'd' and 'k' are higher and *vice versa*. In Jorgenson's theory, the optimal level of capital stock will correspond with the maximum possible return on investment. The firm can hire the units of capital up to a certain rate where the user cost of capital is equal to its marginal product of capital.

- User cost of capital is inversely related to the depreciation (d) and the tax liabilities (k)

$$C_t = P_t \frac{\partial Q1}{\partial K1}$$

Where Ct is the user cost of the capital in the current period, (∂Q1) / (∂K1) is the marginal product of capital in the current period and P1 is the overall price level in the current period.

2.2.9 Financial Theory of Investment

The financial theory of investment is associated with the names of Dusenbery, Myer, Kuh. W. Loke, and Anderson. The essential feature of the Dusenbery theory of investment is that the volume of investment is determined by the equality between the Marginal Efficiency of Investment (MEI) and the Marginal Cost of Capital. The MEI represents the expected rate of return on an additional unit of investment. The marginal cost of capital refers to the extra cost a firm incurs when obtaining additional capital for investment. Dusenbery contends that changes in investment predominantly happen in response to alterations in the rate of utilisation of existing capacity. The marginal cost of funds schedule is based on the marginal cost. The marginal cost fund schedule that outlines the relationship between the cost of obtaining additional funds and the quantity of funds being raised. It essentially shows how the cost increases as the firm seeks additional capital for investment. The marginal cost of funds schedule can shift in response to changes in the degree of financial risk, as well as changes in the market cost of funds.

- Volume of investment is determined by the equality between MEI and the MCC

Unlike the Keynesian theory, this approach considers the importance of the cost of capital in a firm's investment decisions. The financial theory identifies two sources of funds for a firm to finance such as internal funds and external funds.

- Sources of funds for a firm to finance

The internal funds consist of retained profits and depreciation allowances. The cost of internal funds is calculated in terms of the opportunity cost. It is the yield that the company can get by using funds for buying assets that earn interest. On the other hand, external funds are created by borrowing funds from financial institutions and funds obtained through the sale of bonds or issue of securities. There is a direct interest cost associated with the use of external sources. When the cost of internal funds is less than that of external funds, the firm prefers internal funds, or the firm limits its investment funds.

In addition, the firms often avoid debt financing and usually prefer internal sources, the reason is that the cost of raising external finance increases with the amount raised. When the debt position of a firm worsens it results in the firm becoming a less favoured customer and being subjected to higher borrowing rates.

This analysis depicts that the external source bears higher interest costs than internal financing. Dusenbery maintains that a typical business firm's financing depends on the internal source of funds.

The cost of funds in the initial stage can be calculated through

- Weighted averages of cost of funds of firms

'r1 = Internal fund / Total investment, where 'r1' is the opportunity cost of retained earnings.

- In the middle age, the firms calculate the cost of funds

'r2 = Bond issue / Total Investment, where 'r 2 is the rate of interest on bonds.

- In the final stage of the growth, the firms calculate the cost of funds

'r3 = Equity issue / Total investment', where r3 is the returns on equities.

Throughout all stages of operation, the firm utilizes all sources of finance simultaneously in varying proportions. Consequently, the cost of funds should be calculated as a weighted average of the three respective costs. Weights are given by the proportions of total funds raised from these alternative sources.

$$r = r1\frac{\text{Internal fund}}{\text{Total Investment}} + r2\frac{\text{Bond Issue}}{\text{Total Investment}} + r3\frac{\text{Equity Issue}}{\text{Total Investment}}$$

The marginal cost of the fund schedule can be explained with the help of the following figure:

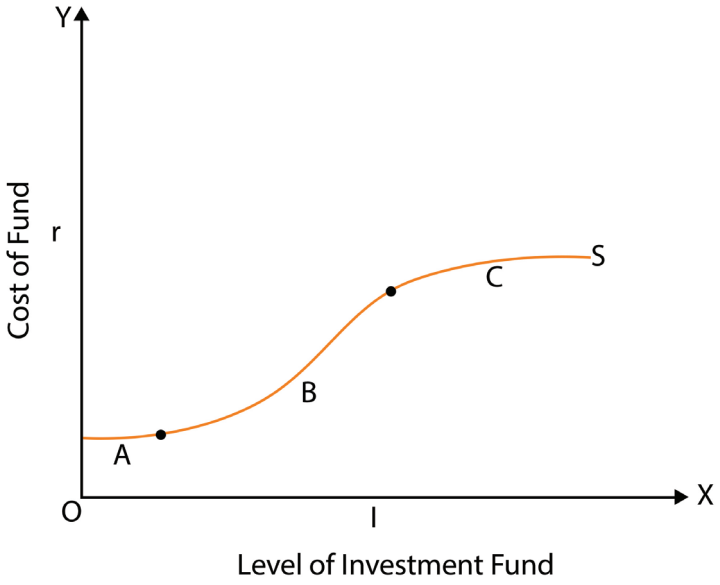

Fig. 2.2.6 Marginal Cost Fund Schedule

In the figure, X-axis represents the investment fund and the Y axis represents the cost of the fund. Then the S curve shows the marginal cost fund schedule or the supply of investable fund schedule. On the S curve point A represents the initial stage of the firm, where the firm uses internal funds for finance. Here, the MCF curve is perfectly elastic, which means the cost of funds to the firm equals the prevailing market rate of interest. In this context, the opportunity cost of funds refers to the interest income that the firm could potentially earn by investing its funds elsewhere. In this region, there are no risk factors involved in the cost of funds. Region B represents funds borrowed through the issued bond. The upward slope of the MCF curve shows that the market rate of interest for borrowed funds rises as their amount increases. However, the sharp rise in the cost of borrowing is not only attributed to the increase in the market rate of interest but also reflects the imputed risk associated with the firm's increased debt servicing obligations. Region C represents the funds collected by the firm through equity financing. In this stage, there is no imputed risk involved because the firm is not required to pay dividends. The gradual upward slope of the MCF curve occurs because as the firm issues more and more of its stock, its market price will fall, and the yield will rise. This means that as the firm issues additional equity, the cost of equity financing increases gradually.

- Financing strategies of firms

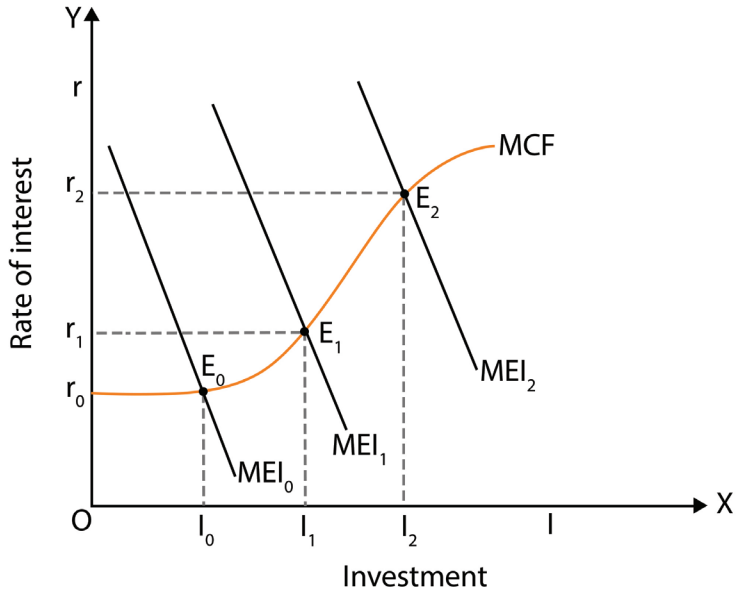

Fig 2.2.7. Equilibrium Level of Investment

- Changes in investment demand affect the equilibrium investment and interest rate

The figure represents the equilibrium level of investment. The X-axis shows the amount of investment fund, while the Y-axis depicts the cost of funds or the rate of interest. The MCF curve represents the marginal cost fund curve, and the MEI curve illustrates the marginal efficiency of investment. The equilibrium level of investment occurs at the point where the MEI curve intersects the MCF curve. In the graph, points E0, E1, and E2 denote the equilibrium points. Suppose the MEI (Marginal Efficiency of Investment) and MCF (Marginal Cost of Finance) curves intersect at point E0, determining an initial investment level of I_0 at the interest rate (the cost of funds) r_0. If the MEI curve shifts to the right to MEI_1 due to an increase in income and capital stock, it will intersect the MCF curve at point E_1. Consequently, there will be an increase in both the cost of funds from r_0 to r_1 and in the investment funds from I_0 to I_1. Notably, internal funds are adequate to cover the increased investment in this stage. However, if the firm further increases investment from MEI_1 to MEI_2, driven by an increase in income and capital stock, but internal funds are insufficient, the firm will rely on external sources of finance. This situation will lead to an increase in both the interest rate from R_1 to R_2 and the investment fund from I_1 to I_2, reaching the equilibrium level at point E_2.

2.2.10 Modigliani - Miller Theory of Investment

- Capital structure of the firm

Franco Modigliani and Merton Miller were two economists who, in 1958, jointly developed the Modigliani-Miller theorem. Their work earned them the Nobel Prize in Economic Sciences in 1985. The Modigliani-Miller theorem is primarily concerned with the capital structure of a firm and the relationship between a company's value and its financing decisions. The Modigliani-Miller Theorem asserts that, under the assumption of perfect capital markets, the cost of capital and the value of a firm are independent of its internal financial structures and financing decisions. The theorem shows that the method of financing, whether through internal funds such as retained profits or external funds (including borrowings and share issues), does not impact investment decisions or the overall value of the firm. This is based on the idea that, in a perfect capital market, the costs and returns associated with different forms of investment financing will be equalised.

The Modigliani-Miller theory might not hold in the real world due to the reasons discussed below:

1. **Firm Specific Risk:** Due to uncertainties and firm-specific risks, the cost of different forms of funds may depend on an individual firm's past investment history. For instance, perceived risks of bankruptcy may increase the cost of borrowing compared to using retained profits.

2. **Information Asymmetries:** Information asymmetries can impact the relative cost of external funds. If lenders perceive higher risks due to lack of information, the cost of borrowing may be higher.

3. **Capital Market Imperfections:** The presence of capital market imperfections, such as the sourcing and availability of funds, can influence the cost of capital. Certain types of funds may be more limited, with small firms particularly reliant on internal funds.

4. **Discontinuities in Funding:** Discontinuities in the cost of capital may occur, such as when internal funds are exhausted. Small firms, for example, may face limitations in borrowing or issuing equity.

2.2.11 Tobin's q Ratio

- Share price would influence the investment decisions

The Nobel prize winner James Tobin proposed the q theory of investment. This theory emphasises the connection between the investment and the stock market. The fund for the investments may be raised by the firm through the sale of shares or equities. The equities of the companies are purchased by the people who have expected to receive a return either in the form of dividends or an increase in the market value of their holding equities. The company's sold-out shares represent an entitlement to the company's capital. When the price of the company shares rises, it makes them capable of undertaking more investment. On the other hand, if the price of the shares falls in the market, the buyers lose interest in the shares. So, the company produces less new capital which means that they are refraining from investment.

- Tobin q ratio

Tobin introduced a method to empirically analyse the investment behaviour of a firm, which is the 'q' ratio. It is often known as the 'Tobin q ratio' and it may be defined as the estimate of the value of the stock market placed on a firm's assets relative to the cost of producing those assets. It is the ratio of the market value of a firm's stock to the replacement cost of capital. So, it can be written as

q = Market value of stock ÷ Replacement cost of capital

This ratio provides a clear picture of the market value of the company assets in relation to the cost of producing those assets.

- Investment decisions of the firm are determined by the value of q

The firm makes investment decisions on the basis of the value of q. If the value of q is high, more assets will be produced by the firm. So, there will be rapid investment or 'Whenever the value of 'q' is greater than one or unity, a firm should make an addition to the capital because each dollar's worth of new machinery or stock the firm can dispose of for q dollars can secure profit (q-1). Thus, there can be the possibility of higher investment. In reality, the need for cost adjustments may prevent the expected rapid increase in investment when q is high. Instead, there is typically only a moderate increase in investment as q rises. When the q value is less than 1 shows that the market value of firm asset is lower than the replacement cost of those asset, it can indeed discourage investment activities.

2.2.12 Post-Keynesian Theory of Investment

- Emphasies the role of uncertainty and the dynamics of financial markets

Post-Keynesian economics, a distinctive school of economic thought that gained prominence in the mid-20th century, diverges from the neoclassical and orthodox theories of investment. In contrast to traditional approaches, Post - Keynesian economists have crafted a well-defined theory that emphasizes the significance of uncertainty and the dynamics of financial markets. Notable figures within this school, such as Joan Robinson, Simon, Minsky's, Nicholas Kaldor, Michal Kalecki, Piero Sraffa, Steve Keen and Paul Davidson, have played pivotal roles in shaping post-Keynesian economics.

Post-Keynesian economists offer a different perspective on investment theory compared to orthodox theorists. The Neoclassical and other orthodox theories of investment are grounded in the assumption that investors become well-informed about the market, and their objective is profit maximisation when making fixed investments. Additionally, people form rational expectations, that uncertainty is measurable. These concepts are fully criticised by post-Keynesians and they argue that a fundamentally different approach to investment theory is necessary for a proper understanding of investor behavior. Post-Keynesians, in particular, challenge the idea that investors always act as rational profit maximisers. They contend that human behaviour is more complex and may not always conform to the assumptions of traditional economic theories. Post-Keynesian economists emphasise the significance of uncertainty, conventional behaviour and the role of money in understanding investment decisions. The availability of finance also influences the levels of investment.

- Constraints on rationality

Constraints on rationality are a focal point in post Keynesian analyses. Post Keynesians argue that real-world decision-making is not always based on perfectly rational expectations. People may face uncertainties and limitations in information, influencing their choices in ways that deviate from the idealised rational behaviour assumed in orthodox theories. The traditional investment model may assume unrealistic levels of rationality, expecting individuals to optimise their behaviour and have rational expectations. Simon distinguishes between two types of rationality: substantive rationality and procedural rationality. Substantive rationality is defined as

individuals making precise calculations to maximise profits. The traditional investment model builds upon substantive rationality. Simon claims that substantive rationality may not be suitable for understanding many economic decisions. Another form of rationality is procedural rationality, where decisions result from thoughtful deliberation rather than strict mathematical calculations. This perspective is more suitable for analysing economic phenomena like investment. In this context, various Post Keynesian models of investment incorporate assumptions of procedural rather than substantive rationality.

Post-Keynesian theorists focuses on the pivotal role of profits as a fundamental source of financing for fixed asset investments. These concepts extend the perspective derived from Kalecki's ideas about the role of profits, Kalecki argues that financing constraints influence capital accumulation decisions through profits. Profits play a pivotal role in determining a firm's ability to invest in the future. The relationship between investment and profit is complex due to a double-sided interaction: profits help fund investments, and these investments increase the company's overall resources, leading to anticipated profits in the future. Essentially, according to Kalecki, a company's ability to invest in its future is greatly influenced by the profits it earns. Joan Robinson expands on Kalecki's ideas, emphasizing the double-sided relationship between capital accumulation and profits. The connection between the accumulation of capital and profits is subject to fluctuations and uncertainties, influenced by unpredictable factors such as changing investor sentiment and behavior—what she terms as 'volatile animal spirits.'

- The fundamental source of financing for fixed asset investments is profit

Post Keynesian economists give more importance to money and finance. If the money supply originates endogenously, meaning that money is created within the economic system to meet liquidity demands for businesses, instability within the system can discourage lenders. The reduction in liquidity would impact private sectors, hampering their ability to capitalise on investment opportunities, resulting in a decline in output and employment. The lending institutions adapt their behaviour with the prevailing economic conditions. During periods of economic prosperity, these institutions typically boost lending, injecting more money into the system. Conversely, when anticipating a forthcoming financial crisis, they adopt a conservative approach and withdraw money

- Availability and flow of money influence the investment decision of a firm

from circulation. In simple terms, the availability and flow of money are perceived as dynamic processes influenced by the changing attitudes of lending institutions in response to the economic environment

Minsky's financial fragility hypothesis builds on the idea that three fundamental types of financial postures influence the debt structure that supports investment decisions. These postures are referred to as hedge finance, speculative finance, and Ponzi finance. These postures carry different levels of risks for both borrowers and lenders, as they involve funding investment projects with varying spreads of expected returns. Let us discuss them below.

1. Hedge Finance: This is the most stable form where cash flows from investments are expected to cover both principal and interest payments. It represents a low-risk situation.

- Financial postures influence investment decisions

2. Speculative Finance: In this case, the cash flows from investments are expected to cover only interest payments, with the reliance on refinancing or asset appreciation to cover the principal. It involves higher risks compared to hedge finance.

3. Ponzi Finance: This is the riskiest posture, where cash flows neither cover interest nor principal payments. Instead, it relies on the continuous appreciation of asset values or the ability to refinance. It is highly vulnerable to market downturns. During economic booms, Minsky argues that there is a tendency for excessive risk-taking, marked by a shift towards riskier Ponzi financing. This implies that in prosperous times, people may take on more debt with the assumption that the value of their investments will continue to rise. However, as risks become apparent and interest rates rise, the stability of the investment process is weakened. This scenario can lead to economic downturns and recessions unless governmental interventions are implemented to stabilize the situation.

Summarised Overview

Investment is a critical and dynamic variable in all macroeconomic theories, known for its high volatility and strategic importance. It exerts a substantial influence on the level of aggregative demand and the productive capacity of the economy. As a result, investment plays a significant role in shaping short-term economic fluctuations and charting the long-term growth trajectory of the economy. In this section we learnt the different aspects of investment dynamics. Keynesian investment theory emphasises the role of interest rates in influencing investment decisions and aggregate demand, while the accelerator theory in both its basic and flexible forms, highlights the direct relationship between investment and changes in output levels, with the flexible accelerator model offering a more adaptable approach to investment decision-making. Jorgenson's neoclassical theory provides a microeconomic foundation for understanding individual firms' investment choices. On the other hand, Dusenbery's financial theory sheds light on the financial considerations that underpin support investment decisions in firms. These various perspectives contribute to a comprehensive understanding of investment dynamics in the economy, encompassing both macro and micro aspects. James Dusenbery developed the financial theory of investment, also known as the cost of capital theory of investment, which contrasts with the accelerator theories. James Tobin, a Nobel laureate economist, introduced the q theory of investment, which links a firm's investment decisions to fluctuations in the stock market. When a firm seeks funds for investment through issuing shares in the stock market, the share prices reflect the firm's investment choices. On the other hand, a group of economists known as Post Keynesians reject the neoclassical synthesis and identify themselves with alternative perspectives. However, while some of these economists offer variations of classical economic theories, they may not fully align with Keynes's original revolutionary ideas. These theories present diverse approaches to understanding investment decisions, incorporating considerations of the cost of capital, capital structure, market efficiency, and market valuation. Together, they contribute to a comprehensive view of investment dynamics in the modern financial landscape.

Assignment

1. What is the central premise of Keynesian investment theory regarding the relationship between investment and economic growth?
2. How does Keynesian investment theory differ from neoclassical investment theory in terms of the role of uncertainty?
3. How does the accelerator theory explain the relationship between changes in real GDP and investment?

4. According to the accelerator theory, what role does the rate of change in output play in influencing investment decisions?
5. How does the adjustment of capital stock relate to the investment decisions of firms?
6. Analysis the impact on lags on investment.
7. Explain clearly the post Keynesian approach.
8. Explain the Keynesian view point on investment.
9. How does Tobin's Q ratio serve as an indicator of investment opportunities for companies?
10. Explain the investment demand.
11. Explain clearly capital stock adjustment principles.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 3
Case Studies of Consumption and Investment Theories

Learning Outcomes

After completing this unit, the learner will be able to:

- know the practical application of the life cycle hypothesis
- recognise the implications of financial market imperfections on investment demand
- understand the consumption patterns of an ageing population

Background

Consumption refers to the use of goods and services by households, encompassing the spending and utilisation of resources to satisfy individuals' needs and wants. Consumption plays a crucial role in economic analysis as it constitutes a significant portion of total demand in an economy. One important theory that explores the relationship between income and consumption is the Life Cycle Theory of Consumption. developed by economists Franco Modigliani and Richard Brumberg in the 1950s and later extended by Albert Ando, This theory posits that individuals make consumption decisions based not just on their current income but also on their expectations of future income over the course of their lifetime. According to this theory, individuals aim to maintain a stable living standard throughout their lives by adjusting their consumption in response to changes in income, savings and expectations about their future financial well-being. The Life Cycle Theory of Consumption provides valuable insights into how individuals allocate their resources across different life stages, influencing their spending and saving behavior.

A financial crisis is a situation where the financial system of a country or the global

economy experiences a severe disruption, often leading to a sharp decline in asset prices, widespread bank failures and a general economic downturn. Financial crises can be triggered by various factors, including excessive speculation, asset bubbles, high levels of debt, banking system weaknesses or external shocks. These crises can have far-reaching consequences, affecting businesses, individuals and governments. The 2008 financial crisis, often referred to as the Global Financial Crisis (GFC), was a severe worldwide economic crisis that emerged in the latter part of 2007 and reached its peak in 2008. The crisis was primarily triggered by the collapse of the subprime mortgage market in the United States. Financial institutions had invested heavily in mortgage-backed securities, which declined sharply in value as the housing market collapsed. The crisis rapidly spread globally due to interconnected financial markets and the complex web of financial instruments.

Keywords

Life Cycle Hypothesis, Consumption, Financial Market Imperfections, Financial Crisis

Discussion

2.3.1 The Life Cycle Hypothesis and Consumption Patterns of Ageing Population

According to the lifecycle hypothesis, the saving habits of people tend to change at different stages of their life cycle based on their earnings. In the early stages of life, individuals, particularly during their teens, focus on education; therefore, they have to live in a low-income pattern. After that, in the middle age, individuals enter the workforce and their income pattern gradually starts to rise as they gain experience and receive promotions. Finally, in old age, productivity declines, leading to a fall in earnings. The earning pattern of individuals during their working life may depend on the nature of their profession. Some professions may impact their productivity in their 30s, as evidenced by a sharp decline in their income, while others professions give opportunities to earn a high income in the later life of a person. As people near retirement or enter retirement, their income generally tends to decrease significantly. It is essential to recognise that various factors, including expectations about future income, uncertainty, access to credit and the impact of capital gains, can influence

the savings behaviour of people throughout their lives. Due to these complexities, governments have only limited ability to influence an individual's consumption pattern by adjusting taxes or interest rates.

The consumption pattern of a person also undergoes significant changes, like savings, throughout their life cycle. When people are single, they usually do not spend much. But as they get older and start families, their spending goes up because of the extra costs of raising kids and managing a household. Once the kids become financially independent, household spending tends to go down. In retirement, spending typically decreases further. This could be because the desire for expensive activities goes down as people age.

The Bureau of Labor Statistics in the U. S. conducted a survey on consumer expenditure in the U. S. economy and provided data on the income-consumption pattern of individuals across various age groups. This study focused on the average U. S. consumer for the years 2001-2002. The data shows the trend in spending and income based on a sample of 1,07,000 U. S. households.

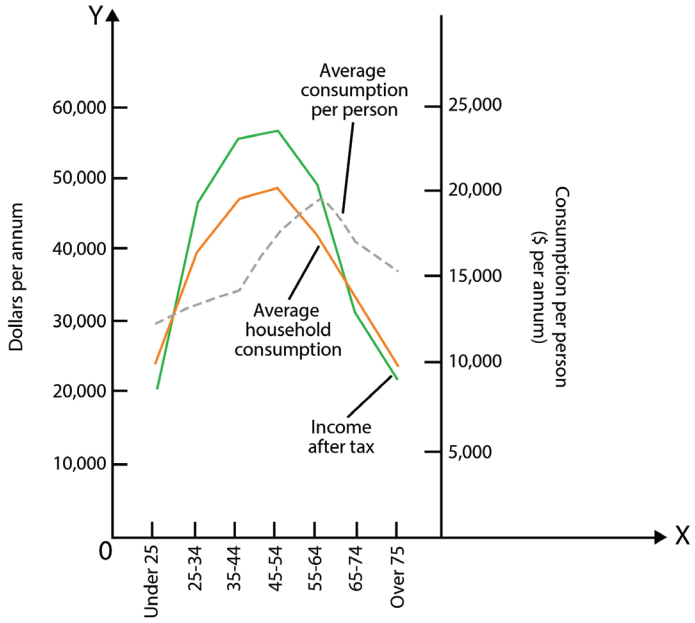

Fig. 2.3.1. Income-Consumption Pattern of Various Age of a Person- Consumption and Income Over the Life Cycle—Average U.S Consumer, 2001- 2002

Source: Bureau of Labor Statistics, Consumer Expenditure Survey (2003) U. S. Economy.

- Significant changes in consumption pattern throughout life cycle

The above figure shows the income and consumption patterns of individuals who exhibit a clear life cycle path. In the early stages, those below the age of 25 earn $10,000 annually after tax, with a corresponding consumption of $5,000 per annum. As individuals progress into the 25-34 age group, both income and consumption rise, reaching $20,000 and surpassing $10,000, respectively. In the middle age between 35 and 44, where income after tax is $30,000, accompanied by consumption exceeding $15,000 per annum. Subsequently, in the 45-54 age group, income and consumption remain relatively stable at $40,000 and nearly $20,000, respectively. As individuals move into the 55-64 age bracket, income increases to $55,000, and consumption decreases to below $15,000. The retirement phase, spanning 65-74, witnesses a decline in both income to $30,000 and consumption to $10,000. Beyond the age of 75, income further decreases to $20,000, and consumption continues to decline, though the exact amount is unspecified.

The Bureau of Labor Statistics in the U. S. conducted a survey on consumer expenditure in the U.S. economy and provided data on the income-saving patterns of individuals across various age groups. This study focused on the average U. S. consumer for the years 2001-2002. The data can be illustrated with the help of the table given below:

Table 2.3.1 Savings rate for an individual at each age group

Age (in years)	Under 25	25-34	35-44	45-54	55-64	65-74	Over 75
Savings (in Percentage)	-13.3%	20.2%	20.4%	21.6%	20.2%	1.1%	-3.4%

Source: Bureau of Labor Statistics, Consumer Expenditure Survey (2001)

The above table explains the saving behaviour of households. The savings rate for individuals under 25 years of age is -13.3% of savings. Between the ages of 25 and 34, the savings rate increases to 20.2%. In the age group of 35 to 44, the savings rate is 20.4%. For individuals aged 45 to 54, the savings rate is 20.25%. In the 55-64 age bracket, the savings

rate remains at 20.2%. However, for individuals aged 65 and above, specifically 75 and above, the savings rate becomes -3.4%.

Next, we establish a connection between the income trends and the savings patterns. Both sets of data, presented in the figure and table above, collectively illustrate the relationship between income and savings at different life stages. In the initial stages of adulthood, individuals below the age of 25 years exhibit a modest income of $10,000 per annum, accompanied by a negative savings rate of -13.3%. As individuals progress through the age brackets, experiencing increases in income, there is a corresponding positive shift in the savings rate. Notably, the 25-34 years age group sees a significant rise in both income, reaching $20,000, and savings rate, at 20.2%. The middle age range of 35-44 years witnesses a peak in both income ($30,000) and savings rate (20.4%). However, as individuals advance into the 55-64 years age group, despite a higher income of $55,000, the savings rate remains consistent at 20.2%, indicating a potential shift in financial priorities. The retirement phase, starting at age 65 years, witnesses a decline in both income and savings rate, highlighting a correlation between reduced earning capacity and a subsequent impact on savings. Beyond the age of 75 years, the savings rate turns negative at -3.4%, possibly indicating a phase of drawing down on savings in later years. The date reveals that how people earn and save money is complicated, and it shows a detailed financial journey as they go through different stages of life.

- Income consumption level peaks during middle age

The life cycle model has been successful in explaining many real-life situations, but it does face some challenges. One notable problem is that older generations tend to be cautious about spending their savings rapidly, if they spend them at all. Two main reasons are often discussed to explain this behaviour: uncertainty and inheritance. Uncertainty is a crucial factor. Since people do not know exactly how long they will live, the simple life cycle theory that suggests they should spend down their wealth in retirement becomes more complicated. Some individuals may fear outliving their money and as a result, try to avoid using up all their savings during retirement.

Additionally, many people want to leave significant inheritances (bequests) to their heirs. This desire to pass on wealth to their loved ones can lead retired individuals to hold

onto their savings and be more reluctant to spend them. The relative importance of uncertainty versus the desire to leave bequests is a subject of debate in explaining why retired individuals tend to have higher savings rates. Some studies suggest that these motives might play a more significant role in the wealth of retired individuals in the United States than traditional life cycle savings patterns.

2.3.2 Analysing the Impact of Financial Market Imperfections on Investment Demand

The financial market refers to a marketplace where securities are traded. There are various types of financial markets, including forex markets, money markets, stock markets and bond markets. The major components of the financial market are equities (stocks), bonds and derivatives. The participants in the market are investors and issuers who raise capital. Funds flow between savers and borrowers through the smooth operation of intermediaries, primarily banks and investment banks. The regulatory bodies, such as the Securities and Exchange Commission (SEC) in the United States and the Securities and Exchange Board of India (SEBI) in India, play a crucial role in ensuring fair practices within the financial market. Financial markets play a crucial role in mobilising savings and facilitating efficient resource allocation. However, even in efficient financial markets may arise imperfections due to a lack of perfect information about market situations which leads to market inefficiencies.

- Mobilising savings and facilitating resource allocation

2.3.2.1 Financial Market Imperfections

A. Information Asymmetry in Lending

Information asymmetry refers to a situation where one party in a transaction has more or better information than the other. In the context of lending, borrowers often have more information about their financial health, credit history, and overall creditworthiness than lenders do. This information gap can lead to several challenges. They are:s

1. **Adverse Selection:** Borrowers who are aware of their own financial vulnerabilities may be more motivated to seek loans than those with stronger financial positions. Lenders, lacking complete information, may find it challenging to

distinguish between high-risk and low-risk borrowers. This phenomenon is known as adverse selection, where lenders face the risk of providing loans to individuals or businesses more likely to default.

2. **Moral Hazard:** Information asymmetry can also create moral hazard problems. Borrowers might be tempted to take on excessive risks, knowing that lenders lack complete information about their actions. This can lead to behaviours that increase the likelihood of default.
3. **Credit Rationing:** Lenders, uncertain about the creditworthiness of potential borrowers, may become conservative in their lending practices. This caution can result in credit rationing, where deserving borrowers are denied loans due to the fear of adverse selection.

B. Regulatory Constraints

The absence of effective regulation in the financial markets allowed financial institutions to engage in risky lending practices, particularly in the form of issuing subprime mortgages. Without proper scrutiny and supervision, these institutions took on higher levels of risk, extending loans to borrowers with a higher likelihood of default.

C. Market Power and Monopolies

The concentration of market power in a few large financial institutions meant that the failure of one or a few institutions could have widespread systemic effects. The interconnectedness of these institutions increased the possibilities of risk.

D. Externalities

- Suboptimal market efficiency due to information gap

Externalities refer to the indirect effects of economic activities on parties not directly involved in the activity. In the financial market, the presence of externalities can significantly impact the efficiency and stability of the financial system. This is particularly evident in situations where there is an unequal distribution of information. The lack of information can lead to suboptimal decisions by market participants, influencing market prices and overall efficiency.

2.3.2.2 2008 Financial Crisis

It all started with problems in the U. S. housing market, which then caused issues for banks and money systems

worldwide. Many banks had big losses and needed help from the government to avoid going bankrupt. This crisis led to a lot of people losing their jobs, and it was the worst economic downturn since the 1930s.

Before the Global Financial Crisis house prices were going up. People, especially in the United States, thought house prices would keep rising, so they borrowed a lot to buy or build houses. This also happened in European countries like Iceland, Ireland, Spain, and some in Eastern Europe. In the U. S., many mortgages were for amounts close to or even more than the house's purchase price. Risky borrowing was done by investors looking for quick profits by buying and selling houses (known as 'flipping') and by 'subprime' borrowers who had higher chances of not repaying loans because of low income or missed payments before. Banks and lenders were giving out a lot of risky loans for a few reasons:

1. Lenders were competing to give out more and more housing loans because, in the good economic times, it seemed very profitable.

2. Lenders did not check carefully if borrowers could repay the loans. They assumed that the good conditions would continue. Lenders also did not worry much because they sold a lot of loans to investors in the form of 'Mortgage-Backed Securities' (MBS), which are packages of thousands of mortgage loans. These MBS became more complicated over time, but they were still considered safe by rating agencies.

3. Investors who bought MBS thought they were getting a very safe investment. They believed that even if some people did not repay their mortgages, most would. Big U. S. banks and foreign banks from Europe and other places invested in MBS, thinking they would get good returns.

In the lead up to the Global Financial Crisis, banks and other investors in the United States and abroad borrowed increasing amounts to expand their lending and purchase MBS products. Borrowing money to purchase an asset (known as an increase in leverage) magnifies potential profits but also magnifies potential losses. As a result, when house prices began to fall, banks and investors incurred large losses because they

had borrowed much. Additionally, banks and some investors increasingly borrowed money for very short periods, including overnight, to purchase assets that could not be sold quickly. Consequently, they became increasingly reliant on lenders – which included other banks – extending new loans as existing short-term loans were repaid.

Before the Global Financial Crisis, the rules overseeing subprime lending and complex financial products like mortgage-backed securities were not strict enough. The institutions creating and selling these complicated MBS to investors were not well-regulated. Many people were given loans that were too big for them to pay back and there was a lot of fraud, like lying about how much a borrower earned and making false promises to investors about the safety of MBS. As the crisis happened, many central banks and governments did notfully understand how many bad loans were given out during the good times and how the problems were spreading through the financial system.

2.3.2.3 Role of Financial Market Imperfections in the 2008 Financial Crisis

1. Moral Hazard

The expectation was that banks and financial institutions could take on excessive risks, including risky loans and leveraging, with the belief that they would be rescued in case of failure. The moral hazard contributed to increased risk-taking behaviour, as these institutions did not fully bear the consequences of their actions. The massive government bailouts during the crisis confirmed the expectations of external support.

2. Asymmetric Information

Asymmetric information was evident in the lack of strict rules overseeing subprime lending and complex financial products like Mortgage-Backed Securities. Investors were not well-informed about the true risks associated with these investments. The lack of transparency and accurate information regarding the safety of MBS contributed to misjudgements by investors. When the true risks became apparent, it led to a widespread loss of confidence in financial markets and significant financial losses.

3. Monopoly Imperfections

The lack of strict regulation and supervision created a situation where institutions creating and selling complex MBS products were not well-regulated. Some large banks and financial institutions had substantial control over certain markets. Monopoly imperfections contributed to the creation and sale of risky financial products without adequate regulation. Investors relied heavily on a limited number of institutions, which hindered market efficiency and contributed to the imperfect conditions that fuelled the crisis.

4. Externalities

- Results from asymmetric information, risky lending practices and poor regulation

The interconnectedness of the global financial system allowed the problems in the U. S. housing market to spill over to financial systems and economies in other countries. The externalities of the crisis were systemic, as the failure of Lehman Brothers and other financial institutions triggered a panic in global financial markets. Investors around the world pulled their money out of banks and investment funds, leading to dysfunctional financial markets, reduced confidence and a cascading impact on economies worldwide.

2.3.2.4 Policy Response of 2008 Financial Crisis

Until September 2008, the primary strategy to address the crisis was led by central banks, which reduced interest rates to boost economic activity as it started to decline in late 2007. Nevertheless, the policy response intensified after the fall of Lehman Brothers and the global economic downturn.

1. Lower Rate Interest

Central banks reduced interest rates to exceptionally low levels, often approaching zero. They extended substantial loans to banks and other institutions possessing sound assets that faced challenges in borrowing from financial markets. Additionally, they acquired a significant volume of financial securities to prop up malfunctioning markets and to encourage economic activity when policy interest rates neared zero, a strategy commonly referred to as 'quantitative easing.'

2. Government Spending

Governments boosted spending to stimulate demand and support employment across various sectors of the economy.

They provided assurances for deposits and bank bonds to instil confidence in financial institutions. Additionally, governments took ownership stakes in certain banks and other financial entities to avert bankruptcies that could have intensified panic in the financial market.

3. Enhanced Supervision of Financial Institutions

In the aftermath of the crisis, regulatory bodies enhanced their supervision of banks and other financial entities. The implementation of numerous global regulations mandates banks to conduct more rigorous assessments of the risks associated with their loans and adopt more robust funding methods. This includes operating with reduced leverage and limiting the use of short-term loans to finance customer loans. Regulators have become more attentive to the potential spread of risks within the financial system and have imposed measures to prevent such dissemination.

- Central bank address the crisis through the effective policies

Summarised Overview

The life cycle hypothesis explains how individuals adapt their savings and consumption behaviour through different life stages. Data presented in the case study illustrate income-consumption patterns and savings rates, shedding light on the complexities of retirement planning due to uncertainties and the desire for bequests. Shifting to the second case study, a detailed exploration of financial market imperfections unfolds, highlighting issues such as information asymmetry, regulatory constraints and market power. The 2008 financial crisis serves as a pertinent case study, showcasing the vulnerabilities inherent in financial systems. The impact of financial market imperfections is elucidated through discussions on moral hazard, asymmetric information, monopoly imperfections and systemic externalities. The policy response to the 2008 crisis is outlined, encompassing interest rate reductions, government spending initiatives and enhanced supervision of financial institutions. Collectively, these measures aimed to mitigate the adverse effects of the crisis and prevent its recurrence.

Assignments

1. Discuss the key stages in an individual's life cycle according to the life cycle hypothesis.
2. Analyse the income-consumption patterns illustrated in the Consumer Expenditure Survey for the years 2001-2002. How do these patterns evolve across different age groups?
3. Explain the concept of information asymmetry in lending and its impact on financial markets. Provide examples from the case study.
4. Evaluate the role of regulatory constraints in contributing to financial market imperfections, as evidenced by the 2008 financial crisis.
5. Discuss the policy responses to the 2008 financial crisis and their effectiveness in addressing issues related to financial market imperfections.

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Suggested Reading

1. Keynes, J. M., *The General Theory of Employment, Interest and Money*, Macmillan, London, 1961.
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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

MASTER OF ARTS ECONOMICS

Block 3

Demand and Supply of Money

BLOCK - 3

UNIT 1
Classical Approach to Demand for Money

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the basic approaches to demand for money
- distinguish the features of Quantity theory approaches
- know about Keynes' liquidity preference approach

Background

Everyone has life goals. We will be happy if we can purchase brand-new clothing, a car or another item from the market. However, we must pay money to purchase these goods from the market. Without money, we cannot buy anything from the market. We had a system known as barter before money was invented. A barter is a system in which people satisfy their wants by exchanging goods. Those who need rice and have wheat will exchange wheat for rice.

Our desire for money is driven by its two primary purposes. Money acts as a store of value apart from being used as a means of exchange. Both people and businesses want to be able to hold money in both cash and asset form. The quantity theory of money, which was designed to provide a monetary explanation for fluctuations in the level of overall prices, considers changes in the quantity of money as a key factor influencing changes in the level of overall prices. The three schools of thought that deal with the desire for money are the Classical, Keynesian and Post Keynesian. Writings of the early mercantilist thinkers include the seeds of the quantity theory of money. David Hume was responsible for systematising and popularising the theory by articulating it precisely in his renowned work named "Political Discourses" from 1752.

David Hume, David Ricardo, J. S. Mill, and other Classical Economists created the early foundations for the Classical theory of money. By introducing the concept of income velocity of money, the Cambridge economists Alfred Marshall and A. C. Pigou developed a new version of quantity theory of money based on the Classical Quantity Theory of Money. J. M. Keynes, within the larger framework of his macroeconomic theory, made additional modifications to the quantity theory of money. He stressed that variations in the money supply would affect prices and they would have an impact on interest rates and investment choices. Everyone has a unique viewpoint on the demand for money. In this unit we will discuss the Classical as well as Keynesian approaches to demand for money.

Keywords

Classical Approach, Quantity Theory, Cash Transaction, Cambridge Theory, Liquidity Preference

Discussion

3.1.1 Approaches to Demand for Money

- Absence of government intervention in the economy

As you already know, the Classical school of economics promoted laissez-faire and free trade. Adam Smith, David Ricardo, Alfred Marshall, A. C. Pigou, J. B. Say and other classical economists had provided only a minimum role for government in the economy. According to these economists, government intervention in the economy will only make matters worse. The foundation of traditional macroeconomics was based on the idea that an economy will always operate at full employment and that any deviations from full employment will only last a short while. The classical economists believed that there would be an invisible hand or automatic forces at work in the economy, bringing it back to its full employment level.

In this unit we will discuss the implicit concepts offered by classical economists through their Quantity theory of money. To indicate the amount of money needed for transaction, the classical economists used the term velocity of money circulation. You may have studied the functions of money

during your undergraduate studies. Therefore, we are aware that money serves as an exchange medium and facilitates the trade of commodities and services. The fundamental idea behind the quantity theory of money is that change in money supply or changes in the amount of money circulation in an economy will result in change in prices. The Classical Quantity Theory of Money provides a clear framework for understanding price changes in relation to the supply of money in an economy. The Irving Fisher model is the one that is most usually used to put the theory into practice.

- Change in money supply will result in change in the price level

3.1.2 Quantity Theory of Money: Fisher's Approach

The famous classical economist, Irving Fisher proposed the quantity theory of money, sometimes referred to as the Cash Transactions method or Fisher's equation or 'neo quantity theory', states that changes in the money supply and the level of prices typically follow a proportional relationship. This is based on a mathematical formula developed by Fisher to describe the quantity theory of money. The classical approach holds that the velocity of money (the speed at which money circulates in the economy) is relatively stable, and changes in the money supply have a direct impact on the price level. Another way of expressing it is that, on the assumption that other factors remain constant, if the money supply rises, the price level will eventually rise as well.

- Changes in the money supply directly effect the price level

3.1.2.1 Cash Transactions Approach or Fishers Equation

The Quantity Theory of Money put forward by classical economists begin with the equation of exchange. According to the equation of exchange, the amounts paid and received for final goods during a certain period must be equal. It is as follows:

$MV = PT$ where,

M = money supply, V = velocity of circulation of money, P = average price level and T = the amount of economic transactions.

- Equation of exchange

The entire amount spent on goods and services is shown on the left-hand side of the equation (MV), and the total amount of receipts from the sale of final goods and services is shown on the right-hand side of the equation (PT). The theory is based on the assumption that V and T are stable in the short run. In general, quantity theory of money explains why an increase in the money supply leads to an increase in price level and vice versa. Price level (P) is directly impacted by changes in money supply (M). As the average price level tends to rise in proportion to changes in the money supply, there would not be much of an effect on actual economic activity. This identity can be represented as follows:

$$MV = PT$$

The number of times the average token of money (rupee, dollar etc.) was used in transactions is what we refer to as the transactions velocity (or turn over rate) of money. For instance, if during a specific period of time, the value of transactions in current rupee (PT) was Rs 5,200 billion and the money supply (M) was Rs 400 billion, then,

$$V = \frac{PT}{M}$$

$$= \frac{5200}{400}$$

$$= 13$$

The transaction variable (T) comprises not only the buying and selling of newly produced goods, but also includes the exchange of previously produced goods and financial assets.

Another way to express the equation of exchange is to focus only on income transactions:

$$MV = PY$$

- Equation of exchange involving income

M stands for the total amount of money and V (Velocity of Money) denotes the frequency with which a typical rupee is used in a current output transaction. The Price index for currently produced output and current output level are denoted respectively by P and Y. This relationship would be an identity, if income velocity were residually defined as the level required to maintain equality. Then,

$$V = \frac{PY}{M}$$

Under the assumed conditions, we discover that the price level varies

a) directly with the quantity of money in circulation (M)

b) directly with the velocity of that circulation (V) and

c) inversely with the volume of trade it facilitates (T)

- Price level varies directly with the quantity of money in circulation

The classical economists are of the view that, in an economy, output is a measure of real economic activity. The major postulation by the Classicals was that the amount or net volume of money is exogenously controlled by the monetary authority of the country *i.e.*, the Central Bank.

According to Fisher and other quantity theorists, institutional factors played a crucial role in determining the equilibrium level of velocity. They viewed it as relatively stable in the short run. If velocity is predetermined and not just established as a residual, to balance MV and PY, the equation of exchange goes beyond being a mere definition. With output fixed from the supply side, the equation of exchange now expresses a relationship of proportionality between the exogenously given money supply and the price level:

$$M\overline{V} = P\overline{Y}$$

$$P = \frac{\overline{V}}{\overline{Y}}M$$

The overline notation on V and Y signifies that these terms are considered constant. The equation suggests that the price level depends on the money supply. Specifically, a 15 percent rise in M corresponds to a 15 percent increase in P. This fundamental outcome aligns with the principles of the quantity theory of money, asserting that the quantity of money determines the price level.

3.1.3 Cambridge Quantity Theory

The Cambridge approach is so named as it was developed by Alfred Marshall and A. C Pigou of Cambridge University.

- Cash balance approach or choice to hold money as cash

The theory demonstrated a proportionate relationship between money supply and price level. But unlike the transaction approach or Fisher's interpretation of the quantity theory, the basis of this relationship was less mechanical. Marshall started off by concentrating on the individual's choice of the ideal sum of money to hold. It goes without saying that some money would be held by the people due to the ease that money gives in transactions. Pigou pointed out that people will not receive any revenue from holding idle currency. Only when the ease and security of holding money outweigh the return on investing in any productive endeavour will people do so. Based on these factors; what quantity of money will be the most ideal to hold? The demand for money, in the opinion of Marshall and other Cambridge economists, would be a proportion of the income.

The Cambridge formula is expressed as,

$M^d = kPY$

In the above equation it shows that,

M^d = Money demand

P = Price level

Y = Aggregate real Income

k = Proportion of the income which people desire to hold in terms of money.

- Transaction demand for money depends on Income

It is assumed that money demand (M^d) equals the proportion of nominal income (k), Price level (P) and real income level (Y). People demand money due to its usefulness in transaction. The transaction demand for money is closely associated with income. As income increases, the volume of transaction also increases. As we discussed under Fisher's theory, based on the community's payment habits, it is expected that the percentage of income best held in cash (k) will remain constant in the short term.

At equilibrium, the exogenous supply of money must equal the quantity of money demanded:

$M=M^d=kP\bar{Y}$

- Proportional relationship between Money supply and Price

The Cambridge equation also shows that the money supply and the level of prices are proportionally related. In the short term, there will not be any change in the percentage of real income that people wanted to hold in terms of money (k). In the short run, it will remain fixed, and the supply conditions will decide the real output ($\bar{Y}$). The Cambridge quantity theory follows Fisher's methodology, where the level of prices will depend on the quantity of money in circulation.

- Excess money supply will result in price rise

According to the Cambridge approach to money demand, an initial excess supply of money prompts individuals to invest in alternative forms and increase consumption, leading to a rise in demand for commodities. The classical perspective describes this situation as "too much money chasing too few goods," resulting in upwards pressure on prices. The new equilibrium is achieved when the price level doubles while output remains constant, and the constant k in the classical model signifies the link between excess money supply and increased commodity demand, ultimately influencing the price level.

3.1.4 Keynes' Liquidity Preference Approach

- Money is the most liquid asset

Keynes believed that the quantity of money played a key role in determining the rate of interest, and he structured his theory to highlight that role. He simplifies financial assets into two groups: money and bonds. Money assets are highly liquid and riskless, while bonds are less liquid and considered risky. Liquidity, measuring the ease of converting an asset into currency without value loss, is a key factor. Keynes introduces the concept of "liquidity preference" to describe the demand for money assets, emphasising their role in determining the interest rate. Keynes identified three motives for holding money. They are as follows.

3.1.4.1 Transactions Motive

- Meet essential requirements

People keep money in their possession for use in transactions because money is a means of exchange. Money bridges the gap between the receipt of income and expenditure. The quantity of money retained for transactions would increase or decrease depending on the volume of transactions the person is engaged in. To meet the daily consumption expenditure, transactions

balances are held by people. According to Keynes, the amount of money demanded for transaction purpose varies directly with income. The higher the income, the higher will be the level of transaction. We can summarise this function as

$M_t = f(Y)$

M_t = Transaction demand for money

Y = Income

Thus, transaction demand for money is a function of Income.

3.1.4.2 Precautionary Motive

- Unforeseen expenditure

Keynes believed that in addition to the funds kept for planned transactions, there should also be additional funds on hand in case of unanticipated expenses like the need for urgent home repairs or medical care. Keynes referred to the money held for this purpose as the precautionary demand for money. He believed that the quantity of money held for this purpose is positively impacted by income. The precautionary demand for money can be represented as

$M_p = f(Y)$

M_p = Precautionary motive

Y = Income

Thus, precautionary demand for money is a function of income.

3.1.4.3 Speculative Motive

Keynes believed that individuals would choose to keep money for speculative purposes rather than just for transactional and precautionary purposes. He meant holding money for speculative purposes, such as investing it in bonds to earn interest. The rate of interest has a negative relationship with the speculative demand for money. People's predictions for how the interest rate or bond capital value would fluctuate in the future affect their actions regarding their cash and bond holdings. Bond prices and interest rates have an inverse relationship in terms of market value. In other words, as the interest rates increase, the market value of bonds declines.

However, when the interest rate decreases, the market value of bonds rises. Let us take an example.

Imagine you have a bond with a face value of Rs 1,000, an annual interest rate of 5%, and a maturity of 10 years. This means the bond pays Rs 50 in interest each year (5% of Rs 1,000).

- Investment depends on rate of interest

Scenario 1: Interest Rates Increase

You own this bond, and the current interest rates in the market rise to 6%. New bonds with similar risk now offer Rs 60 in annual interest (6% of Rs 1,000). Since your bond pays only Rs 50, it becomes less attractive to investors compared to the new bonds with higher yields. Consequently, the market value of your bond may decrease.

Scenario 2: Interest Rates Decrease

Now, imagine the current interest rate in the market falls to 4%. New bonds with similar risk offer only Rs 40 in annual interest (4% of Rs 1,000). Your bond, paying Rs 50, becomes more attractive because it offers a higher yield compared to the new bonds. In this scenario, the market value of your bond may increase. This illustrates the inverse relationship between bond prices and interest rates, ie, when interest rates go up, bond prices tend to go down, and vice versa. The speculative demand for money can be illustrated as follows.

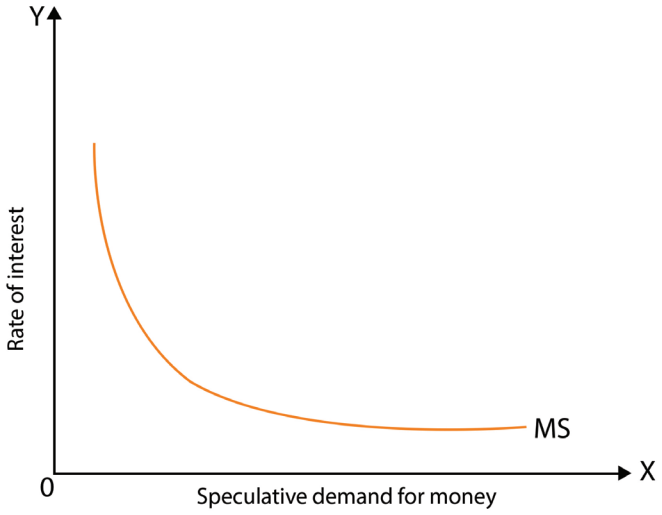

Fig. 3.1.1. Speculative Demand for Money

The X axis in the above diagram represents speculative demand for money, and the Y axis represents the rate of interest. The price of bond will drop if the market interest rate rises from O to Y. Investment and consumer expenditure remain sluggish when interest rates are low. Thus, Keynes asserts that people will prefer to keep cash rather than invest it or use it when interest rates are low. As a result, the speculative demand for money and the interest rate are inversely related. The speculative demand for money function can be represented as,

$M_S = f(r)$

- Function of rate of interest

M_S = Money Supply

r = rate of interest

As we discussed, the three components that make up the total demand for money are transaction demand, precautionary demand and speculative demand. The meeting point of the demand for money and the supply of money determines the equilibrium rate of interest.

3.1.4.4 Determination of Equilibrium Rate of Interest

Given the money supply and the level of income, the transaction, precautionary and speculative demand for money will be equal to the supply of money at a particular rate of interest. The interest rate that equates the demand for money and the supply of money is the equilibrium rate of interest. This can be illustrated with the help of a diagram.

- Equality between demand and supply of money

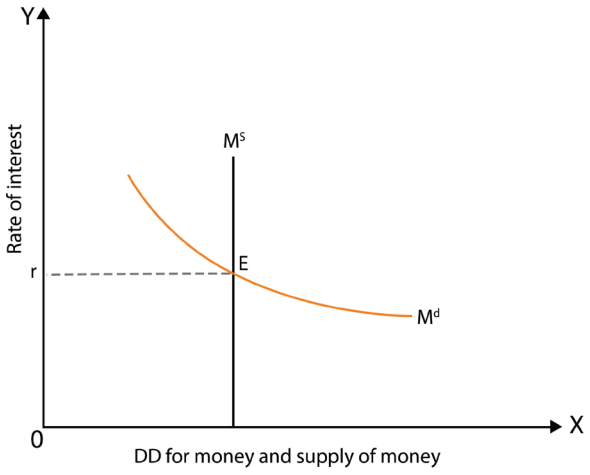

Fig. 3.1.2. Equilibrium Rate of Interest

The vertical line M^s in the diagram above represents the money supply. The demand for money (M^d) and Supply of Money (M^s) intersects at point E and the equilibrium rate of interest is determined. The equilibrium rate of interest is represented by the corresponding rate of interest, 'r'.

3.1.4.5 Liquidity Trap

- Perfectly elastic demand for money

In the Keynesian model, the relationship between the speculative demand for money and the interest rate is inverse. According to J. M. Keynes, under liquidity trap situation, private individuals and business people prefer holding cash rather than investing it or spending it. At lower rate of interest people will expect that the rate of interest may rise in the future and people will tend to hold the money rather than investing it on bonds. An increase in the market rate of interest will result in a decrease in the market price of bonds. Consequently, at lower interest, everyone may become convinced that rate of interest may rise in the near future. In this situation, the speculative demand for money is perfectly elastic. This situation can be illustrated with the following diagram.

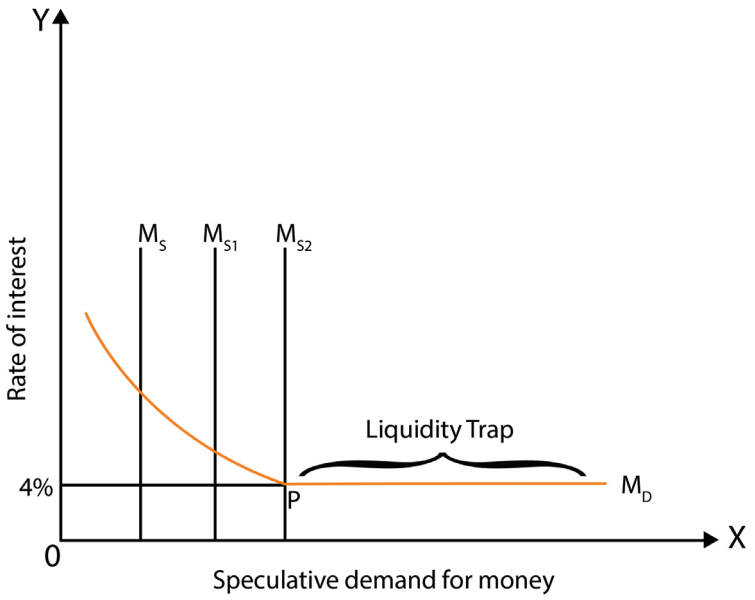

Fig. 3.1.3. Liquidity Trap

In the diagram, the speculative demand for money is shown in the X axis and rate of interest is shown in the Y axis. M_D is the demand for money and M_S, M_{S1} and M_{S2} show the supply of

money. When the rate of interest becomes too low, *ie*; at 4%, the speculative demand for money is perfectly elastic. This perfectly elastic portion (P to M_D) of the demand for money function is called the liquidity trap.

Summarised Overview

Money serves as a medium of exchange and facilitates the trade of commodities and services. The idea behind the quantity theory of money is that changes in the amount of money circulation in an economy will result in change in the price level. Fisher argues that changes in the money supply and changes in the level of prices generally follow a fixed proportionate relationship. The Cambridge approach, developed by Marshall and Pigou, also showed a proportional relationship between the quantity of money and the level of prices.

Keyne's considered three motives for holding money by the individuals. They are transaction motive, precautionary motive and speculative motive. Transactions motive means people held some amount of money in their hands to meet their daily requirements like purchase of grocery, fuel price *etc*. Precautionary motive means people hold money to meet the unanticipated expenses like medical treatments, pet care, automobile repair etc. Speculative motive includes people holding money for speculative purposes, such as investing it in bonds to earn interest. The transaction motive and precautionary motives are a function of income and speculative motive is a function of rate of interest.

Assignments

1. Distinguish between the ideas put forward by the Classical economists and Keynes in their quantity theory of money.
2. Keynesian approach to quantity theory of money is well above the critics. Evaluate.
3. Liquidity preference theory is a novel idea of demand for money. Comment.

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1. Froyen Richard T., *Macro Economics: Theory and Policy,* 1990, Macmillan Publishing Co., New York.

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3. Fisher Stanley, Startz Richard, Dornbusch Rudiger *Macroeconomics*, 7th edition, McGraw Hill Education.

Suggested Reading

1. Snowden Brian, Vane Howard. R., *Modern Macroeconomics: Its Origins, Development and Current State,* Edward Elgar Publishing Ltd, 2005.

2. Mankiw, N. Gregory., *Macroeconomics*, Worth Publishers, 2016.

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 2
Approaches to Demand for Money

Learning Outcomes

After completing this unit, the learner will be able to:

- analyse Friedman's restatement of Quantity theory of money
- understand the portfolio approach of Tobin
- know about the inventory approach of Baumol
- evaluate the real balance effect of Patinkin and Pigou

Background

After Keynes' ideas revolutionised economics, a new era of thought emerged. The economists who built upon or questioned Keynes' ideas about money demand are known as Post Keynesians. They respected his ground breaking insights but looked at things differently. They aimed at understanding the complex ways people use and demand money.

Milton Friedman is a key figure in this regard. He offered a different view called the Restatement of Quantity Theory of Money. Friedman's work sought to reinstate the significance of monetary aggregates and their relationship with economic variables. This resurfacing of the Quantity Theory of Money, though grounded in earlier economic theories, sparked new debates and discussions around the mechanisms through which changes in the money supply affect overall economic activity.

Baumol and Tobin are other important thinkers. Baumol's view of money as an inventory for transactions draws curiosity between individuals' behaviour and that of businesses managing their inventories. In contrast, Tobin's portfolio approach introduces the dynamics of risk and return, highlighting how people allocate their wealth between money

and other assets in response to interest rates. These perspectives not only shed light on the practical considerations of money management but also underscore the importance of individual behaviour in shaping macroeconomic phenomena.

We will also discuss the real balance effect, Patinkin's ideas and Pigou's influence in this unit. These perspectives help us understand how money, economic activity and our choices are all connected. They show that economics is always changing and adapting to our world.

Keywords

Monetarism, Quantity Theory, Portfolio, Inventory, Real Balance

Discussion

3.2.1 Monetarism

- Money supply does not always impact prices

The classical quantity theory of money emphasised that an increase in money supply would result in a corresponding rise in price level. As a result of the 1930s Great Depression, the quantity theory of money had lost favour, along with the rest of classical economics. The quantity theory of money was criticised by J. M. Keynes, who pointed out that an increase in the money supply did not always result in an increase in prices. Keynes and his early supporters, known as early Keynesians, held the view that the amount of money had no bearing on the level of economic activity and that reduction of the money supply by the central bank of a country was not the cause of depression. According to Keynes the demand for money at low interest rates was virtually infinitely elastic, (a liquidity trap existed in the demand for money) and due to this, an increase in the money supply would not lower the rate of interest. As a result, despite the increase in the money supply, investment would not rise. They also claimed that the investment demand was significantly less interest elastic, which made it clear that an expansionary monetary policy was unsuccessful in boosting

investments and the level of economic activity. Briefly stated, early Keynesians believed that money was not significant or "money does not matter."

Milton Friedman, an influential American economist and Nobel Prize winner in economics, however, laid stress on the importance of money not only in determining the general price level, but more importantly in influencing the level of economic activity. This led to the emergence of new thinking in the 1950s and 1960s. According to Friedman, the 1930s events had been misinterpreted and did not provide evidence against the quantity theory of money. However, he saw that the quantity theory of money needed to be restated or reformulated to reinstate the role of money in influencing the intensity of economic activity and the level of prices. However, in his formulation of the quantity theory of money, he considered Keynes' contribution to monetary theory, particularly his emphasis on the desire for money as an asset. Friedman presented a fresh macroeconomic theory called monetarism while revisiting the quantity theory of money. The following are the tenets of Friedman's monetarism.

- Role of money in economic activity

1. The stock of money is the main factor that determines the level of economic activity in current rupee terms, or the level of nominal income.

2. In the long run, an increase in the money supply has a significant impact on the level of prices and other nominal variables. In the long run, real output and employment are determined by the real factors including the stock of capital goods, the state of technology, the size and quality of the labour force.

- Expanding and refining Keynesian ideas

3. In the short run, price level as well as the level of real national income (*i.e.*, real output) and employment are determined by the supply of money and demand for money. Changes in the money supply are the main driver of short-term cyclical swings in output and employment.

4. Depending on the elasticity of the short-run aggregate supply curve, the effect of an increase in money supply is split in the short run between an increase in real national income (GDP) and a rise in price level. Friedman asserts that wages and prices are completely flexible in the long term and result in the establishment of equilibrium at full employment (*i.e.*, potential GDP) level.

5. Unlike Keynes's monetary theory, increase in money supply affects prices directly and not indirectly through its effect on rate of interest.

Expanding on Keynes' ideas, post-Keynesian thinkers work to better understand how economies function, especially when it comes to money, uncertainty and real-world complexities. They focus on how institutions, social systems and history shape economic outcomes, offering a more detailed perspective that adds to the ongoing development of economic theories.

3.2.2 Friedman's Restatement of Quantity Theory of Money

- Friedman revised Quantity Theory

Milton Friedman introduced Monetarism or the New Quantity Theory, a revised version of the classical Quantity Theory of Money. In contrast to early Keynesian perspectives, Friedman asserted the stability of the demand for money. Contrary to the depiction of a near-liquidity trap, Friedman argued that the interest elasticity of money demand was not infinite but "rather small." He emphasised that the quantity of money played a significant role, refuting the notion that it was unimportant. According to Friedman, the quantity of money exerted a dominant influence on the overall level of economic activity.

- Returns for various forms of wealth

Friedman examined the expected rates of return on various forms of wealth, which significantly impact the demand for money. They are:

i) Money: Friedman takes a comprehensive stance on money, encompassing physical currency, demand deposits and time deposits in commercial banks. Money offers security and convenience, but it does not yield returns. Bank deposits, on the other hand, provide nominal interest. Changes in prices affect money's value.

ii) Bonds: These represent government securities or debentures and offer interest payments.

iii) Equities: Equities denote ownership in companies, entitling shareholders to get dividends.

iv) Physical goods: Appreciation in the nominal prices of physical goods yields capital gains. Highly valued physical

assets include gold, land and houses due to their rapid value appreciation.

3.2.2.1 Friedman's Demand Function of Money

Friedman's equation for money demand can be expressed as follows:

$M^d = f(P, Y, r_B, r_E, r_D)$

where P = price level

Y = real income

r_B = nominal interest rate on bonds

r_E = nominal return on equities

r_D = nominal return on durable goods

Money demand, according to Friedman, is influenced by nominal income, which is the product of the first two variables in the above equation; namely P and Y. The higher the nominal income, the greater the demand for money. Additionally, Friedman, like Keynes, put forward that the amount of money demanded depends on the rate of returns on alternative assets such as bonds, equities and durable goods (like houses). Durable goods do not yield explicit interest, but rely on the expected increase in their prices over the years during which it is held. Therefore, the expected rate of inflation also affects money demand. When the rate of return on alternative assets rises, the demand for money tends to decrease.

- Money demand influenced by nominal income

Friedman's theory diverges from Keynes by considering the money demand function as stable, contrary to Keynes view that the demand for money function was unstable. Unlike Keynes, Friedman does not segment money demand into transaction balances, speculative demand and precautionary demand, preferring a more unified approach. Another contrast lies in Friedman's inclusion of separate yields for bonds, equities and durable goods, while Keynes focused on the choice between money and bonds. Friedman's theory allows for a broader consideration of choices and substitutions in response to changes in rates of return, offering a more flexible perspective compared to the narrower focus of Keynesian analysis.

- Friedman challenges Keynesian views

Friedman's theory of money demand enables a restatement of the Cambridge equation as follows:

$$M^d = k\,(r_B, r_E, r_D)\,PY$$

In Friedman's restatement of the quantity theory, the constant k, representing the proportion of wealth held as money, is no longer treated as fixed but is expressed as a function of the rates of return on alternative assets. If the rate of return on any of these alternative assets increases, the constant k decreases, indicating a greater preference for the alternative asset. This restatement by Friedman offers a systematic explanation for k, incorporating Keynesian insights into money as an asset and highlighting the influence of returns on alternative assets on the demand for money. Essentially, Friedman integrates the Keynesian analysis into the quantity theory, making it more dynamic.

- Redefines constant k

In Friedman's version of the Cambridge equation, the equilibrium condition in the money market is expressed as:

$$M^S = M^d = k\,(r_B, r_E, r_D)\,PY$$

In the expression above, the equilibrium condition in the money market is represented by the equality of the money supply (M^S) and the demand for money (M^d). The demand for money (M^d) is a function denoted as $k\,(r_B, r_E, r_D)\,PY$, where k represents the constant, and r_B, r_E, r_D are the interest rates for bonds, equities and durable goods, respectively. PY represents the product of the price level (P) and real output (Y). In essence, the equilibrium is reached when the quantity of money supplied equals the quantity of money demanded and this equilibrium is influenced by various interest rates and the overall level of economic activity.

- Money market equilibrium

3.2.3 Tobin's Portfolio Approach to Demand for Money

James Tobin, an American economist, explained that people tend to be rational in their financial behaviour. He suggests that it is wise for individuals to have a mix of assets, including both bonds and money, in their investment portfolios. He assumes that individuals generally prefer having more money and assets over less. In determining the allocation of money

- Tobin's rational asset allocation advice

and bonds, an investor confronts the task of striking a suitable balance between interest-earning assets, such as bonds, and non-interest-earning assets, such as money. People might also have riskier investments like stocks.

- Risk averse investment

Tobin observes that individuals generally prefer avoiding excessive risk when considering potential returns on investments. This is different from Keynes' idea, where people allocate their wealth entirely to either money or bonds based on predictions of future interest rates. Tobin contends that due to uncertainty about future interest rates, individuals are hesitant to heavily invest in riskier assets like bonds, even though they may yield higher average returns. He argues that those averse to excessive risk would not opt for a portfolio solely comprising risky assets. On the other hand, sticking only to safe assets like money offers limited returns, hampering wealth growth.

- Balancing safe and risky investments

Typically, individuals prefer a diversified portfolio with a mix of safe and risky assets. This allows them to strike a balance between having a secure investment and earning reasonable returns. It is crucial to note that most people would not invest all their money in riskier assets like bonds unless they expect higher returns. People seek both safety and decent returns, choosing a combination of safe assets like money and riskier ones like bonds and stocks. The specific balance between safety and risk varies based on individual risk preferences and desired returns.

3.2.3.1 Tobin's Liquidity Preference Function

- Interest rate affects money demand

Tobin developed the liquidity preference function to explain how the demand for money, as a secure and risk-free asset, is linked to the interest rate. He argued that when the interest rate (the returns on bonds) increases, people are more inclined to invest in bonds and hold less money. In other words, as the interest rate rises, their desire to hold money, or liquidity, decreases, leading them to opt for more bonds in their investment mix. Conversely, when the interest rate is lower, they prefer to hold more money and fewer bonds.

This concept resembles Keynes' speculative demand for money. Tobin's approach shows that the demand function for money as an asset follows a downwards slope, indicating

that as bond interest rates decrease, the demand for money in investment portfolios goes up. This is illustrated below.

- Downwards sloping liquidity preference curve

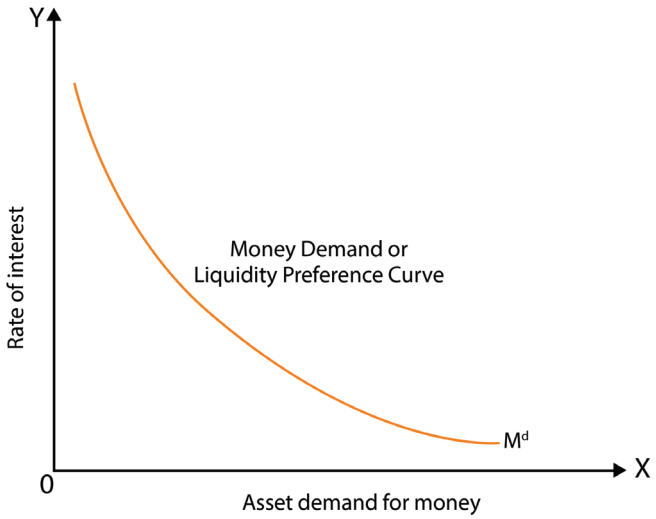

Fig. 3.2.1. Tobin's Liquidity Preference Function

Tobin's method led to the creation of the aggregate liquidity preference curve. He examined how changes in the interest rate impact the asset demand for money within individuals' portfolios. Empirical studies assessing the elasticity of money demand have validated Tobin's liquidity preference theory. His portfolio approach demonstrated that the aggregate liquidity preference curve generally slopes downwards as shown in the above figure 3.2.1. This implies that most individuals in the economy tend to exhibit a liquidity preference function like the one depicted by the curve M^d.

- Mixed holding of assets and flexibility

Tobin's approach overcomes a limitation in Keynes' theory of liquidity preference regarding the speculative motive. Unlike Keynes' notion that individuals only hold all money or all bonds, Tobin's approach suggests that people can hold both money and bonds simultaneously, but in varying proportions based on different interest rates. This leads to a continuous liquidity preference curve. Tobin's analysis considers the concurrent holding of money and bonds and avoids Keynes' assumption that interest rates will move in only one direction. Instead, Tobin recognises that individuals lack certainty about how interest rates will change. Tobin's portfolio approach, which links liquidity preference (or the desire for money) to an individual's risk attitude, can be expanded beyond the realm of money and bonds. This concept can also apply to the

decision-making process when there are multiple alternative assets available, not just limited to money and bonds.

3.2.4 Baumol's Inventory Approach to Transactions Demand for Money

- Money as inventory, transaction

While Keynes focused on why people hold money for speculative reasons, Baumol shifted his focus to the practical need for money in everyday transactions. He introduced a fresh perspective on the demand for money. Just as industries keep goods on hand for smooth operations, Baumol suggested that individuals keep money as a form of 'inventory' to make their purchases easier. Holding money for transactions comes with its own costs, as individuals lose out on potential interest earnings they could have gained from investments like savings deposits or bonds. The foregone interest earnings represent the cost associated with using money for transactions. Baumol and Tobin emphasised that this cost is influenced by the current interest rate, shaping the demand for money for transactions.

- Holding money vs interest bearing savings

It is important to note that when we talk about "money," we are referring to currency and demand deposits, which are safe but do not yield interest. In contrast, bonds offer returns but involve risk, which could lead to capital loss. However, Baumol highlights that savings deposits from banks are low-risk and provide some interest. Given this, Baumol asks a significant question: Why do people opt to hold money (currency and demand deposits) instead of choosing the safer alternative of savings deposits, which provide security and the chance to earn interest?

- Transactional money preference and cost

Baumol's explanation revolves around the convenience of using money for daily transactions, as it is easily accessible and usable. This convenience leads people to prefer holding money over savings deposits. Unlike Keynes, both Baumol and Tobin assert that the demand for transactional money is impacted by the current interest rate. People hold money to make transactions. When deciding between holding money and having interest-bearing savings deposits, individuals consider the advantages and disadvantages. Baumol highlights that the cost of holding money is the potential interest income forgone by not choosing savings deposits. His analysis centres on the demand for transactional money in cases where an individual receives regular income and spends it gradually.

This is illustrated in Figure 3.2.2, where a monthly salary of Rs. 18,000 is received on the first day of each month.

- Salary conversion

Consider a scenario where he promptly converts his monthly salary into cash on the first day and then spends a consistent sum daily (Rs. 600 per day) throughout the month. As the month comes to an end, he depletes his money. Upon analysis, it is evident that his average money balance over the month is Rs. 9,000 (calculated by dividing the total monthly salary of Rs. 18,000 by 2). Before 15th of a month he will be having more than Rs. 9,000 and after 15th day he will have less than Rs. 9,000.

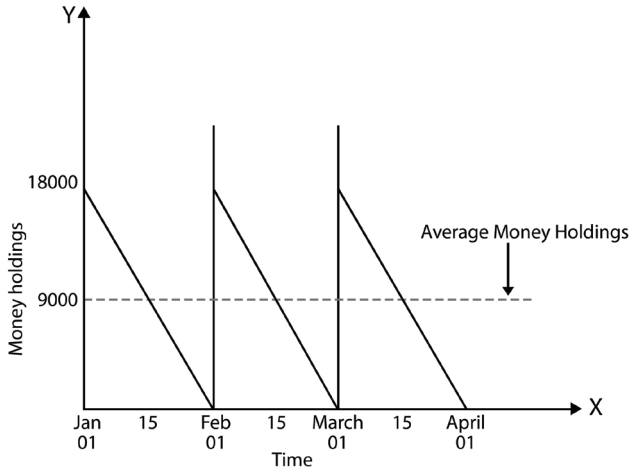

Fig. 3.2.2. Stream of Cash Payments & Transactions Demand for Money

- Savings and expenditure

The dotted line represents the average money balance of Rs. 9,000. However, this approach is not optimal for money management due to the opportunity cost of missing out on interest earnings. The individual has a more effective option (as shown in figure 3.2.3). Instead of withdrawing the entire monthly salary on the first day, he takes out only half (Rs. 9,000) in cash and deposits the rest into a savings account with a 5% interest rate. His daily expenses of Rs. 600 remain constant. In this improved strategy, his Rs. 9,000 money balance is spent by the end of the 15th day. Then, he withdraws Rs. 9,000 on the 16th day and spends it at a steady rate of Rs. 600 per day for the next 15 days. This method enables him to earn interest on the deposited Rs. 9,000 for 15 days every month. As a result, the average money balance becomes Rs. 4,500 (half of Rs. 9,000). This approach is more effective since it allows him to earn interest while still meeting his transaction needs.

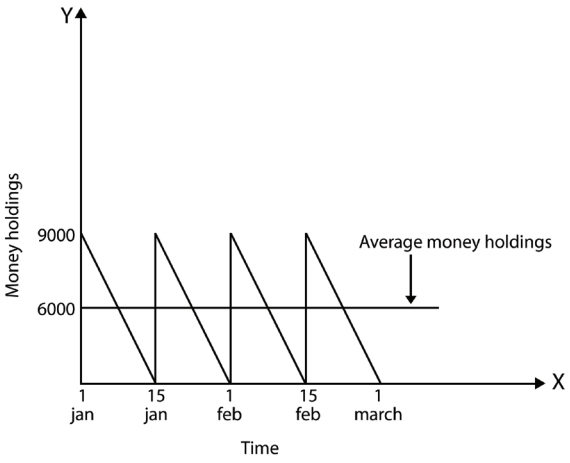

Fig. 3.2.3. Transaction Demand for Money and Stream of Cash Payments

- Alternate approach

Similarly, the individual could opt to withdraw Rs. 6,000 (one-third of his salary) at the beginning of each month, depositing Rs. 12,000 into a savings account. This Rs. 6,000 will gradually be used up for transactions, completely spent by the 10th day. Then, on the 11th day, he withdraws another Rs. 6,000 for further transactions, which he uses until the 20th day. Lastly, on the 21st day, he withdraws Rs. 6,000 again for continuous spending until the month's end.

- Strategic approach reduces costs

By adopting this strategy, his average money balance decreases to Rs. 3,000 (half of the total Rs. 6,000, divided by 2). The remaining funds are channelled into the savings account, allowing interest income to accumulate. This approach proves more profitable in terms of interest earnings compared to previous methods. However, the decision on which approach to choose is not straightforward, as there are costs associated with investing in savings deposits and subsequently withdrawing for transactions. Similarly, engaging in transactions involving interest-bearing bonds incurs brokerage fees during buying and selling. Even with savings deposits, there are extra costs, including transportation expenses for additional bank trips and time spent waiting in lines for withdrawals. Consequently, the more frequent the trips to the bank for cash withdrawals, the greater the cost accumulated. If a larger amount of cash is withdrawn, some costs can be avoided.

Thus, individuals face a challenge in determining the optimal amount of money to hold. Baumol's insight highlights that

- Optimal money balance minimises costs

the optimal money balance depends on minimising both the cost of forgone interest income and the brokerage fee. Let us examine this concept further. In this scenario, we consider an individual's pay cheque (salary) as *Y*, the amount he withdraws per bank visit as *C*, the number of bank visits as *T*, and the brokerage fee as *b*. In the initial method of managing money, where he cashes his entire pay cheque on the first day of each month, he incurs the cost only once because he makes just a single trip to the bank. So, in our initial scenario, *T* is equal to one *T = Y/C = 18000/18000 = 1)*, since in this situation *C* equals *Y*. In the second scenario,*T = 18000/9000 = 2*, and in the third case, *T = 18000/6000 = 3*.

The interest income foregone due to holding money is the product of the average money balance and the interest rate. As observed earlier, the average money held corresponds to half of the cash withdrawn on each occasion (that is, $\frac{C}{2}$). Hence, the interest (rate @ 5%) income lost in the initial case is $r \times \frac{C}{2} = \left[\frac{5}{100}\right] \times \frac{18000}{2}$ = Rs 450. In the second scenario, the lost interest is $\left(\frac{5}{100}\right) \times \frac{9000}{2}$ = Rs 225, and in the third case, it amounts to $\left(\frac{5}{100}\right) \times \frac{6000}{2}$ = Rs 150. Consequently, the total cost incurred due to brokerage fee and the forgone interest income is calculated as follows:

$$\text{Total Cost} = bT + r \cdot \frac{C}{2}$$

Here, b represents the brokerage fee. As previously noted, $T = \frac{Y}{C}$.

- Cost minimisation

$$\text{Hence, the Total Cost} = \frac{Y}{C} b + r \cdot \frac{C}{2}$$

Baumol has demonstrated that the optimal cash withdrawal amount that minimises cost is determined by:

$$C = \sqrt{\frac{2bY}{r}}$$

The square root rule suggests that the best average cash withdrawal amount to minimise cost is the square root of two times the broker's fee, multiplied by the individual's income (Y) and divided by the interest rate. According to this rule, a higher broker's fee encourages more money holding and discourages frequent bank visits. In contrast, a higher interest rate prompts people to keep less money for transactions and instead invest in interest-bearing accounts to earn more interest. This means that as interest rates rise, the demand for money held for transactions tends to decrease.

- Influenced by fees and interest

In contrast to Keynes' belief that interest rates do not impact the demand for money used in transactions, Baumol and Tobin's analysis emphasises that changes in interest rates do affect the demand for money. They argue that higher interest rates increase the opportunity cost of holding money, making people opt for less money for transactions. Conversely, lower interest rates reduce the cost of holding money, leading individuals to hold more money for transactions. This insight results in a downwards-sloping curve depicting the transactions demand for money shown in figure 3.2.4.

- Interest rates affect money demand

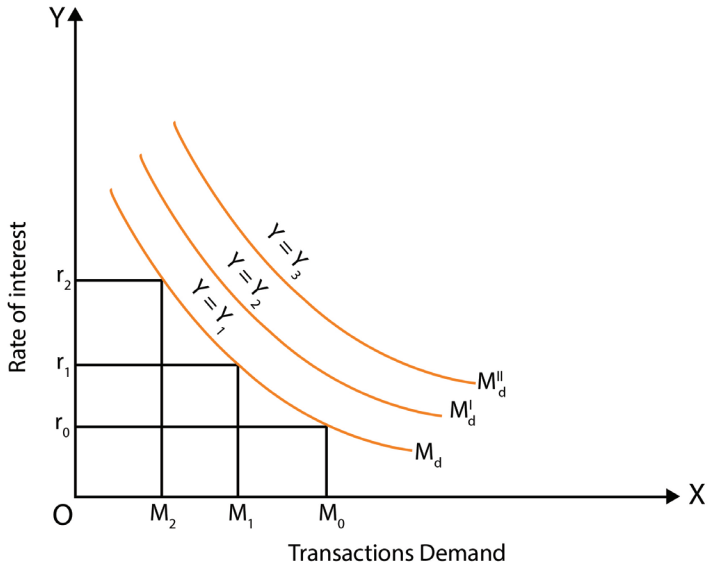

Fig. 3.2.4. Transaction Demand for Money: Baumol & Tobin Approach

- Income and interest affect money demands

The square root rule establishes a direct connection between the demand for money used in transactions and individuals' income, implying that as income grows, so does the demand for transactional money, all else being equal. Illustrated in Figure 3.2.4 are three transaction demand curves (M_d, M_d', and M_d'') for varying income levels (Y_1, Y_2 *and* Y_3). According to Baumol and Tobin, this transaction demand for money is influenced by both the interest rate and income level, as depicted by the function

$$M_{td} = f(r;Y)$$

where 'r' represents the interest rate and 'Y' signifies the income level.

3.2.5 Real Balance Effect-Patinkin-Pigou

- Patinkin criticised the neoclassical concepts

The Real Balance Effect theory, formulated by Don Patinkin, is summarised in his work "Money, Interest, and Prices." This theory aimed to bridge the gap between the real and monetary aspects of economics. Patinkin argued that an increase in the money supply initially impacts both demand and relative prices, before influencing absolute prices. Patinkin criticised the homogeneity postulates of the Cambridge economists. These postulates suggested that the demand and supply of goods are solely affected by relative prices. This perspective implied that a doubling of the overall price level would not alter the demand and supply of goods. The postulate assumes that demand and supply functions for goods are homogeneously unaffected by changes in price alone, which limits the market's response to changes in the price level. Milton Friedman's Quantity Theory of Money is based on the idea that fluctuations in the money supply can cause changes in the overall price level. However, the economist Don Patinkin challenged this theory for its failure to provide a conclusive explanation of the relationship between money and prices. Patinkin also examined the neoclassical concept of dichotomisation, which separates the determination of the relative price level through the demand and supply of goods, and the absolute price level through money's demand and supply. This approach mirrored the homogeneity postulate of the Cambridge school. In essence, it proposed that changes in the absolute price level would not affect the monetary sector and changes in monetary prices would not influence the real

sector.

Patinkin's Real Balance Effect model aimed to unify the money and goods markets. It did this by considering not only relative prices but also the real purchasing power of people's cash holdings. Changes in the price level affect the purchasing power of cash holdings, which, in turn, affects the demand and supply of goods. This is known as the real balance effect. Patinkin introduced the concept of the stock of real balance $\left(\frac{M}{P}\right)$ to deny the homogeneity postulate and dichotomisation assumption. He demonstrated that the stock of real balance held by the community significantly influences their demand for goods.

- Integrate the real and monetary factors

According to the model, the demand for commodities is determined by both the real balance and relative price level. When the price level increases, people's real balance decreases, causing a decrease in spending capacity and resulting in lower demand for goods. This, in turn, leads to a further decline in commodity prices. Conversely, when the price level decreases, the real balance increases, boosting the demand for goods and elevating the price level. In his analysis, Patinkin highlights that when the real and monetary rates of an economy that includes outside money are defined, the relative prices, the rate of interest and the absolute price levels are simultaneously determined by all the markets of the economy. This introduces the real balance effect into the general equilibrium analysis.

- Real balance and relative price level are determined by commodity demand

In Patinkin's perspective, people are not affected by the "money illusion". Rather, they are concerned with the relative value of their cash holdings. On the other hand, people focus on what their money can purchase. This is relevant when considering the impact of an increased money supply on the economy. When the money supply increases, the price level also rises, but the relative price and real balance remain constant. As a result, the overall equilibrium of the economy remains unaffected. This phenomenon can be effectively explained using a graphical representation.

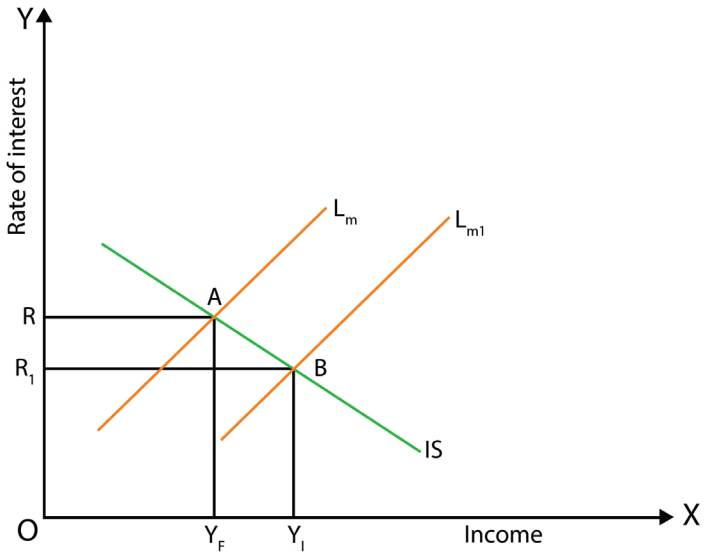

Fig. 3.2.5 Patinkin Real Balance Effect.

The figures provided illustrate the application of the IS-LM model to explain the Patkin real balance effect. In this framework, the IS curve reflects the equilibrium in the goods market, while the LM curve represents the equilibrium in the money market. The intersection of the IS and LM curves, marked as point A, signifies the market equilibrium. Initially, the economy functions at an income level noted as OY_F, while the interest rate remains at OR, symbolising full employment income. Suppose a situation where the money supply increases without altering the OR interest rate. This amplified money supply is depicted through the LM_1 curve. Consequently, demand experiences a surge, leading to an increase in the price level. Simultaneously, the augmented money supply heightens the demand for bonds, prompting a decline in the interest rate to OR_1. This interest rate reduction stimulates investments, thereby pushing income growth. This, in turn, adds to the upward movement of the price level within the goods market. The escalated price level implies an inherent rise in income, transitioning from OY_F to OY_1. Consequently, another equilibrium arises, denoted as point B. This sequence of events highlights the Patkin real balance effect within the IS-LM framework.

During this stage, the Patkin real balance effect becomes active to restore the equilibrium at the full employment level of OY_F. As the price level rises, people's real purchasing power

diminishes, causing them to reduce their spending compared to previous levels. This decrease in spending results in reduced demand for goods and subsequently leads to a decline in the price level. Simultaneously, to maintain their real purchasing power, individuals increase their demand for money, leading to a rise in the interest rate. These adjustments are illustrated by the upwards shift of the LM_1 curve back to its original position as the LM curve, and by the interest rate moving from OR_1 back to OR. This process ultimately works to reestablish the full employment equilibrium at the OYf level, determined by the influence of the real balance effect.

3.2.5.1 Pigou Real Balance Effect

- Relation between real balance and consumption

A. C. Pigou explains Pigou effect in the article titled "The classical Stationary State" published in 1943. The Pigouvian real balance model explains the relationship between real balance and consumption. Before the period of deflation, the economy faced a liquidity trap, which resulted in there being no possibility of investment demand in bonds and people kept cash in hand because they anticipated a period of war and deflation. Pigou explains how the economy escaped this liquidity trap. When the price level falls, the real balance increases which stimulates consumption in the economy. The Pigou effect is also referred to as the 'real balance effect.'

- Price reduction creates employment

The Pigou effect operates on the commodity market. The Pigou effect shows the real balance effect during the depression. The process through which consumption shifts upwards is frequently referred to as the Pigou effect. Hence, at its core, the Pigou effect signifies an overall decrease in the price level due to factors like wage reduction, deflation, and low labour demand. The Pigouvian effect deals with deflationary tendencies in the economy. This explains how deflation results in the stimulation of output and employment. Whenever the economy is faced with deflationary tendencies, which will reduce the price level, it raises the purchasing power of the people. Thus, demand for goods increases as a result consumption also increases. When the demand for goods increases the derived demand for labour also increases and it results in the overall improvement in employment. On the other hand, inflation creates the opposite situation. Whenever the economy faces inflationary trends within the economy. price rises due to the inflationary pressure and as a result the

cash balance of the people falls. It elucidates the demand for goods leading to reduced consumption. As the demand for goods falls, the derived demand for labour also decreases, resulting in an overall decline in employment.

The Pigou effect can be explained with the help of the following figure.

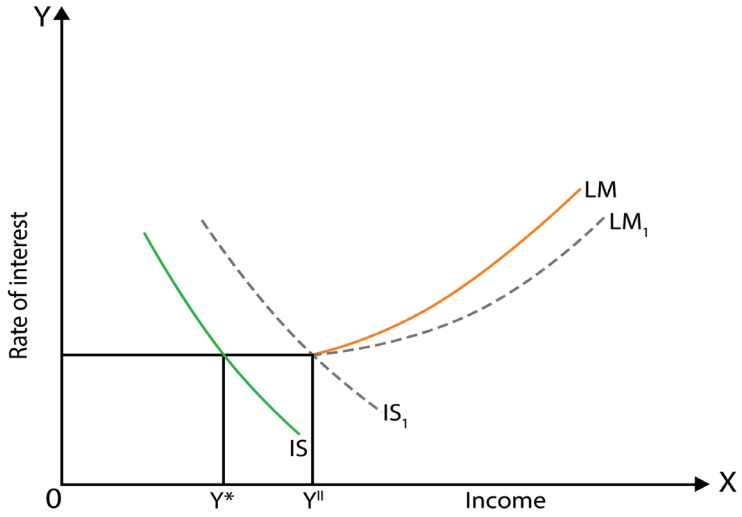

Fig. 3.2.6 Pigou Effect

The IS-LM model shows the liquidity trap faced by the economy. The economy operates on the horizontal portion of the LM curve. Here, people anticipate that the economy will soon experience deflation. When the monetary policy is used by the monetary authority it fails because of the low level of output and high unemployment. The Pigou effect provides a mechanism to escape this trap. When the price falls, the real balance increases which would raise consumption in the economy. This leads to the establishment of new IS-LM curves, at y^{II}, with the IS curve intersecting the LM curve beyond the horizontal liquidity trap segment at a higher interest rate. As a result, the economy achieves equilibrium at full employment.

- New equilibrium at full employment

Summarised Overview

Post-Keynesian approaches to money demand have gone beyond the original ideas of Keynes, aiming to improve and expand our understanding of how money works in the economy. One prominent aspect is Friedman's restatement of the Quantity Theory of Money, which introduced Monetarism, bridging the gap between Keynesian and classical economics. Friedman highlighted the impact of money on economic activity and emphasised the need to strike a balance between holding money and investing it in interest-bearing assets. His work sparked discussions about how changes in the money supply affect economic conditions.

Baumol and Tobin provided fresh perspectives on money demand. Baumol compared money to an inventory used for everyday transactions, while Tobin's portfolio approach focused on rational asset allocation. Both approaches underscored the role of interest rates in shaping people's preferences for holding money. Additionally, the Real Balance Effect, is explained by the influence of changes in wealth on money demand, added complexity to the analysis. Patinkin and Pigou extended the theory by analysing how shifts in prices and real balances impact money demand and overall economic equilibrium.

These diverse post Keynesian approaches shed light on the complex relationship between money, interest rates, individual behaviour and economic outcomes. By factoring in practical considerations, psychological factors and historical context, these economists have provided a more detailed understanding of the forces driving money behaviour and their implications for the broader economy.

Assignments

1. How do Post Keynesian theories explain the impact of interest rates on money demand? Utilise Baumol and Tobin's frameworks to elucidate the interconnection between interest rates and the desire to hold money.

2. Distinguish the Post Keynesian approaches to money demand from Keynes' original ideas. How do these perspectives enhance our comprehension of the determinants of money demand?

3. Examine Baumol's perspective on money demand. Elaborate on the concept of considering money as a form of "inventory." How does Baumol's theory incorporate the concepts of convenience and transactions in shaping the demand for money?

4. Explain the contributions of Patinkin and Pigou to the discourse surrounding money demand. How do their theories explore the intricate relationship between alterations in prices, real balances, and overall economic equilibrium?

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1. Froyen Richard T, *Macro Economics : Theories and Policies*, 10th edition, Pearson, 2022.

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3. Rosalind Levacic and Alexander Rebmann, *Macro Economics: An Introduction to Keynesian-Neoclassical Controversies*, The Macmillan Press Ltd, London.

Suggested Reading

1. Mankiw, N. Gregory (2016). *Macroeconomics.* New York: Worth Publishers.

2. Friedman, M, *Studies in the Quantity Theory of Money*, The University of Chicago Press, Chicago.

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 3
Supply of Money

Learning Outcomes

After completing this unit, the learner will be able to:

- understand the role of money supply in economic stability
- familiarise with the major approaches of supply of money
- realise the basic idea of the monetary base and the money multiplier
- explore the concepts of high-powered money, inside and outside money

Background

Money is an essential medium for economic transactions. Its evolution from tangible goods to digital forms has brought about a profound transformation in finance and trade. This progression encompasses various stages, including barter systems, commodity money, metallic and paper currency, electronic money, digital banking, online payments, and now, cryptocurrencies, characterising the current era. Money's influence on economic activity and financial stability is significant. It fulfils vital roles as a medium of exchange, a store of value, and a standard for deferred payments. Policymakers use money as a tool to guide the economy, playing pivotal roles in the stabilisation process through monetary policy, price stability, and demand management. Skilful management of the money supply is crucial for these aims. By influencing factors like inflation, interest rates, and overall demand, policymakers try to establish a stable economic environment that supports sustainable growth and minimises the risk of economic downturns. Money plays a significant role in economics by influencing income, savings, investments, and productivity.

Keywords

Money Supply, Money Multiplier, Monetary Policy, Cash Reserve Ratio, Bank Rate, High Powered Money

Discussion

3.3.1 Measures of Money Supply

- Measures are based on liquidity

Money supply refers to the total amount of money circulated in an economy at a particular time. The amount of money available can impact how prices change and how much people buy. The central bank controls the money supply through the monetary policy. There is not just one way to figure out how much money is in the economy. In India, From 1977 to 1998, the Reserve Bank has come up with four different ways to measure the money supply. These measures are called, M1, M2, M3, and M4. The Working Group on Money Supply: Analytics and Methodology of Compilation, chaired by Dr. Y.V. Reddy, recommended the addition of a new monetary aggregate, M0, to the existing monetary aggregates. They look at different types of money and the classification based on liquidity, which means how easily they can be turned into cash.

1. M1 or Narrow Money

This is the narrow measure of money supply and it includes the following items:

$$M1 = C + DD + OD$$

The components of M1 are: C is the currency with the public, DD is demand deposits, and OD is other deposits of the RBI. The money supply M1 is the most liquid measure of the money supply. It can be easily used as a medium of exchange for transactions.

2. M2

M2 is a broader concept of money supply in India than M1. In addition to the three items of M1, the concept of money supply M2 includes savings deposits with post office savings banks.

M2 = M1 + savings deposits with post office savings banks.

The money supply M2 has been distinguished from M1. M1 includes highly liquid assets that can be quickly and easily accessed. On the other hand, M2 encompasses slightly less liquid assets compared to M1, such as savings deposits held at post office savings banks. Withdrawals from savings accounts may involve some restrictions or processing time, making them less liquid than M1 assets.

3. M3 or Broad Money

M3 is the board concept of money supply. It includes:

M3 = M1 + Net time deposits with banks

Time deposits are savings accounts that are not immediately accessible but can be withdrawn at any time with some earned interest. The Sukhamoy Chakravarty-led working group on monetary reforms recommended using M3 for monetary planning and setting targets for money growth in the economy. In the terminology of money supply employed by the Reserve Bank of India until April 1977, M3 was referred to as Aggregate Monetary Resources (AMR**).**

4. M4

- Old measures of money supply

The measure M4 of money supply includes not only all the items of M3 described above but also the total deposits with the post office savings organisation. However, contributions made by the public to the national saving certificates are not included in this.". Thus,

M4 = M3 + Total Deposits with Post Office Savings Organisation

Previously, the commonly used monetary aggregates in India were M1, M2, and M3. However, with the recommendations

of the working group, the nomenclature and composition of the monetary aggregates were revised. The new monetary aggregates typically include:

1. M0 monetary base or Reserve money

M0 is the most liquid form of the money supply and it can be easily converted into cash. the components of M0 are Currency in Circulation, Bankers' Deposits with RBI and Other Deposits with RBI

2. M1 Narrow Money

M1 includes Currency with the Public, Current Deposits with the Banking System, Demand Liabilities Portion of Savings Deposits with the Banking System, Other Deposits with RBI

3. M2

M2 is the sum of Currency with the Public, Current Deposits with the Banking System, Demand Liabilities of Savings Deposits with the Banking System, Other Deposits with RBI

Term Deposits of residents with a contractual maturity up to and including one year with the Banking System. In other words, M2=M1+ Time Liabilities Portion of Savings Deposits with the Banking System + Certificates of Deposit issued by Banks + Term Deposits of residents with a contractual maturity of up to and including one year with the Banking System, Certificates of Deposits issued by Banks

4. M3 Broad money

M3 is the sum of Currency with the Public, Current Deposits with the Banking System, Savings Deposits with the Banking System, Certificates of Deposits issued by Banks, Term Deposits of residents with the Banking System, Call/Term borrowings from 'Non-depository' financial corporations by the Banking System, and 'Other' Deposits with RBI. In other words M3=M2+ Term Deposits of residents with a contractual maturity of over one year with the Banking System + Call/Term borrowings from 'Non-depository' financial corporations by the Banking System.M3 captures the complete balance sheet of the banking sector.

- New measures of money supply

3.3.2 High - Powerd Money

The high-powered money, refers to the money created by the central bank and government, (paper currency and coins) which is held by both the public and banks. It is also known as monetary base. The monetary base or high-powered money (H) in a country consists of the currency held by the public (C) and the reserves held by commercial banks (R). It can be expressed as

$$H = C + R$$

The currency held by the public, denoted as 'C' includes gold reserves and the money issued by the government, such as coins and paper currency. Additionally, it encompasses the total outstanding credit of the central government, which involves loans, securities and related assets. Commercial bank reserves (R) consist of both required reserves (RR) and excess reserves (ER)

$$R = RR + ER$$

- H consists of coins, paper money, and reserves of commercial banks

The supply of high-powered money is managed by the central bank, so it is considered something that is given from the outside (exogenous). If there is more high-powered money supplied, it results in a higher money supply, and viceversa.

3.3.3 Money Multiplier Process and its Determination

The money multiplier effect describes how a rise in the monetary base results in a multiplied expansion of the money supply. In essence, this theory explains the central role of money multiplier and high-powered money in shaping the overall dynamics of the money supply in an economy. We have already discussed the high powered money. Let us discuss the money multiplier process.

3.3.3.1 Money Multiplier

The money multiplier is the ratio of the total money supply (M) to the stock of high-powered money, denoted as 'm'. The money multiplier can be written as expressed as

$$m = \frac{M}{H}$$

Rearranging we have, M = m × H

The money supply in an economy is influenced by both the size of the money multiplier (m) and the amount of high-powered money (H). Changes in the value of the money multiplier shows how much the money supply will change in response to alterations in the amount of high-powered money. The size of the money multiplier depends on two key factors:

1. The preference of the public to hold currency relative to deposits, denoted as the currency-to-deposits ratio and

2. The desired cash reserve ratio to deposits by banks, referred to as the cash reserve ratio

i. Currency-Deposit Ratio and Multiplier

- High-powered money held by the public in the form of cash relative to deposits

The currency-deposit ratio, represents the proportion of high-powered money held by the public in the form of cash in relation to deposits. It is highlighted as an important determinant of the actual value of the money multiplier. When banks increase their reserves and subsequently create demand deposits, individuals may prefer to hold some of their money in the form of cash rather than depositing it in banks. As banks create demand deposits, some currency leaks out from the banking system to individuals who prefer to hold cash. This drainage of currency reduces the expansion of demand deposits and, consequently, diminishes the size of the money multiplier.

ii. Cash Reserve Ratio and the Deposit Multiplier

- Ratio of the change in total deposits to the change in reserves

The deposit multiplier measures the ratio of the change in total deposits to the change in reserves, which depends on the cash reserve ratio. The value of deposit multiplier is the reciprocal of cash reserve ratio, expressed as $d_m = \frac{1}{Cash\ Reserve\ Ratio}$,. If cash reserve ratio is 10 percent of the deposits, then $d_m = \frac{1}{0.10} = 10.$ This implies that for every 100 units increase in cash reserves with the banks, there would be a subsequent expansion of 1000 units in demand deposits, assuming no leakage of cash to the public during the deposit expansion process by the banks. In India, this ratio is known as the Cash Reserve Ratio (CRR) and is regulated by the Reserve Bank of India (RBI). Thus, the relationship between the cash reserve ratio and the deposit multiplier is vital in determining the economy's money supply expansion.

The determinants of the money supply in an economy can be explained by using the M1 measure, which is regarded as the foundational concept of money supply. For simplicity, we will represent it as M.

Thus

$M = Cp + D$ **……... (1)**

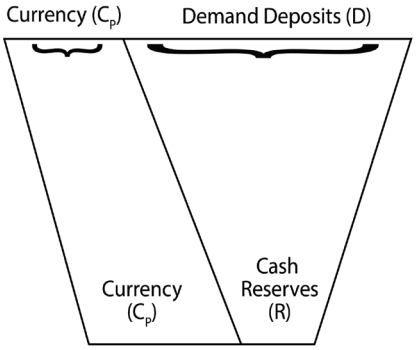
where M = Total money supply with the public, Cp is Currency with the public, and D is Demand deposits held by the public. Additionally, the quantities of high-powered money, also known as Reserve Money have a central role in determining the money supply. The high-powered money is the sum of currency held by the public (Cp) and the portion held by banks as reserves (R), which is denoted as H. High-powered money consists of currency (notes and coins) issued by the Government and the Reserve Bank of India**.** Thus

$H = Cp + R$……... (2)

where H is the amount of high-powered money, Cp is the Currency held by the public, and R is Cash Reserves of currency with the banks. High-powered money is indeed produced by the Reserve Bank of India and the Government, and commercial banks do not have a role in its production. On the other hand, Commercial banks produce demand deposits, which serve as money similar to currency. Since these cash reserves held by banks play a crucial role in facilitating the multiple creations of demand deposits, which are a significant component of the total money supply in the economy, they provide high-poweredness to the currency issued by the Reserve Bank and Government.

If we take a look at equations (1) and (2) mentioned above, it becomes apparent that equation one represents the total money supply, where demand deposits (D) are added to the currency held by the public. Equation two represents high-powered money, where cash reserves (R) of the banks are added to the currency held by the public. Furthermore, it highlights the significance of cash reserves (R) in facilitating the multiple expansion of credit or demand deposits by banks. This expansion significantly contributes to the overall

increase in the money supply within the economy. The total money supply within the economy is related to high-powered money (H). This relationship can be explained with the help of a figure.



- Relation between the total money supply and H

Fig 3.3.1 The High-Powered Money and the Stock of Total Money Supply

The base of the figure represents the supply of high-powered money (H), while the top represents the total stock of money supply. The total stock of money supply (at the top) is determined by a multiple of the high-powered money (H). Thus, the relationship between the money supply and high-powered money is determined by the money multiplier.

3.3.4 H Theory of Money Supply

The money supply in an economy is jointly determined by the monetary authority, banks, and the public. Here, we consider two types of money viz. ordinary money and high-powered money. Ordinary money, or narrow money, denoted as M = C + D + OD represents the sum of currency deposits, demand deposits and other deposits held by the public in banks. When discussing narrow money, other deposits held by the central bank are often ignored because they typically make up a very small fraction of the total money supply. Therefore, the equation simplifies to: M = C + DD..... (1)

High-powered money (H) is the sum of currency held by the public, cash reserves of the banks, and other deposits of the RBI, denoted as H = C + R + OD. H is produced by the RBI and the government and is held by the public and banks. This money is also known as reserve money or base money. Other deposits of the RBI constitute 1% of the total high-powered

money; therefore, we disregard them in the model, simplifying the equation to

$H = C + R$..... (2)

When comparing Equation 1 and Equation 2, we can observe that 'C' is common to both 'M' and 'H'. However, while 'M' includes 'DD', 'H' includes 'R'. This difference is a crucial factor in the 'H' theory of money supply. The reason for this disparity lies in the presence of banks. Because, banks are the ones responsible for creating demand deposits ('DD'), which are essentially money that people can access through their accounts. 'DD' is counted as money on par with 'C'. Banks are indeed able to produce 'DD' and are required to maintain 'R'. 'R' is a part of 'H' that is produced by the monetary authority, not by the banks themselves. The H theory of money supply earns its name due to the significant role of 'H', high powered money in determining the money supply. H is also called base money. The model assumes that the supply of 'H' is policy-determined and is exogenously given to the public and banks. This assumption gives us

- H is produced by the RBI and the Government

$H_S = H$.....(3)

The model assumes that the demand for H money typically has two sources viz. public demand for currency (C) and bank demand for reserves (R). Both the demand for currency ('C') and demand deposits ('DD') are influenced by the same set of factors, such as the rate of interest and income. Consequently, both 'C' and 'DD' are correlated, with the demand for currency being a proportional function of demand deposits. Which means that when demand deposits increase, for example, it is likely that the demand for currency will also increase, and vice versa. This can be written as

$C_d = c.DD$ .....(4)

c represents the ratio of currency deposits (Cd) to demand deposits (DD). In essence, it reflects the desired currency deposit ratio of the public. c serves as an indicator of the public preference between holding currency and demand deposits in banks. Therefore, c is considered a behavioural ratio assumed to remain constant within the model.

Reserves are typically classified into two primary categories, viz; required reserves and excess reserves. Required reserves

denote the reserves that banks are mandated by statutory regulations to hold with the RBI. Banks do not have discretion over these reserves. Excess reserves encompass all reserves held by banks in surplus of the required amount. Banks have the freedom to retain excess reserves either as cash on hand or as balances with the RBI, which is also known as vault cash. Therefore, both required reserves (RR) and excess reserves (ER), as well as the reserve demand (Rd), become increasing functions of the total demand and time liabilities of banks. The demand and time liabilities of banks are primarily from demand and time deposits from the public. Hence, it can be stated that Rd is largely a proportional function of the total deposits of the banks.

- Reserves of the bank includes required reserves and excess reserves

$R_d = r.D$……(5)

Then, 'r' represents the ratio of R_d to the total deposits of the banks. This ratio is commonly referred to as the reserve deposit ratio.

It is assumed that bank deposits come in two forms, viz;demand deposits and time deposits. Demand deposits are considered as money, while time deposits are not. The division between demand deposits (DD) and time deposits (TD) is determined by the public based on the terms and conditions offered by banks for each type of deposit. In other words, it is the public who decides how much time deposit to hold in relation to the demand deposit. As a simplification, it is hypothesised that time deposits (TD_d) increase in direct proportion to demand deposits (DD). It can be expressed as

TD_d - t.DD…….(6)

$D = DD + TD_d$…….(7)

Here 't' is the ratio of TD d to DD. It is called as time deposit ratio. From equation (7) and from (6) we get

- Bank deposits included demand deposits and time deposits

$D = DD + t.DD$

$D=(1+t)DD$……(8)

From equation (5), it is clear that $R_d = r.D$

Considering equation (8), R_d can be written as

$R_d = r.(1+t)\ DD$……(9)

Recalling that H =C+ R, demand for high powered can be written as $H_d = C_d + R_d$ From equations (4) and (9), we have

$H_d = c.DD + r.(1+t)\ DD$

$H_d = [c + r.(1+t)]DD$……(10)

Thus demand for high-powered money (H_d) has a function of demand deposits (DD)and the three behavioral ratios i.e., the ratio of currency deposits (c), time deposit ratio (t) and reserve deposit ratio(r). The market for H will be in equilibrium when $H_d = H_S$ or from equation (3) and (10) when

$[c+r.(1+t)]DD = \bar{H}$

The above equation can be solved for DD

$DD = 1/c + r(1+t).\bar{H}$……(11)

The above equations give the equilibrium value of demand deposits (DD) in terms of H and the three behavioural ratios c, t, and then the demand deposit multiplier is 1/c+r(1+t).

Next, from equations (1) and (4) and assuming that $C = C_d$, we have

$M = c\ DD + DD$

$M = (c+1)DD$

Substituting the value of DD from equation (11) in the above equation.

$M = c+1/c+r(1+t).\bar{H}$……..(12)

- The H theory of money supply is also known as the money multiplier theory of money supply

Equation (12) is the key equation of the H theory of money supply. It makes the supply of money a function of H and three behavioral ratios c, t, and r. Thus, the equation $c+1/c+r\,(1+t).\bar{H}$ gives the value of money multiplier 'm'. Then equation (12) can be written as

$M = m.\bar{H}$

The H theory of money supply is also known as the money

multiplier theory of money supply. The equations show the factors that determine the money supply of M can be categorised under two heads.Firstly, those affecting H, and secondly, those influencing 'm'. From the theory it is clear that changes in H are predominantly under policy control, while changes in 'm' are mainly endogenous, that is the changes in 'm' mainly dependent on the behavioural decisions of the public and banks. This distinction is helpful for understanding and planning money-related matters. It means that, for managing money, authorities should concentrated on controlling H rather than directly influencing 'm', to control money supply.

- Policy makers should focus on H to control money supply

3.3.5 Behavioural and Endogenous Model of Money Supply

In behavioural models of the money supply process, banks are treated as firms that produce an output of banking services. This output increases with the number of deposits a bank creates. The generation of bank deposits incurs costs. These costs consist of two main components: Real Resource Costs and Interest Payments.

- Bank deposits cost included real resources cost and interest payment cost

1. Real Resource Costs: These are the expenses associated with employing capital (such as buildings, technology, etc.) and labour (bank staff) to manage and operate bank accounts and loans. These costs include salaries, administrative expenses, maintenance costs, and other operational expenditures required to run the banking operations effectively.

2. Interest Payments: Banks need to attract deposits from customers to have reserves against which they can extend loans. To attract these deposits, banks typically offer interest payments to depositors. The interest paid on deposits constitutes a significant portion of the bank's costs, as it represents the price the bank must pay to acquire funds that can be used to generate loans and earn interest income.

- Bank's revenue, influenced by its fee structure and loan interest

A bank's revenue depends on two primary factors that are the fees it charges per sight deposit or demand deposits and the interest rate it earns on loans. When a bank adjusts its deposit levels, it does not directly impact the interest rates on deposits or loans. In a competitive banking industry, these interest rates typically remain stable even if an individual

bank changes its deposit quantity. Therefore, a bank's revenue is mainly influenced by its fee structure and the interest rates it earns on loans. The marginal revenue remains constant for a competitive bank given a fixed ratio of sight to time deposits. Conversely, the marginal cost increases with the volume of deposits due to the assumption of an increasing marginal-cost function for the real resource costs of bank asset and liability management.

In a competitive banking industry as a whole, interest rates on deposits and loans, as the volume of deposits and loans made by all banks change. To understand how these interest rates change with the volume of deposits produced by the entire banking industry, we need to introduce behavioural functions for the banks' depositors and borrowers. Let us assume that the non-bank public can hold four types of assets: currency, demand deposits, time deposits, and loans to the ultimate borrowers in the economy, who can either borrow directly from the non-bank public or from banks. The public's desire to keep cash on hand, instead of in the bank, is influenced by various long-term factors. These include the size, coverage, and sophistication of the banking system, as well as factors like rural-to-urban migration, the prevalence of bank and credit card usage, desires for tax evasion, and the extent of the black economy. Additionally, if there i's a decrease in confidence in the banking system's stability, people may opt to hold more cash at home rather than depositing it in banks.

- Factors influencing the behaviour of depositors and borrowers

In the short term, when the rate of return on bank deposits goes up, people usually keep less cash and put more money in their bank accounts. This means the proportion of cash compared to total deposits decreases. Similarly, when the deposit interest rate rises, people tend to put less money into short-term sight deposits compared to longer-term time deposits. Additionally, if bond and loan rates rise relative to deposit rates, individuals are less inclined to keep their funds in any form of account, whether it is cash or deposits. If the central bank maintains a constant supply of high-powered money (like cash reserves), banks cannot increase their total deposits unless they raise the interest rate on time deposits. By increasing the interest rate on time deposits, banks encourage people to deposit more money into their accounts instead of holding onto cash. This shift from holding currency to depositing funds helps banks increase their deposit volume.

- Changes in deposit interest rates affect people's behaviour

- Relation between the banks AR and MR

The banking industry's marginal cost for deposit production rises due to increasing marginal management costs and the need for a higher interest rate to attract more deposits, which reduces the public's currency-deposit ratio. In the banking industry's average revenue function, we need to consider the demand by borrowers for bank loans, which is directly influenced by the demand for consumer credit and investment funds. This demand increases if the interest rate on bank loans falls or if there's an anticipation of higher future income and profits. In a competitive banking industry, the average revenue from deposit creation declines as deposits expand because banks must lower the lending rate to expand loans. The industry will expand deposits until the point where average revenue equals marginal cost.

When considering the behavioural relationship between money supply and demand for bank loans, if investment in real capital goods becomes more profitable and the demand for bank loans rises, both the average and marginal revenue of the banking industry will increase. Banks can only extend more credit by attracting additional cash reserves. This can be achieved by raising the interest rate on time deposits, which encourages the non-bank sector to hold a smaller currency-deposit ratio, thereby allowing banks to hold a higher proportion of high-powered money. As a result, banks experience higher marginal costs, deposits expand, and both deposit and loan rates rise. In this way, the money supply varies directly with the demand for bank loans.

- Role of central banks in managing reserve ratio in the banking system

The model highlights the importance of the reserve ratio in the banking system. Initially, we assumed that banks could only increase their reserves by raising the interest rate on time deposits, encouraging people to keep more money in the bank and less in cash. However, this approach carries risks. If a bank can't immediately pay back all depositors in cash during a withdrawal rush, it can lead to the collapse of banks and spreading panic to other banks. To prevent such crises, countries have central banks. Among their main responsibilities is providing banks with extra cash when needed to avoid running out and collapsing. Central banks can loan money to banks and set interest rates for these loans. With central banks involved, banks have more options for obtaining cash reserves—they can borrow from the public or the central bank itself. If banks have the flexibility to choose their reserve

ratio, it becomes a dynamic factor. While a higher reserve ratio reduces the risk of running out of money, it also means banks forego interest earnings on those reserves.

In the behavioural model, the money supply is considered partly endogenous because factors such as the reserve ratio and currency ratio vary with interest rates and the demand for different financial assets and liabilities. Conversely, in the mechanistic model, the money supply is entirely exogenous due to the fixed nature of the money multiplier. This means that changes in high-powered money directly impact the money supply. However, even in the behavioural model, if high-powered money remains exogenous and its relationship with r and c is stable, the money supply still maintains a significant degree of exogeneity.

- Money supply is partly endogenous

3.3.6 Control of Money Supply

In day-to-day life, money serves as a medium of exchange and a store of value. Money has the power to make the economy go up and down because of this. The main changes that the economy experiences are inflation and deflation, which occur because of either too much or too little money supply. Money supply means the total volume of money that individuals have in their hands at a given point in time. As a result, the government and the monetary authorities use specific strategies to manage the money supply. The government uses fiscal policy, while the monetary authority employs monetary policy to keep things steady.

- Money supply determines the stability of the economy

Monetary policy refers to the steps that a monetary authority takes to address price stability using tools such as adjusting interest rates, modifying reserve requirements for banks, and participating in open market operations. Its goal is to manage inflation, influence economic activity, and foster steady economic growth. Fiscal policy refers to the government's strategy for managing the economy through the regulation of its income and spending and to achieve specific goals, such as controlling inflation, stimulating economic growth, and maintaining overall stability. Fiscal policy includes decisions about how much the government spends on various programs, how it funds its expenditure (through taxes or borrowing), and how it uses taxes to influence consumer and business behaviour.

- Monetary and fiscal policies are used to control money supply

3.3.7 Methods of Monetary Control

The excessive money supply faced by the economy will lead to a higher price level. Similarly, an inadequate money supply leads to price deflation. Both situations might affect economic growth negatively. The monetarist principles emphasize that the instability in an economy can be curbed by controlling the money supply. Some methods of monetary control are discussed below.:

1. Monetary Base Control
2. Interest rate control
3. Direct Control on Bank Lending

3.3.7.1 Monetary Base Control

The multiplier approach to determining the money supply uses the monetary base as a tool for regulation. This concept becomes particularly relevant in a closed economy where the government and monetary authorities act as the primary sources of high-powered money. If government spending exceeds tax revenue, the budget deficit or Public Sector Borrowing Requirements (PSBR) may arise. This deficit is not covered by selling government debts to the non-bank sector is must be financed using high-powered money. Additionally, the monetary authorities can impact the quantity of high-powered money independently of the PSBR's deficit or surplus status by engaging in open market operations. One strategy to encourage individuals to hold more bonds and reduce their money holdings involves increasing the interest rate on government bonds. As the interest rate on government bonds rises, the non-bank public opts to purchase these bonds using bank deposits. Consequently, private-sector banks experience a contraction in their cash reserves.

- Monetary base is used as a tool for regulating the money supply

To maintain their required reserve ratios and prevent them from falling excessively low, banks have a few options:

1. Reduce the currency deposit ratio: This involves encouraging customers to deposit more of their cash into bank accounts rather than holding onto physical currency. By lowering the currency deposit ratio, banks can increase the portion of deposits held in the form of reserves.

2. Acquire reserves from the central bank at a penal rate: In some cases, banks may need to borrow reserves directly

from the central bank. If they do so, they might be subject to a penalty interest rate, meaning they'll have to pay extra for accessing these reserves.

3. Curtail loans and deposits: Another option is for banks to reduce the amount of loans they give out and the deposits they accept. By doing this, they can preserve their reserves by not extending themselves too thin in terms of lending or liabilities.

3.3.7.2 Interest Rate Control

- Rate of interest is a tool used to regulate the money supply

The central bank aims to keep a particular interest rate at a desired level to regulate the money supply. When a central bank sets an interest rate target, it often uses interest rates as a tool to achieve price stability, full employment, or economic growth. By adjusting benchmark interest rates, central banks can disincentivise the lending activities of commercial banks which indirectly impacts the money supply.

3.3.7.3 Direct Control on Bank Lending

Direct control of bank lending involves regulatory measures implemented by central banks to manage the monetary base, which includes currency in circulation and bank reserves held at the central bank. By controlling bank lending directly, central banks can impact the amount of reserves banks hold, thereby affecting the overall money supply.

1. **Setting Reserve Requirements:** Central banks have the power to set reserve requirements, which dictate the amount of reserves that banks must hold against their deposits. By raising reserve requirements, central banks restrict the amount of money banks can lend out, thereby causing a decrease in the money supply. Conversely, lowering reserve requirements allows banks to lend out more money, leading to an increase in the money supply.

- Central banks controlling bank lending directly influence the reserves of the banks

2. **Open Market Operations:** Central banks can directly buy or sell government securities in the open market to influence the reserves of commercial banks. When central banks purchase government securities, they inject money into the banking system, increasing reserves and expanding the money supply. Conversely, selling securities reduces reserves and contracts the money supply.

3. **Credit Controls:** Central banks have the power to implement direct credit controls. These controls can include setting limits on the amount of lending or specific types of loans that banks can offer. By restricting or encouraging lending to certain sectors or borrowers, central banks can influence the allocation of credit and control the expansion or contraction of the money supply.

3.3.8 RBI Approach to Monetary Policy

- Monetary policy is the policy of the central bank

On April 1, 1935, the RBI was established under the provisions of the RBI Act 1934. Initially, the RBI's central office was located in Kolkata, later it was permanently moved to Mumbai in 1937. Although the RBI was initially under private ownership, it became fully controlled by the Government of India after nationalisation in 1949. Now, the RBI is the Central Bank of India, and it has the authority to make decisions regarding money supply and credit control. Reserve Bank of India (RBI) is entrusted with the responsibility of formulating and implementing monetary policy in India. The primary objective is to maintain price stability while also considering the goal of promoting economic growth.

Section 45 Z B of the amended RBI Act, 1934 stipulates the establishment of an empowered six-member Monetary Policy Committee (MPC). The first MPC was constituted on September 29, 2016. The MPC is responsible for determining the policy repo rate essential for achieving the specified inflation target. To facilitate effective decision-making, the MPC is mandated to convene at least four times annually, ensuring regular assessments and adjustments to the monetary policy framework.

3.3.8.1 Monetary Policy Instruments

The Reserve Bank of India employs direct and indirect tools to implement monetary policy which ensures effective liquidity management and financial stability. These instruments include:

1. Repo Rate

The repo rate is the interest rate at which the central bank of a country lends money to commercial banks. The interest rate at which the Reserve Bank provides liquidity through the Liquidity Adjustment Facility (LAF). Participants in the

- Interest rate charged by the central bank when commercial banks borrow money from it

LAF can access funds by offering government and approved securities as collateral. And it influences borrowing costs in the economy, impacting spending and investment. During times of inflation, the RBI increases the repo rate, while in periods of depression, it reduces the repo rate. This allows the RBI to control the money supply effectively.

2. Standing Deposit Facility (SDF) Rate:

The SDF rate is the rate at which the Reserve Bank accepts uncollateralized overnight deposits from LAF participants. It serves as a financial stability tool and helps with liquidity management. Its role is to replace the fixed reverse repo rate as the floor of the LAF corridor, set at 25 basis points below the policy repo rate, since its introduction in April 2022. The main purpose of SDF is to reduce excess liquidity and control inflation.

3. Marginal Standing Facilities

- MSF used as a tool against unexpected liquidity shocks

The scheme was introduced in May 2011.MSF allows banks to borrow overnight funds at a penal rate of up to 2% by utilizing a portion of their Statutory Liquidity Ratio (SLR) portfolio, as per the Reserve Bank of India. This acts as a safety valve against unforeseen liquidity shocks to the banking system, with the MSF rate set 25 basis points above the policy repo rate. By increasing the MSF rate, the central bank can reduce the money supply and control inflation. Conversely, by decreasing the MSF rate central bank can increase the money supply and stimulate economic growth during deflation.

4. Liquidity Adjustment Facilities

Liquidity adjustment facility was introduced in 2000. The Liquidity Adjustment Facility (LAF) encompasses several operations that the Reserve Bank performs to inject or absorb liquidity in the banking system. These operations include overnight and term repo / reverse repos, SDF and MSF. The role of the LAF is critical for managing short-term interest rates and overall liquidity conditions in the financial system. RBI can use the LAF to manage a high level of inflation .it does by increasing the repo rate, which raises the cost of servicing debt, This in turn reduces the investment and money supply in the economy. Conversely, RBI trying to stimulate the economy after a period of slow economic growth (deflation), which can lower the repo rate to encourage businesses to borrow. Thus, increasing the money supply.

5. LAF Corridor

The LAF corridor is a range that sets an upper limit (ceiling) with the Marginal Standing Facility (MSF) rate and a lower limit (floor) with the Standing Deposit Facility (SDF) rate. The Policy Repo Rate is situated in the middle of this range. This range helps ensure stability and control over liquidity for short-term interest rates.

6. Main Liquidity Management Tool

The primary tool for liquidity management involves a 14-day term repo / reverse repo auction operation at a variable rate, synchronized with the cash reserve ratio (CRR) maintenance cycle. It manages frictional liquidity requirements by offering flexibility and predictability during the reserve maintenance period.

7. Fine-Tuning Operations

In addition to the primary liquidity operation, they conduct fine-tuning operations, both overnight and for longer periods, to address any unpredicted changes in liquidity during the reserve maintenance period. If needed, they may also conduct variable rate repo / reverse repo auctions for more than 14 days.

8. Reverse Repo Rate:

- Hike RRR during inflation to control the money supply

The reverse repo rate is the interest rate at which the Reserve Bank of India absorbs liquidity from banks through the Liquidity Adjustment Facility (LAF), accepting eligible government securities as collateral. With the introduction of the Standing Deposit Facility (SDF), fixed-rate reverse repo operations will be at the discretion of the RBI for specific purposes. This tool helps regulate excess liquidity in the system and serves as a means of short-term liquidity absorption. The RBI controls inflation by increasing the reverse repo rate, while in deflationary conditions, it decreases the reverse repo rate to manage the money supply.

9. Bank Rate

The Bank Rate is the interest rate at which the Reserve Bank is willing to buy bills of exchange or other commercial papers from banks. It also acts as a penal rate for banks that fail

to meet their cash reserve ratio and statutory liquidity ratio requirements. This rate is aligned with the Marginal Standing Facility (MSF) rate. The Bank Rate has a significant impact on the cost of borrowing for banks, and it encourages adherence to reserve requirements, ensuring financial stability. During periods of inflation, the Reserve Bank of India (RBI) raises the bank rate to decrease the money supply in the economy. This results in commercial banks generating less credit, thereby reducing the overall money supply. As a consequence of the reduced money supply, demand decreases, leading to a decline in prices.

- Bank rates ensure financial stability

10. Cash Reserve Ratio (CRR)

The Reserve Bank requires banks to maintain a certain percentage of their net demand and time liabilities (NDTL) as an average daily balance. This is calculated based on the last Friday of the second preceding fortnight, which the Reserve Bank may notify from time to time in the Official Gazette. To curb inflation, the Central Reserve Ratio (CRR) is raised by the RBI to discourage banks from excessive lending. Additionally, CRR is tied to the base rate of loans, which serves as the minimum rate at which banks can lend. By adjusting CRR, the supply of money in the economy is regulated.

- CRR hike by RBI during inflation

11. Statutory Liquidity Ratio (SLR)

Banks operating in India are required to maintain a minimum value of assets, which should not be lesser than a certain percentage of their total demand and time liabilities in India, on the last Friday of the second preceding fortnight. The Reserve Bank of India will specify this percentage from time to time through notifications in the Official Gazette. The assets that the banks maintain should be as per the specifications mentioned in these notifications, which usually include unencumbered government securities, cash, and gold. During inflationary periods, the statutory liquidity ratio is raised, reducing the amount of funds available for commercial banks to create credit. Conversely, during deflationary phases, the statutory liquidity ratio is lowered, allowing commercial banks to hold a larger portion of funds, thereby facilitating credit creation.

- SLR reduced by the RBI during deflation

12. Open Market Operations (OMOs)

These transactions involve the Reserve Bank of India buying

or selling government securities to manage durable liquidity in the banking system. Open market operations (OMOs) are a tool used by central banks to manage inflation by adjusting the money supply. When inflation is high the central bank can sell securities to decrease the money supply which helps to lower prices and buy securities to increase the money supply which helps to raise prices.

3.3.9 Inside Money and Outside Money

In 1960, John G. Gurley and Edward S. Shaw explored whether money should be seen as an asset in their book "Money in a Theory of Finance." They made a distinction between "inside money" and "outside money." Inside money refers to funds issued by private entities like banks, usually in the form of debt such as bank deposits. While this money is an asset for the depositor, it's also a liability for the bank, so its net value is zero. Inside money is what we usually use in our everyday transactions. On the other hand, outside money is different. It's not a liability for anyone within the economy and is held in net positive amounts. Examples include currency backed by gold, foreign cash, and securities in foreign currencies. Government-issued money, like coins and bills, also falls under outside money. Unlike inside money, outside money is considered an asset because it contributes to the overall wealth of the sector holding it.

- Outside money contributes to overall wealth of the particular sector

Summarised Overview

Money is an essential factor in day-to-day life. Therefore, economists have argued about money since the beginning of economics as a discipline. Money supply can create fluctuations in the economy. Therefore, the money supply should be controllable. In India, monetary policy isttv used by the monetary authority to control the money supply through various monetary instruments which are qualitative and quantitative measures. There is no exact way to figure out how much money is available in an economy. Different countries use different ways to measure money supply. In India, the RBI measures the money supply on the basis of liquidity. High-powered money is influenced by individual behaviour therefore, the policymakers gave more concentration on controlling H. Then we see those forms of money on the basis of origin, they are inside money and outside money. Money originating from the private sector is called inside money while its origin from exogenous sources is called outside money, both of them act in their way in the economy. Therefore, the importance of money cannot be denied in today's world.

Assignments

1. Examine the Evolution of Money: From Barter to Cryptocurrencies.
2. Analyse Money Supply Theories
3. The Role of Money and the Monetary Base: Evaluate their Significance in an Economy.
4. Explain the specific tools and strategies that the central bank might employ to address these challenges and restore stability.
5. Explain the potential benefits and risks associated with the widespread adoption of cryptocurrencies in the global economy.
6. What is the behavioural model of money supply, and how does it differ from traditional economic theories in explaining individuals' decisions regarding money holding and spending.
7. Explain the concepts of inside money and outside money.

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1. Rosalind Levacic and Alexander Rebmann, *Macro Economics: An Introduction to*

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4. Rudiger Dornbusch, Stanley Fisher and Richard Startz (2007) 7th Edition. *Macroeconomics.*

Suggested Reading

1. Mankiw, N. Gregory author. (2016). *Macroeconomics.* New York: Worth Publishers.
2. Friedman, M, *Studies in the Quantity Theory of Money,* The University of Chicago Press, Chicago.

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

MASTER OF ARTS ECONOMICS

Block 4

Theories of Unemployment and Inflation

UNIT 1
Inflation and the Phillips Curve

Learning Outcomes

After completing this unit, the learner will be able to:

- know the trade-off between inflation and unemployment
- understand the concept of Phillips curve
- examine the Natural Rate of Unemployment Hypothesis

Background

Inflation is a topic widely discussed and debated in macroeconomics. Inflation in any economy stimulates growth but can be detrimental to employment. Policymakers and researchers have keenly followed trends in inflation. They have tried to solve the puzzle of inflation and unemployment trade-off. Fifty years ago, a household consisting of five members could easily purchase all household consumption items, with Rs 100 per month. A bagful of vegetables and groceries that could last for an entire month with just Rs 100. Household budgets at present have considerably altered. You would have also studied inflation and its causes during your graduation period. Retail inflation and core inflation, are some of the topics discussed in our newspapers daily. What is inflation? Let us recall that inflation is a sustained increase in the general price level in an economy. This signifies that while Rs 100 could purchase a basketful of goods five decades ago, today you cannot even make your basket half full with the same 100. This means that the purchasing power or value of money has come down. The immediate effect of inflationary pressure is felt by the common man, as it is no longer possible to buy goods and services that he could previously with the given income. As inflation restricts the purchasing power of individuals it has wider implications for the society. Inflation can be due to demand-pull factors and cost-push factors and it can affect the entire economy in adverse ways. As inflation is a growing menace to any society, unemployment is another serious social issue. In an inflationary situation, money wages will increase and may adversely affect

production activities. It may eventually lead to a fall in production which in turn results in layoff and unemployment. Policymakers have had the daunting task of dealing with inflation and unemployment. How do economists resolve the dual issue of unemployment and inflation? Classical economists believed in the concept of classical dichotomy where the real variables are separated from monetary variables. According to Classical theory, an increase in the supply of money decreases the value of money and thus causes the inflationary spiral in the economy. Unemployment is a real variable and inflation is a monetary variable. Thus, classical economists ruled out the relationship between inflation and unemployment. If policymakers can control inflation and unemployment in the economy, two serious economic issues are kept in check and one such policy tool that we will study in detail is Phillip's curve.

Keywords

Inflation, Unemployment, Phillip's Curve, Expectations, Natural Rate of Unemployment

Discussion

4.1.1 Inflation

- Rise in the general price level

Inflation is an economic phenomenon characterised by a sustained increase in the general price level of goods and services within an economy over time. The rate of inflation is typically measured through an annual percentage change in the price index, such as the Consumer Price Index (CPI) or the Producer Price Index (PPI) also known as the Wholesale Price Index (WPI). While moderate inflation is considered a natural aspect of an economy, excessive or hyperinflation can lead to severe consequences.

When we look at the causes of inflation, we can break it down into two main types. They are demand-pull and cost-push inflation. Demand-pull inflation occurs when aggregate demand exceeds aggregate supply, often fuelled by increased consumer spending, government expenditures, or increased investment. Cost-push inflation emerges from rising production costs, such as rising wages or increased raw material prices.

- Causes and management of inflation

Inflation severely impacts individuals, businesses, and the overall economy. To manage and control inflation, central banks and governments adopt various strategies. Central banks utilise monetary policy, adjust interest rates and regulate the money supply to control inflation. Governments, through fiscal policy, implement measures such as taxation and spending adjustments to manage overall demand in the economy.

4.1.2 The Inflation - Unemployment Trade - off

- Lower unemployment is possible only with a higher inflation rate

The Phillip's curve tries to map the relationship between unemployment and inflation in the economy. It shows us that in the short run, there exists a trade-off between inflation and the unemployment rate. Trade-off means that a certain rate of inflation can be traded for some rate of unemployment. In other words, a lower rate of unemployment can be made possible only if there is a higher rate of inflation. The policy implication of this trade-off between inflation and unemployment is very important. Given the inflation and unemployment rate combinations, policymakers obtain numerous trade-off points between inflation and unemployment to choose from.

- Inverse relationship between unemployment and inflation

In 1958, A. W. Phillip, a professor at the London School of Economics, published his empirical study on wage behaviour using data for the UK economy from 1861 to 1957. The main finding from his study was that there exists an inverse relationship between the rate of change in the money wage rate and the rate of unemployment. This inverse relationship between the rate of unemployment and the rate of increase in money wages depicted in the form of a curve is called the Phillips curve. The general conclusion that is derived from Phillips' empirical finding is that a rise in the money wage rate reduces the rate of unemployment and a fall in money wages increases the rate of unemployment. The Phillip's curve becomes extremely relevant as a macroeconomic policy tool as it shows us that there exists a trade-off between the rate of unemployment and the rate of change in money wage rates, that is, a lower rate of unemployment can be achieved only by allowing money wage rate to rise to a certain level. For any economy, this implies that inflation becomes essential to reduce unemployment.

The Phillip's curve shows that the rate of wage inflation decreases with the unemployment rate. Let us see how this works in the economy. Let W_t be the wages in country A for this current time period and W_{t+1} the wages in the next period, the rate of wage inflation can be given by

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

If r^* represents the rate of natural unemployment then we can write the simple Phillip's curve equation as

$$g_w = e\,(r - r^*)$$

where e measures the responsiveness of wages to unemploy ment. The Phillip's curve equation states that wages fall when the unemployment rate exceeds the natural rate, that is when $r > r^*$ and rises when unemployment is below the natural rate.

The Phillip's curve predicted a slow adjustment in wages and prices to changes in aggregate demand. Why?

The economy is in equilibrium with stable prices and unemploy ment is at its natural rate. Suppose there is an increase in prices by 10%, now both prices and wages have to rise by 10% for the economy to come back to equilibrium. But the Phillip's curve shows us that for wages to rise by 10% the unemployment rate has to fall. This will result in the rate of wage increase to go up. When wages start rising prices too rise and slowly the economy will get back to full employment levels of output and employment.

Rewriting our Phillip's curve equation can see this as,

$$W_{t+1} = W[1-e(r-r^*)]$$

- Wage rise prompts an increase in price level increasing employment

For wages to rise above their previous level, unemployment must fall below the natural rate. Although Phillip's curve was associated with the rate of increase in wages or wage inflation to unemployment, the term Phillip's curve later began to be used to show a curve relating the rate of inflation to the unemployment rate.

4.1.3 Phillip's Curve

- Inverse relation between (U) and (P)

The Phillips curve illustrates a negative correlation between the unemployment rate (U) and the inflation rate (P), as depicted in Figure 4.1.1. Higher aggregate demand growth boosts output, thereby reducing the unemployment rate. However, such higher demand growth also leads to an increase in the prices, i.e.; inflation. This suggests a trade-off between inflation and unemployment scenario where achieving lower unemployment rates comes at the expense of higher inflation rates. Friedman concurs with this idea of a short-term trade-off between inflation and unemployment.

4.1.3.1 Short Run Phillip's Curve

Using the figure 4.1.1 given below, we can depict the short run Phillip's curve.

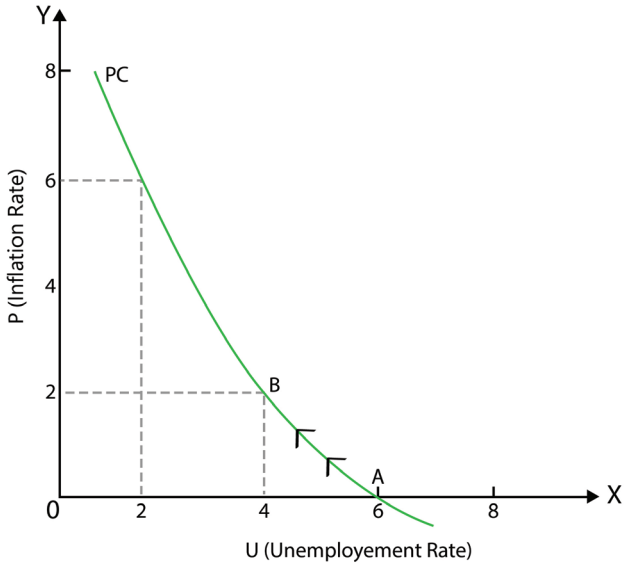

Fig. 4.1.1: The Phillip's Curve

In figure 4.1.1, the unemployment rate (U) is depicted on X-axis and the inflation rate (P) is depicted on Y-axis. In the short term, a rise in the money supply shifts the economy along the short-run Phillips curve (PC) from point A to point B. The trade-off between the unemployment and the inflation rate can be easily found. For example, as shown in the figure, if unemployment rate is intended to be reduced from 6 percent to 4 percent, a rise in the inflation rate from 0 percent to 2 percent will have to be accepted. If an inflation rate of 2 percent is the goal of the policy maker, then an unemployment rate of 4 percent will have to be accepted.

4.1.3.2 The Policy Implications

- No permanent trade off

Phillip's curve is considered to be a crucial macroeconomic policy tool. Economic policymakers could choose a range of combinations of unemployment and inflation rates. For example, low unemployment in the economy was possible if there were high rates of inflation. Most of the developed countries followed the policy of maintaining low unemployment and high inflation during the early 1960s and slowly changed the policy by choosing low inflation and high unemployment rates by the late 1960s. The notion of a permanent unemployment-inflation tradeoff is not possible in an economy because in the long run aggregate supply curve is vertical.

4.1.3.3 Sticky Wages in the Short Run

- Wages adjust slowly

In the predominant neoclassical understanding of supply, wages adjust immediately to make sure that output remains at the full employment level. However, output is not always at full employment level as the economy goes through various stages in the business cycle. The Phillip's curve demonstrates that wages adjust slowly in response to changes in unemployment. Why do nominal wages adjust slowly to changes in output? Why are wages sticky? Sticky wages or sluggishness in wages is because wages move slowly over time, rather than being fully flexible, to make sure that there is full employment at every time.

To understand the wage stickiness assumption, we can rewrite the Phillip's curve as a relationship between the rate of change in wages and the level of employment. We can denote the full employment level of employment by N^* and actual employment by N. The unemployment rate is the fraction of the full employment labour force N^* that is not employed.

$$r = \frac{N^* - N}{N^*}$$

The Phillip's curve relationship between level of employment and rate of change in wages

$$g_w = \frac{W_{t+1} - W_t}{W_t} = -e\left(\frac{N^* - N}{N^*}\right)$$

Rewriting the equation, we can see that the Phillip's curve shows the relationship between the wages in this period, the wages in last period and the actual level of employment.

$$W_{t+1} = W_t \left[1 + -e\left(\frac{N^* - N}{N^*} \right) \right]$$

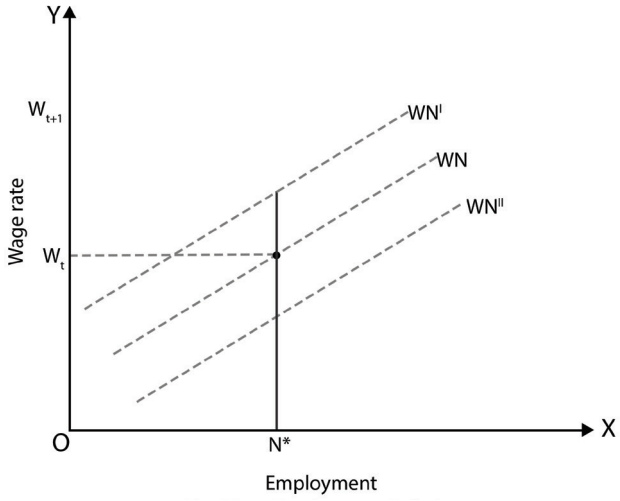

Fig. 4.1.2. The Wage Employment Relation

- Wage response

The wage in the next period is equal to the wage that existed in the current period but with an adjustment for the level of employment. At full employment level, the next period's wage is equal to this periods. If employment is above full employment level, the wages in the next period increase above this period's wage. On the other hand, if employment is below the full employment level, the wages in the next period fall below this period's wage. How can we understand the response of wages? The extent to which the wage responds to employment depends on the parameter e. If e is larger, then unemployment has a huge impact on wages and the WN wage line is steep.

- WN relationship shifts over time

The Phillip's curve also provides us with the insight that the WN relationship shifts over time. If there is overemployment in this period, the WN curve will shift upwards next period to WN'. If the employment level falls short of full employment, the wage line shifts downwards to WN''. If there are changes in aggregate demand in this period which changed the rate of unemployment in this period, will have effects on wages in subsequent periods. This adjustment of employment is a dynamic change that we observe over time.

The wage stickiness of Phillip's curve is explained by different schools of economics. Let us examine what these crucial observations are.

1. Imperfect Information- Market Clearing

- Slow worker responses

Some economists explain wage stickiness in Phillip's curve using the market clearing assumption. This implies that wages are fully flexible but adjust slowly as expectations are temporarily incorrect. In 1960's, models developed by Milton Friedman and Edmund Phelps demonstrated that when nominal wages go up as prices has risen, workers think that their real wages have also increases and therefore are willing to work more. In the short time period until the workers realise that higher nominal wages are only due to higher price level, a rise in the nominal wages is linked with a higher level of output and less unemployment. In these models, wages adjust slowly because of workers slow responses or imperfect information about price changes.

- Workers uncertain

The Lucas model takes forward this explanation and shows that workers do not know the current price level at the time they have to decide whether to work at the ongoing nominal wages. When the wage they receive increases, they have the understanding that it might have increased because the overall price level has increased or because the wage for the type of labour they offer has increased. But if the wage for the kind of work they offer has increased then the real wage must increase, and they should work more. As the workers cannot be sure about the reason for the increase of wages, they strike a compromise by working more but not as much as they would if they were twice sure that the real wages have increased. In this way, Lucas further develops a short-run trade-off between higher wages and higher employment, depending on imperfect information for workers.

2. Coordination Problems

The coordination problems point out the process by which the firms adjust their prices when demand changes. If the economy has an increase in money stock. Then prices will go up in the same proportion as the money supply and the output will remain the same. But if one firm increases its price in proportion to the increase in money stock, and no other firm does so, then that single firm will lose its business when compared to other

firms. If on the other hand, all the firms increase their prices then they would move to the new equilibrium levels. As all firms in an economy cannot coordinate this price increase, each one will increase prices slowly because the effect of change in money stock is felt through an increased demand for goods at the prevailing prices. Coordination problems also help us to understand why wages are sticky downward, and why they do not suddenly fall as aggregate demand decreases. If a single firm cuts wages, then most of the workers will be angry and leave that firm. If all firms coordinated then wages could be reduced. But this coordination does not happen and wages decrease slowly as individual firms cut the nominal wages of the employees.

- Coordination problems in price adjustment

3. Efficiency Wages and Costs of Price Changes

Wages are considered to be a motivating factor in this theory. The amount of effort the workers take on the job is related to how well the job is paying relative to other options. Firms would not want to pay wages above the market clearing wages to ensure that employees remain with them and thereby reduce the attrition rate. Efficiency wage theory thus explains why there are slow changes in real wages but does not explain why the average nominal wage is slow to change.

- Wages motivate effort

4. Contracts and Long-Term Relationships

The labour market typically is a long-term relationship between firms and workers. Most of the workers expect to continue their current job for some time. Working conditions including wages are discussed from time to time, but not always, as costs are associated with this. Even in cases where wages are supposed to be set by market conditions, procuring details about alternative wages is costly. So, workers as well as firms relook at wages and adjust them once a year.

- Long-term labour market relationship

5. Insider- Outsider Models

Unemployed people expect firms to cut wages and create more jobs so that they can find employment. But firms always try to negotiate with their workers and not with unemployed people. It is a costly exercise for firms to send away their existing labour force as it involves firing costs, hiring costs, training costs, etc. Here the insiders have an advantage over the outsiders. The insider-outsider model thus predicts that

- Unemployed expects wage cut

wages to a large extent do not respond to unemployment and thus gives us a reason why we do not quickly come back to full employment once there are recessionary pressures on the economy.

4.1.4 Natural Rate of Unemployment

- Full employment is an ideal state

The full employment situation in any economy is an ideal condition. This implies that all those who are actively searching for a job are employed in the economy. In economies across the world have you ever seen the situation of full employment? Is it possible to attain full employment levels? When we say that an economy is operating at a 'full employment' level, this does not mean that there is zero unemployment. As there are market rigidities or stickiness in wages and prices in the economy it is impossible to make sure that there is zero unemployment in the economy.

- It is natural to have a certain section of labour unemployed

Most of the times in an economy, workers are shifting from one job to another. This transitional unemployment phase is referred to as frictional unemployment. Sometimes a section of workers is unemployed because of the mismatch of their skill sets with the skill sets required for the job. This is called structural unemployment. Milton Friedman and Edmund Phelps introduced 'natural rate of unemployment' in the 1960s. The natural rate of unemployment considers the frictions and imperfections in the economy and assumes that it is natural for an economy to have certain proportion of its labour force unemployed, at any point of time. We observe that any unemployment that is not natural could be due to business cycles, or policy related.

- Sum of frictional and structural unemployment

For empirical purposes, the natural rate of unemployment is the total of frictional unemployment and structural unemployment in an economy. It is different across countries, and over time for the same country. For the US economy, for example, the natural rate of unemployment is estimated to be between 3.5 per cent and 4.5 per cent. Many countries do not report any estimate of the natural rate of unemployment.

Summarised Overview

Inflation and unemployment are considered to be the two important issues in any economy. To tackle this, policy makers try different tools. Out of this, the Phillips curve is considered to be empirically strong analysing the tradeoff between inflation and unemployment. Robust results proved the trade-off between inflation and unemployment in the short run. There exists an inverse relationship between inflation and unemployment in the short run. Any policy to reduce unemployment will result in increasing rates of inflation. The Phillip's curve thus provides us a base for understanding the complex phenomenon of inflation and unemployment. There are widespread implications for the Phillips curve including the sticky wages and prices and the insider outsider model. The natural rate of unemployment considers the frictions and imperfections in the economy and assumes that it is natural for an economy to have certain proportion of its labour force unemployed, at any point of time.

Assignments

1. The empirical analysis of Phillips of the UK economy gave us a very important policy tool to analyse inflation. Explain this statement.
2. As policy maker do you think government policies to reduce inflation will be effective under rational expectations? Why?
3. What are the crucial policy implications of the Phillip's curve?
4. The concept of natural rate of unemployment can be used to understand macro-economic issues better. Analyse this statement.
5. Using Phillip's curve explains the trade-off between inflation and unemployment in the short run taking Indian economy as an example.

Reference

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3. Mankiw, N. Gregory author. (2016), *Macroeconomics*, New York : Worth Publishers

Suggested Reading

1. Rudiger Dornbusch, Stanley Fisher and Richard Startz (2007) 7th Ed: *Macroeconomics*

2. 2.Shapiro, E, *Macroeconomic Analysis*, Galgotia Publications, New Delhi, 1994

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

UNIT 2
Role of Expectations and Theories of Inflation

Learning Outcomes

After completing this unit, the learner will be able to:

- analyse the role of expectations in economics
- familiarise with the concept of expectation-augmented Philips curve
- know the importance of managing inflationary expectations in Tobin's framework
- compare the difference between monetarist and structuralist theories of inflation

Background

The importance of the role of expectations is significant in macroeconomic theory. For instance, inflation is influenced significantly by people's expectations, views, and anticipations about future economic situations. This complex relationship has led to the emergence of several well-known theories and ideas that attempt to explain the problem of inflation and its control. The Adaptive Expectations Hypothesis constitutes one of the major theories and ideas covered in this unit. According to this theory, past inflation rates have an impact on predicting current inflation rates. The Rational Expectations Hypothesis asserts that economic agents have a forward-looking, rational approach to developing expectations. Agents build their expectations using all the information at their disposal, including their knowledge of economic principles.

In economic theory, Phillips Curve shows an inverse relation between unemployment and inflation. According to the Expectations Augmented Phillips Curve, inflationary

pressures are influenced not just by the current level of unemployment but also by the gap between actual and expected inflation rates. When individuals and firms anticipate higher inflation, wage demands and price-setting behaviour may adjust accordingly, affecting the overall dynamics of inflation. The Non-Accelerating Inflation Rate of Unemployment (NAIRU) is defined as 'a rate such that, as long as unemployment is above it, inflation can be expected to decline'. That is, it is the rate at which inflation will be in a non-accelerating situation.

Stagflation, a phenomenon marked by economic stagnation, high unemployment and high inflation, reshaped assumptions about how economies function. Stagflation in the 1970s made the situation difficult for Phillips curve analysis and defied the traditional Phillips Curve relationship and underscored the complex role of expectations, supply shocks, and macroeconomic policies in shaping economic outcomes. The cost of inflation comprises both economic and social consequences. High inflation reduces purchasing power, affects pricing signals, and may discourage investment due to uncertainty. It can also hinder long-term economic growth and worsen income inequality. To reduce inflation, many different tactics have been suggested and put into practice. These include monetary policy actions like reducing the money supply, increasing interest rates etc. Fiscal policies can also be used, such as cutting back on government expenditures or raising taxes. In addition, structural reforms aimed at overcoming supply-side limitations and enhancing market effectiveness, to keep inflation under control.

As a result, various economic theories and concepts have been developed in response to the complex link between expectations and inflation. Understanding and controlling expectations is essential for influencing economic outcomes and policy choices. Thus in this unit, we will discuss the expectation hypothesis and various associated inflation theories.

Keywords

Expectations, NAIRU, Monetarist, Structuralist, Inflation, Stagflation

Discussion

4.2.1 The Role of Expectations

In the world of economics, what people expect to happen is really important. These expectations, whether they make sense or are based on feelings, have a big impact on how people make decisions about money, how markets work, how government rules affect things, and how the economy stays stable. Expectations are highly important in economics and explain why they matter in different ways. For example, when individuals are optimistic about positive developments in their jobs and the economy, they are inclined to increase their spending. On the other hand, if they have concerns about adverse events, they may exhibit a more cautious approach, leading to reduced spending.

- Expectations shape economic decisions and outcomes

Also, when business people think things will go well, they invest more money in their plans. But if they are not so sure, they might not spend as much money. This can influence the pace and direction of economic growth. Imagine, the stock market and other financial aspects. The prices of assets such as stocks, bonds, and commodities can fluctuate because of prevailing perceptions and anticipations regarding future events and market conditions. Sometimes, when many people think in the same way, it can lead to problems like bubbles or market crashes.

- Workers adjust wage demands

Workers sense the change in the economic situation and demand wages accordingly. If a worker expects that demand for labour will be somewhat higher in the coming months, he will definitely ask for an increase in wages. On the other hand, if demand for labour is going to decrease due to recessionary tendencies in the economy, he would try not to lose his job and may not ask for an increase in wages. We also notice that in economies that have higher inflation rates, the cost of living increases. If the worker expects that prices of goods and services are increasing steadily (i.e., inflation is higher) he would demand for higher wage rate so that his real wage rate remains the same. When inflation is anticipated correctly then individuals are careful and they alter their future payments keeping the rate of inflation in mind.

What if there are unexpected inflationary pressures on the economy? Unexpected inflation results in income re-distribution between income groups. Usually, the workers who earn wages monthly or the salaried class who have a fixed nominal wage get severely affected as real wages gets decline due to price rises. The role of expectations in deciding economic behaviour is crucial. Keynesian analysis discusses about expectations of people, but he does not include it in his analysis. By 1950s, expectations in economic theory began to be incorporated, as it was important to see how individuals adjusted their economic behaviour according to expectations. There are two important hypotheses of expectations, a) adaptive expectations and b) rational expectations. Let us discuss them in detail and see how this discussion led to the improvement of Phillip's curve, which we learned in the previous unit.

- Expectations play an important role in economic decisions

4.2.2 Adaptive Expectation Hypothesis

As ordinary citizens, we all think twice before any action is taken. For instance, people might anticipate an increase in vegetable prices due to heavy rain for a large number of days or flooding that affects crops, leading them to buy vegetables in bulk before prices rise. Imagine a prolonged heatwave causing a spike in electricity consumption. People, expecting a subsequent increase in electricity prices, might decide to conserve energy or invest in energy-efficient appliances before the higher rates kick in. Likewise, if they anticipate higher car costs due to new government policies, the demand for cars would increase. Thus all of our activities are dictated by the expectations we hold today.

- Expectations shape our actions

The past behaviour of a variable becomes crucial in economic analysis. Adaptive expectations take into account the past behaviour of a variable. Suppose the price level for period (t) is p_t and we put a superscript 'e' to indicate the expected price level. Thus expected price level in period (t) is p_t^e . According to adaptive expectations,

$$p_t^e - p_{t-1}^e + \lambda\left(p_{t-1} - p_{t-1}^e\right)$$

λ is a parameter such that it takes values between 0 and 1. The equation can be interpreted as follows.

During the previous year, economic agents (for example,

households and firms) expected price level to be $_{-1}$. Actual price however turned out to be p_{t-1}. Thus, there is a forecast error of $\left(p_{t-1} - p^e_{t-1}\right)$. Now as a result of this forecast error, people will update their expectations by adding $\lambda\left(p_{t-1} - p^e_{t-1}\right)$ to last year's expected price. Note that people would like to update their expectations and correct part of the error they committed during the previous year. Let us take an example. Suppose, in 2020 firms expected the inflation rate (π)to be 3 percent $\left(\pi^e_{t-1}\right)$. But in spite of this prediction, the inflation rate turned out to be 6 percent $\left(\pi_{t-1}\right)$, thereby resulting in an error of 3 percent. What should be the expected inflation rate in 2021 (value of π^e_t)? Firms would update their expected inflation rate for the current year and they would expect a higher rate of inflation in 2021. Suppose, firms have learnt from experience that about 50 per cent of the forecast errors have to be corrected (it means, λ = 0.5) while updating their forecast about the price level. Thus, the expected inflation rate in 2021 would be

$$\pi^e_t - \pi^e_{t-1} + \lambda\left(\pi_{t-1} - \pi^e_{t-1}\right)$$

$$= 3 + 0.5\ (6 - 3) = 4.5\ \%$$

The operation of the adaptive expectations hypothesis is simple. It also brings in an important concept, i.e., expectations into macroeconomics thereby making it more application-oriented. There are however two major limitations of the adaptive expectations hypothesis. First, the model assumes that people do not learn from past mistakes. They adjust current-year expectations by λ times the forecast error. Thus, they consistently underestimate the rate of inflation, if the actual inflation rate is more than the expected inflation rate. Similarly, they constantly overestimate the rate of inflation, if the actual inflation rate is less than the expected inflation rate.

- Neglecting mistakes

Second, the model places too much weight on past expectations alone. People base their expectations on past information only and fail to take into account the present or future events. For example, under adaptive expectations, when the government

- Relying solely on past data

pursues an expansionary monetary policy people do not expect that the inflation rate will go up. Similarly, when there is a natural disaster such as a famine, people do not expect that aggregate supply will decline and prices will go up. Due to these limitations of adaptive expectations, economists were forced to search for alternative theories of expectations.

4.2.3 Rational Expectation Hypothesis

The rational expectations hypothesis was an improvement over the adaptive expectations hypothesis. The rational expectations hypothesis assumes that households and firms make informed decisions based on the best possible information available to them. Thus, they consider not only past trends but also present and expected future events. According to rational expectations, people adapt as they learn from their past mistakes. Sometimes accurate predictions of the future may be wrong but on average it will be correct.

In simple terms, the expected rate of inflation in period t is given by

$$\pi_t^e = \pi_t + \varepsilon_t$$

- Considering all information

In the above equation, ε is a stochastic error, with the expected value of zero. While some people may have positive errors in their forecast, others will have negative errors. When aggregated, such errors cancel out in the sense that the sum of positive errors is equal to the sum of negative errors. Secondly, the errors do not show any pattern; they are random in nature. Recall that under adaptive expectations, errors followed a pattern or errors were systematic.

- Account for systematic errors in expectations

There are two versions of the rational expectations hypothesis: weak and strong. In the weak approach, it is assumed that people have access to limited information; but they make the best use of the information. Let us take a real-world example. You buy ragi flour every week for household consumption. As a consumer, you are unaware of the relative prices and nutrient levels of all the brands of ragi flour available in the market. With limited information available to you, however, you usually stick to the same brand and end up buying from the same shop even if other shops are charging less. In the strong approach of the rational expectations hypothesis, it is assumed that people have access to all information. Decisions

taken are based on all information. Thus, their expectations are equal to the actual values. Any error in the forecast is due to unexpected changes in the economy.

4.2.4 Expectations Augmented Phillip's Curve

The policy tools are modified once they cannot explain the existing economic situations. The Phillips curve which acted as a ready policy tool in the short run could not explain stagflation in an economy. Stagflation can be referred to as a situation where there is a very slow rate of growth of the economy or nearly zero growth coupled with unemployment. For analysing stagflation, we incorporate expectations into our analysis. The Phillips curve shown in the previous unit will remain valid if there is no change in expectations in the minds of people. In case people perceive that there is a change in expectations, then there is a shift observed in the Phillips curve. Both adaptive expectations and rational expectations have important implications for the Phillips curve.

- Stagflation challenges the effectiveness of Phillips curve

4.2.4.1 Long Run Phillips Curve Under Adaptive Expectations

Most economic decisions by workers and employers on employment are taken based on real wage and not nominal wage. According to Friedman and Phelps, expectations play an important part in economic decisions. Thus the 'expected real wage' should always be taken into consideration to determine the equilibrium output and wage rate. The employment contract signed by the workers usually specifies the salary for a particular period. During this contract period, salary cannot be re-negotiated; it can be altered after the contract period is over. As the workers already have this information available to them they include expected inflation into the contract. For example, if the workers expect that the inflation rate will be 3 per cent in the coming year, they will negotiate the wage rate in such a manner that the real wage rate does not decline due to price increases.

- Real wage key in employment decisions

Let us now understand the behaviour of Phillip's curve in the long run from the below figure 4.2.1.

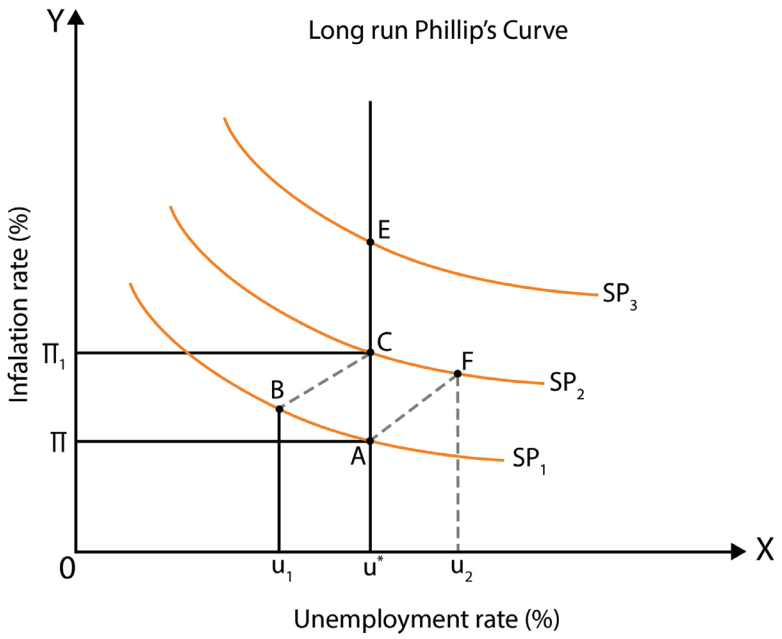


Fig. 4.2.1. Shifts in Philips Curve and Long-run Phillips Curve

The three curves SP_1, SP_2, and SP_3 are the short-run Phillips curves at different levels of unemployment and inflation rates. At a particular period if the economy is at point A with an unemployment rate of u* and an inflation rate of π, these rates are consistent with the potential level of output. Now policymakers realise that the prevailing unemployment rate is high rate of unemployment and have decided to control it by pursuing expansionary policies. Since the economy has already employed all available resources any expansionary policy will only push up the price level. When the price level rises, the real wages decrease. Workers fail to grasp the intensity of the situation or do not fully realise the decline in real wages. Now the real wages continue to decrease. Under these conditions money wages cannot catch up with the price increase and the real wage falls at a faster pace. As a result of a fall in the real wages, employers increase their demand for labour, employment shoots up and unemployment decreases. Now with the general increase in price level and decreasing unemployment, the trade-off point changes from A to B on the same Phillip's curve. This results in a decline in the unemployment rate from u^* to u_1. The inflation-unemployment combination at point B is not sustainable for a long time. This

is because the workers slowly realise the decline in their real wages and begin to anticipate a further fall in their real income. Therefore, they begin to incorporate their 'expectations' into their demand for higher money wages matching with the expected price rise. They negotiate for a higher monetary wage rate at the time of the renewal of the labour contract. As a result, real wages begin to rise. The rise in the real wage rate causes a decline in the demand for labour. Consequently, the labour market begins to move towards a higher equilibrium point as shown by the movement from point *B* towards point *C*. This is virtually a situation of stagflation when both prices and unemployment increase simultaneously. Stagflation is, in fact, a situation in which prices increase without an increase in employment and output.

- Expansionary policies shift the Phillips curve

Thus whenever government tries to reduce the unemployment rate below the natural rate, it results in higher and higher inflation. Given this, the natural rate of inflation is often termed the 'non-accelerating inflation rate of unemployment' (NAIRU). When unemployment is at the natural rate or NAIRU, there will be stability in the rate of inflation. When unemployment moves away from the natural rate, there is a steep increase or decrease in the inflation rate. Thus if actual unemployment is less than u*, inflation will continue to rise higher and higher in the coming years. The concept of NAIRU and expectations formation explains the hyperinflation witnessed by many countries. Unless unemployment returns to its natural rate the inflation spiral will keep on accelerating. The above analysis brings us to an important conclusion. Under adaptive expectations, the Phillips curve in the short run is downward-sloping. In the long run, however, it is vertical. The vertical line LRPC depicts the long-run Phillips curve. Thus there is no trade-off between inflation and unemployment in the long run.

- Reducing unemployment below the natural rate accelerates inflation

4.2.4.2 Phillips Curve Under Rational Expectations

Under rational expectations economic agents such as firms and households are future-ready. They consider all available information – past experience as well as present and future developments in the economy. There is no perfect prediction under rational expectations, but the errors cancel out on the whole. An implication of this is that, the actual inflation rate is equal to the expected inflation rate. Thus workers and firms do not commit any error regarding wage rates during negotiations.

Thus, there is no trade-off between inflation and unemployment under rational expectations. The unemployment rate in the economy is at the natural rate. Suppose unemployment in the economy is at the natural rate, firms and workers expect inflation to be at the rate of 6%. Suppose, the government pursues an expansionary policy as a result of which there is an increase in aggregate demand. Consequently, there is an increase in the rate of inflation. If this policy was an expected change by the economic agents, they would have factored in the increase in inflation rate into their decision-making. If the policy is unexpected, then it will have the desired effect which is a fall in unemployment. This brings us to an important macroeconomic problem: how effective is government policy under rational expectations? If government policy is expected, it will not have any impact. Rational expectations theory rules out any trade-off between inflation and unemployment, as the expected inflation rate is equal to the actual rate of inflation.

- Rational expectations eliminate trade-off

4.2.5 NAIRU

An important economic concept that describes the connection between the unemployment rate and inflation is the Non-Accelerating Inflation Rate of Unemployment (NAIRU). The NAIRU is the lowest level of unemployment that a country's economy can tolerate without accelerating inflation. In simple terms, NAIRU represents the point at which the labour market is in equilibrium, where the demand for labour (job opportunities) matches the supply of labour (available workforce) and prevents inflationary pressures from building up due to excessive demand for workers. NAIRU is the rate of unemployment at which the labour market is in equilibrium, that is, when the existing labour is being used and there is no upward or downward pressure on wages or prices. The economy is producing at its maximum capacity with this level of unemployment, so the central bank's monetary policy does not need to be changed to control inflation or boost employment.

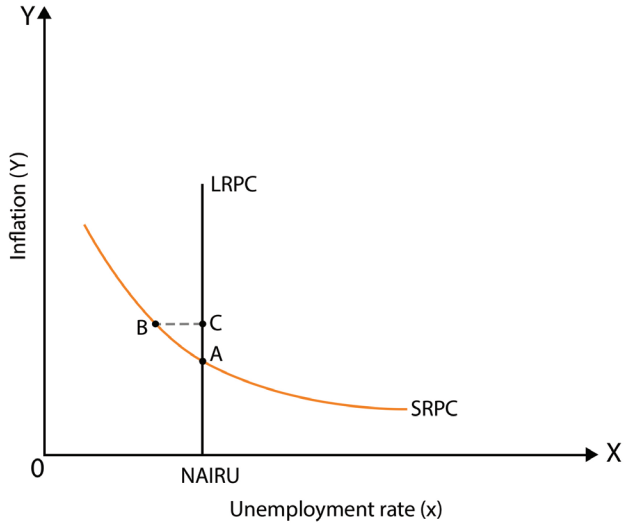
- Equilibrium unemployment rate

The degree of NAIRU in an economy can be influenced by several factors, including long-term characteristics of the labour market, such as skill mismatch, labour market restrictions, and demographic shifts, known as structural factors. Institutional factors such as the bargaining power of employees and the determination of wages can be impacted by

- Factors influencing NAIRU

labour market institutions like minimum wage regulations and labour unions. Changes in technology can modify the skills needed for professions and affect the level of employment. Macroeconomic Policies like monetary and fiscal policies can influence the overall demand for goods and services, which in turn affects the demand for labour.

The following simplified graph uses a hypothetical Phillips Curve to demonstrate the concept of NAIRU:



Fig, 4.2.2. NAIRU

- Trade-off between inflation and unemployment

In the figure above, the Unemployment Rate is displayed on the x-axis. The inflation rate is shown on the y-axis. The original Phillips Curve (SRPC) depicts the inverse relationship between inflation and unemployment. In the short term, point A on the graph represents the equilibrium where the natural rate of unemployment equals the Non-Accelerating Inflation Rate of Unemployment (NAIRU), resulting in stable inflation along a vertical line. If external factors or government actions lower unemployment to point B, then inflation increases to point C. Notably, inflation at C surpasses that at A. However, over the long term, the interplay of wage levels, aggregate demand, unemployment, and prices will eventually align NAIRU with the actual unemployment rate. To make educated choices about monetary policy, central banks and policymakers keep an eye on the NAIRU. Inflation may result if the actual unemployment rate is lower than the NAIRU because of upward pressure on wages and prices. In contrast,

there may be downward pressure on wages and prices if the actual unemployment rate is higher than the NAIRU, which could result in deflation or disinflation.

It's vital to remember that the idea of NAIRU has changed over time and that due to shifting economic conditions and other influencing factors, determining its precise estimation can be difficult. The provided graph is a simplified illustration; actual-world events may be more complex. Remember that while NAIRU and other economic models are tools to aid economists and policymakers in understanding and managing complex economic scenario, they might not fully reflect every detail of actual-world circumstances.

- Accurate estimation not possible

4.2.6 Tobins View on Philips Curve

James Tobin suggested a middle ground between the negatively sloped and vertical Phillips curves in his presidential address to the American Economic Association in 1971. Tobin thinks there is a Phillips curve within limits. However, when the economy grows and employment increases, the curve weakens even more and disappears until it becomes vertical at some critically low rate of unemployment. Tobin's Phillips curve is therefore, with a portion that resembles a standard Phillips curve and the balance of it that is vertical, as seen in Figure 4.2.3. According to the graph, Uc represents the critical unemployment rate at which there is no trade-off between unemployment and inflation. Tobin asserts that the vertical component of the curve does not reflect an increase in the demand for more wages but emerges from imperfections of the labour market. At higher unemployment levels, an excess supply of labour can set a wage floor. Consequently, the wage percentage may not decline to zero. As the wage level is above the floor limit, any attempt to raise aggregate demand through expansionary policies will result in a reduction in unemployment and an increase in wage and price percentages. In such circumstances, the Phillips-type inverse relationship remains applicable. The negative slope of the Phillips curve is observed only within this specific range.

- Diminishing trade-off between unemployment and inflation

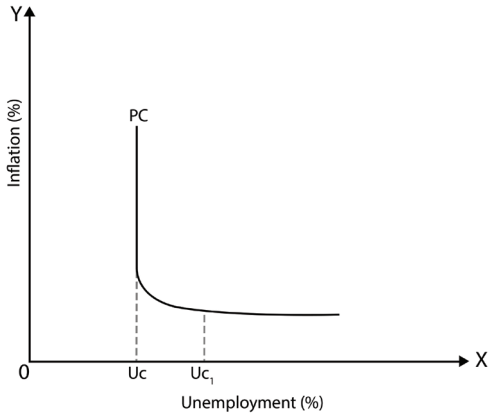


Fig. 4.2.3. Tobin's Philips Curve

- Downward rigidity of wages

In the modified Phillips curve suggested by Tobin, Uc represents the natural rate of unemployment. At this rate of unemployment, there is no trade-off between inflation and unemployment and P_cU_c part of the Phillips curve is vertical. If the rate of unemployment is over U_{c1}, the Phillips curve is horizontal on account of the downward rigidity of wages. Between U_c and U_{c1} rates of unemployment, the trade-off exists between inflation and unemployment so that the curve slopes negatively. When the unemployment rates go beyond U_{c1} the Phillips curve follows a horizontal path because of the downward wage rigidity.

4.2.7 Monetarist Theory of Inflation

- To Keynes, inflation is a monetary phenomenon

According to Keynes, inflation is a result of real sector forces in the economy. In his inflationary model, excess demand results from an autonomous increase in investment, consumption, or government spending on goods and services. In other words, the increase in total expenditure or demand happens independently of any growth in the money supply.

On the other hand, Monetarists explain the appearance of surplus demand and the subsequent increase in prices, due to a rise in the economy's money supply. Thus, according to Friedman, "Inflation is always and everywhere a monetary phenomenon". Friedman pointed out that, when the economy's money supply is increased, an excess of real money becomes available to the public over the demand for money. This throws off the balance. According to Friedman and other

- Inflation arises from excessive money supply

monetary economists, the public will spend more money on goods and services to reduce the money balances and restore equilibrium. Therefore, the excess supply of real monetary balances leads to an increase in the overall demand for goods and services, and the price of goods increases as a result of this. The following is a representation of it.

$$M^s > kPY \rightarrow AD \uparrow \rightarrow P \uparrow$$

Here, M^S stands for the quantity of money and P stands for the price level. Therefore, $\frac{M^S}{P}$ represents real cash balances. Y represents national income and k for the ratio of income which people want to keep in cash balances. Hence, kPY represents demand for cash balances (ie; demand for money), and AD represents aggregate demand for or aggregate expenditure on goods and services which is composed of Consumption demand (C) and investment demand (I).

The equation $M^S > kPY$ implies that when the quantity of money (M^S) exceeds the ratio (k) of income (Y) people want to hold as real cash balances $\left(\frac{M^S}{P}\right)$, aggregate ($AD$) demand increases, leading to a rise in the price level (P). Friedman's monetary theory of inflation can be better explained with the quantity equation $\left(P = \frac{MV}{Y} = \frac{M}{Y}.\frac{1}{k}\right)$ written in percentage form which is written as below taking V or k remains constant.

- Excess money supply increases aggregate demand

$$\frac{\Delta P}{P} = \frac{\Delta M^S}{M^S} - \frac{\Delta Y}{Y}$$

It thus follows that when the money supply increases, it causes disturbance in the equilibrium, that is,

$M^S > kPY$

Friedman and monetarists argue that when people receive extra money, they spend it on goods and services to restore money supply equilibrium. This increased spending boosts

- Impact of money supply on economic variables

overall demand and nominal national income (PY), assuming a constant k. They also emphasise wage flexibility in maintaining full employment. Thus, in the long run, growth in money supply leads to higher aggregate demand, raising both nominal national income and the price level. However, they share Keynesians' belief that the economy may operate at less than full employment in the short run. In other words, in the short run, excess capacity and labour shortages may predominate, leading to an increase in nominal income that partly causes real income to increase (Y) and partly raises the price level, as shown in Fig. 4.2.4. The elasticity of supply or aggregate output determines how much the price level rises in the short run.

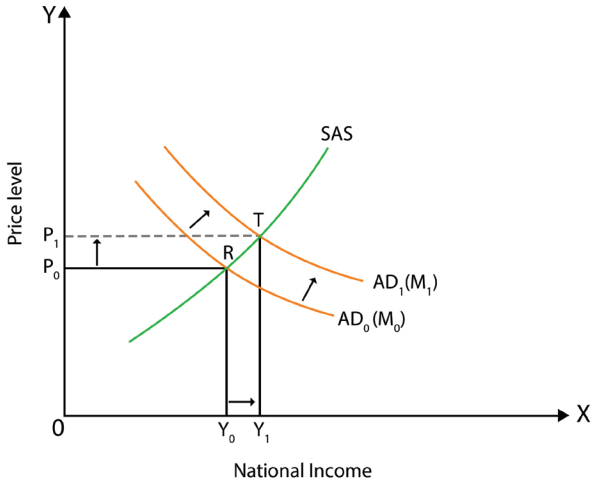


Fig. 4.2.4. Friedman's Monetarist Approach

- Demand-pull inflation

It will be seen from Fig. 4.2.4, that effect of an increase in the money supply from M_0 to M_1 and resultant increase in the aggregate demand curve for goods and services from AD_0 to $AD_1$is split up in the rise in the price level (from P_0 to P_1) and the increase in real income or aggregate output (from Y_0 to Y_1). Both Friedman and contemporary quantity theorists, while acknowledging output growth, recognise that in the short run, full employment might not prevail due to recessions. They agree that excessive money supply growth relative to output growth can cause demand-pull inflation due to increased demand for goods and services. Both Friedman and Keynesians attribute inflation to excess demand, with Keynesians linking it to autonomous expenditure and Friedman emphasising the role of money supply growth that surpasses output growth, making inflation a demand-pull phenomenon in both views.

4.2.8 Structuralist Theory of Inflation

- Focus on structural characteristics

The structuralist theory of inflation, also known as the structural theory of inflation, provides an alternative explanation for inflation in developing nations, attributing it to increased investment spending and expanded money supply. Developed by economists Myrdal and Streeten, it focuses on the structural characteristics of economies, particularly in Latin America, and has been generalised by Kirkpatrick and Nixon to explain inflation challenges in all developing nations. Myrdal and Streeten argue against using highly aggregated demand-supply models to explain inflation in developing nations. The developing countries are characterised by unbalanced and less integrated economic structures, which hinder smooth inter-sectoral resource flows and substitution between consumption and production. Thus, inflation in developing nations cannot be adequately explained in terms of aggregate demand and supply.

- Reasons for structural bottlenecks

The Structuralist discusses several sectoral restrictions or bottlenecks that cause sectoral imbalances and price rises. The reasons that cause these bottlenecks or imbalances of various kinds in the course of economic development in developing countries are classified into three. 1)A bottleneck in the agricultural sector, 2) A resource or budget limitation on the government, and 3) A bottleneck in foreign exchange.

- Hinder agricultural production

Bottlenecks in agriculture: The primary obstacle affecting emerging nations' ability to increase the supply of food grains is related to agriculture. Disparities in land ownership, a flawed system of land tenure that discourages increasing agricultural output in response to rising demand, population growth, and urbanisation are some of the structural problems. Apart from this, using outdated agricultural technology hinders the expansion of agriculture. Therefore, these obstacles must be addressed to boost agricultural output quickly and satisfy the rising demand for it brought on by the process of economic growth.

Resources shortfall or budgetary restrictions on the government: Structuralists identify resource limitations as a hurdle in financing economic development for governments in developing nations, leading to excessive deficit financing due to challenges in taxation and borrowing. This situation, coupled

- Hurdles in economic development

with inadequate private sector savings and an underdeveloped capital market, results in increased bank credit for the private sector, leading to expanding the money supply and causing inflation in developing economies.

- Increasing imports and reducing exports

Bottleneck in foreign exchange: Foreign exchange shortages hinder industrialisation efforts in developing nations, driven by heavy imports of capital goods, resources, and oil. Slow export growth due to export surplus limitations and low competitiveness adds to the imbalance, causing trade deficits and foreign currency scarcity. This scarcity leads to increased import costs and currency devaluations, raising prices due to reduced domestic supply and cost-push inflation, particularly in countries like India, Pakistan, and Latin America.

4.2.9 Stagflation

- High unemployment and inflation

Stagflation is an economic phenomenon marked by the co-occurrence of stagnant growth, high unemployment and inflation. The term stagflation was first used in the 1970s to describe a situation that appeared to challenge the conventional economic theory given by A.W Phillips. Stagflation challenged the accepted economic theory because it combines two factors that are normally at odds with one another. One is high unemployment, which is linked to low demand and poor economic growth and another is high inflation, which is frequently linked to high demand.

- Supply shocks

Stagflation is frequently brought on by large supply interruptions, such as spikes in oil prices as happened during the 1970's. During the seventies, the cost of energy inputs, specifically the surge in crude oil prices by OPEC, led to higher prices for petroleum products. The substantial increases in global oil prices in 1973-75 and later in 1979-80 caused significant supply shocks, causing inflation due to rising costs. Energy cost spikes and other manufacturing input price increases can result in cost-push inflation, which forces businesses to raise prices to retain profitability. Even at times of low demand and heavy unemployment, this is still possible. Long-term structural issues in an economy, such as stiff labour markets, supply-side bottlenecks, a lack of innovation, or stagnant productivity growth, can also affect stagflation. These elements may slow economic expansion and result in high unemployment that lasts for a long time.

Disrupts policies, trade, and growth

Stagflation has several negative effects and is difficult for the economy and policymakers to deal with. In a stagflationary situation, conventional policy solutions to tackle either unemployment or inflation may be ineffective. Tight monetary policy, which aims to minimise inflation, may make unemployment worse, whereas expansionary measures, which try to lower unemployment, may make inflation worse. As the typical correlations between important economic variables break down, stagflation causes uncertainty for businesses, consumers, and investors. Investment and consumption may decline as a result of this uncertainty, further slowing the economy. Stagflation can have an impact on a nation's ability to compete internationally in trade. Excessive unemployment may make it challenging for an economy to compete in international markets, while excessive inflation might result in currency devaluation.

- Complexities of stagflation

The 1970s saw one of the most noteworthy instances of stagflation. Several industrialised economies, notably the United States, experienced a period of high inflation and high unemployment as a result of oil price shocks mixed with expansionary fiscal and monetary policies. Stagflation can have serious effects on an economy and contradicts conventional economic ideas. It emphasises how supply and demand forces interact as well as how crucial it is to take both immediate and long-term structural difficulties into account. Stagflation serves as a reminder to policymakers and economists that the economy is a dynamic and complex system capable of producing unexpected results when faced with particular situations.

4.2.10 Cost of Inflation

- Evaluate costs of reducing inflation

In public policy, a crucial question is whether it is a good idea to reduce inflation, taking into account the costs involved. We need to figure out whether the benefits of having lower inflation are worth the expenses involved. In examining the costs of inflation, it is essential to distinguish between anticipated and unanticipated inflation.

4.2.10.1 Anticipated Inflation with Full Indexing

In this scenario, all nominal values, such as money wages, prices, and nominal interest rates, increase proportionally with

- As inflation rises, demand for real money balances diminishes

inflation. Despite this, money itself does not earn interest due to challenges associated with paying interest on circulating cash balances. As a result, the opportunity cost of holding money rises along with the inflation rate, leading to a decrease in the demand for real money balances. The cost of inflation in this scenario is characterised by the foregone benefits related to the convenience of holding money. This concept is illustrated in Figure 4.2.5, emphasising the diminishing demand for real money balances as the cost of inflation increases.

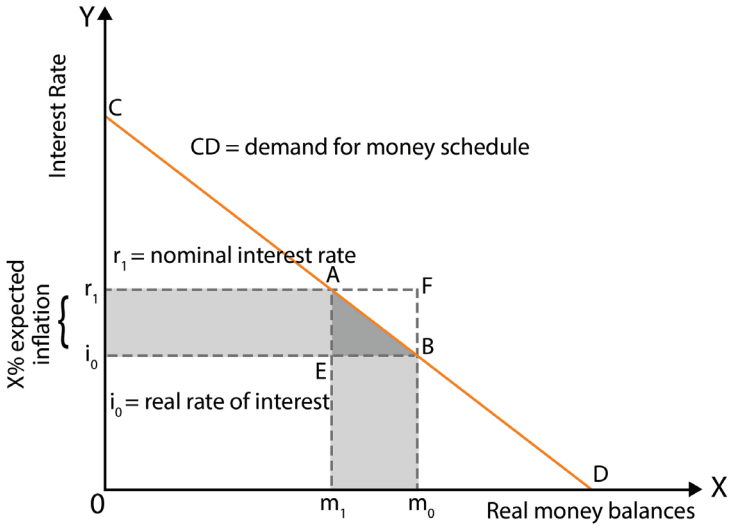


Fig. 4.2.5. The Cost of Inflation and the Inflation Tax

- Impact of inflation on interest and real money balances

In the above figure, where inflation is zero, the real rate of interest is $0i_0$, and the demand for real money balances is $0m_0$. The total welfare derived from holding $0m_0$ money balances is represented by the area under the demand curve, $CBm_0 0$. This area signifies the maximum amount individuals are willing to forego in terms of interest for the advantages gained from holding $0m_0$ money. If the expected rate of inflation increases to x percent, the nominal interest rate rises to $0r_1$, and the demand for real money balances decreases to $0m_1$. With the public now holding m_1m_0 fewer money balances, the loss in welfare is measured by the area m_1ABm_0. Assuming that the production of money is costless, the net welfare loss to society due to an x percent expected inflation rate reducing the volume of real money balances held is represented by the area m_1ABm_0.

Apart from the decline in the real stock of money, another cost associated with anticipated inflation is the administrative

- Administrative cost of price changes

cost of continually changing prices. As prices fluctuate with inflation, businesses and individuals incur expenses related to adjusting and adapting to the changing price environment. This administrative burden can add to the overall economic cost of inflation, contributing to the motivation for policies aimed at maintaining price stability.

4.2.10.2 The Inflation Tax

- Implication of holding money

The concept of the inflation tax is illustrated in Figure 4.2.5 above, where inflation is considered a tax on holding money balances. When inflation increases from 0 to x percent, individuals are required to pay an additional x percent for holding $0m_1$ real money balances. This extra amount paid is represented by the rectangle i_0r_1AE, which constitutes the inflation tax revenue. The tax base is the quantity of real money held, $0m_1$, and the tax rate is the inflation rate of x percent.

- Transfers purchasing power to the government

Essentially, the government acquires goods and services by issuing money. Inflation then decreases the actual worth of money, diminishing the purchasing power of those who hold money. The inflation tax operates by transferring purchasing power from those being taxed to the government, similar to the effects of direct taxes on income and indirect taxes on goods and services. From a welfare analysis perspective, if equal weight is given to the money costs and benefits of different societal groups, the tax revenue is considered a transfer payment and not a net cost to society as a whole. However, the cost of collecting the tax revenue arises from the welfare lost due to fewer real money balances being held (i.e., area m_1ABm_0). This cost is a burden on society as a whole, encompassing the use of human effort and other resources to reduce the real balances held, as well as any psychological costs associated with operating with lower real balances.

4.2.10.3 The Cost of Unanticipated Inflation

When compared to the cost of the anticipated inflation rate, unanticipated inflation has a more significant and negative impact. Unanticipated inflation hurts pensioners whose pensions are fixed in rupee terms. After a few years of inflation, the fixed nominal pension's real worth or purchasing power will significantly drop, lowering his standard of living in old age. Therefore, inflation damages people who rely on fixed

- Adversely affect fixed-income earners

pensions. A rate of inflation that is higher than expected also damages lenders who make loans to others and receive their principle back after the agreed-upon time. Inflation thereby redistributes wealth in favour of debtors.

- Impact on economic growth

The impact of inflation on long-term economic growth, particularly in developing nations, is a significant concern. Some economists argue that moderate inflation boosts growth, citing historical examples. They point to past industrialised nations where inflation led to higher output growth due to increased profit margins. Inflation outpacing wage growth benefits businesses, raising profits and savings among top earners, and promoting investment and capital accumulation for long-term growth. However, recent understanding suggests inflation may hinder capital accumulation despite promoting savings and affecting economic growth. The complex relationship between inflation, savings, investment, and growth is acknowledged in modern economic analysis.

- Reduces savings, and hinders growth

Rapid inflation reduces the value of money, encouraging spending over saving. The urgency to spend before further value loss curtails saving and boosts consumption. Rising prices increase the portion of earnings spent on maintaining living standards and hence limit savings. Inflation thus affects people's ability to save as well as their desire to save. Inflation encourages non-productive investments like gold, and real estate, and worsens the nation's economic potential. Unproductive investments waste economic surplus. Inflation worsens poverty by hitting vulnerable populations unable to afford basic necessities due to rising costs. Inflation harms the balance of payments and growth, especially in developing countries, as local goods become uncompetitive for exports due to price increases, leading to higher imports and an imbalanced balance of payments.

- Benefits entrepreneurs, harms wealth holders

Entrepreneurs and dealers who work in the business world stand to benefit from inflation, because salaries did not rise as quickly as prices of commodities during inflation. The prices of goods produced by entrepreneurs rise comparatively faster than the cost of production. Therefore, inflation boosts businessmen's earnings. Apart from this, Inflation harms wealth holders with fixed-value assets like cash, bonds, and debentures by reducing their real value. Assets like savings, fixed deposits, bonds, and debentures lose purchasing power due to inflation.

It is commonly accepted that inflation leads to resource misallocation and, as a result, to a loss in economic efficiency. Price distortions brought on by inflation lead to inefficient resource allocation. Because not all prices increase by the same amount due to inflation, there are changes in relative pricing, which leads to this price distortion. It should be highlighted that when prices diverge from the proper prices as established by costs and demand situations, price distortions occur. Apart from this, inflation releases resources that are being previously used (before the onset of inflation) by those who suffer from inflation and will be made available to those who are in a better position to utilise them.

- Inefficient resource allocation

4.2.11 Methods of Controlling Inflation

A major objective of macroeconomic policy is to keep inflation under control because high and persistent inflation can reduce purchasing power, undermine economic stability, and have other unfavourable effects. A range of measures are used by governments and central banks worldwide to manage inflation. These measures try to achieve a balance between stable prices and long-term economic growth. The following are some of the key methods for controlling inflation.

- Bringing economic stability

1. Monetary Policy

Through tight monetary policy, Central banks can increase interest rates to restrict the availability of credit and the money supply. Borrowing becomes more expensive at higher interest rates, which reduces consumer spending and investment. This decrease in demand contributes to a slowdown in economic growth and lessens inflationary pressures. Apart from this, the central bank can reduce the money supply in an economy through open market operations. Through open market operations, central banks can sell government securities to banks and the general public. This lowers the money supply, which in turn restrains expenditure and lowers demand-driven inflation.

- Restrict credit and lower money supply

2. Fiscal Policy

By reducing Government spending, governments have the option to reduce public spending, which lowers economic demand. When the economy is running close to capacity, this

- Reduce spending and raise taxes

can assist lower inflationary pressures. Apart from this, the government can raise taxes to curb inflation. Increased taxes may result in less disposable income and consumer expenditure, which may diminish demand and maybe moderate inflation.

3. Supply-Side Regulations

- Boost productivity

Productivity should be increased in the economy through policies that support spending on infrastructure, education, and technology. These policies can boost productivity and result in higher output without equivalent increases in costs. Price pressures may be reduced as a result. Apart from this, enhancing flexibility in the labour market and reducing wage rigidities helps to avoid wage-price spirals and excessive cost-push inflation.

4. Exchange Rate Policy

- Currency appreciation

Through Currency appreciation, imported products and services might be cheaper with a stronger home currency, which can help contain inflation. Central banks have the power to intervene in the foreign exchange market and enact laws that affect exchange rates.

5. Regulation and Price Controls

- Prevent price rise

Direct price controls help to prevent excessive price increases. Governments might set price caps on necessities like products and services. This strategy unintentionally might have unforeseen consequences and may lead to shortages.

6. Government Borrowing with Caution

- Ensure stability

Governments can avoid borrowing too much money and running up deficits, which can raise demand and cause inflation. Macroeconomic stability is maintained by prudent budgetary measures. It is crucial to remember that the success of these tactics can change based on the particular economic circumstances, the root causes of inflation, and the legitimacy of the institutions in charge of setting policy. To effectively manage inflation and maintain economic stability, it is frequently necessary to combine several different techniques. The potential trade-offs between increasing economic growth and employment and containing inflation must also be taken into account by policymakers.

Summarised Overview

Expectations play a significant role in the study of inflation. According to the adaptive expectation hypothesis, people base their expectations for the future on their experiences in the past and assume that historical patterns will hold. Contrarily, the Rational Expectations hypothesis postulates that people are future-focused and take into account all available data to generate precise predictions of future inflation. These expectations shape economic decisions and influence the outcome of inflationary pressures. The Phillips Curve examines the connection between unemployment and inflation. The adaptive expectation hypothesis indicates there is a short-term trade-off between unemployment and inflation, but that this trade-off is reduced over time due to adaptive changes in inflation expectations. The Non Accelerating Inflation Rate of Unemployment (NAIRU) defined as 'a rate such that, as long as unemployment is above it, inflation can be expected to decline'. That is, it is the rate at which inflation will be in a non accelerating situation. Pushing unemployment below this level would result in accelerating inflation.

The impact of inflation on economic efficiency is emphasised through Tobin's View. This viewpoint asserts that inflation generates inefficiencies in the distribution of resources and restricts the price signals required for rational decision-making. The excessive rise in the money supply compared to output is attributed to rising prices by the monetarist theory of inflation, highlighting the significance of restricting the money supply to stop inflation. The structuralist theory of inflation, on the other hand, concentrates on the structural features of growing economies, looking at elements like investment and the expansion of the money supply that might cause inflation in these environments.

Stagflation is the term used to describe the simultaneous occurrence of high inflation and high unemployment, which challenges traditional economic theories that assume an inverse relationship between the two variables. The cost of inflation involves a number of unfavourable effects, including declining purchasing power, wasteful spending, escalating poverty, and distorted resource allocation. Tight monetary policy, currency appreciation, strict pricing controls, and sensible fiscal policies are all ways to reduce inflation. Overall, controlling inflation is a difficult endeavour that involves a detailed understanding of structural variables, economic expectations, and policy measures.

Assignments

1. Discuss the implications of the Adaptive Expectation Hypothesis on economic decision-making and its relevance in today's context.
2. Discuss real-world examples where the Rational Expectations hypothesis has been applied to explain economic behaviour.
3. Analyse the factors that lead to a diminishing trade-off over time, according to the Expectations Augmented Phillips Curve.
4. What are the potential challenges that policymakers face when trying to manage inflation while keeping unemployment below the NAIRU.
5. Evaluate the applicability of the Structuralist theory in explaining inflation challenges in different developing nations.
6. Discuss the challenges that policymakers face in selecting and implementing appropriate strategies to effectively manage inflation in different economic contexts.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

BLOCK - 4

UNIT 3
New Microeconomic Theories of Labour Market

Learning Outcomes

After completing this unit, the learner will be able to:

- familiarise with the search theory in the labour market
- know the Diamond- Mortensen- Pissarides search model
- analyse the matching theory

Background

The economic future of individuals and households is shaped by their position in the labour market. Factors such as wages, employers, and the occurrences of unemployment play a pivotal role in determining the income-earning capacity of an individual. Due to this, economists are interested in analysing the empirical behaviour of wages, employment, and unemployment, and also in building models to help us understand the forces that shape these outcomes. These models can be used to assess the ultimate result of changes in policies or institutions. The Neo-classical assumption of a labour market equilibrium through a centralised market may be unrealistic in the first place. This is because workers are a heterogeneous group and each of them has different skill sets and abilities. Therefore, the labour market works through one-to-one matching in a decentralised manner. This provides an alternative story of why the labour market is non-Walrasian or not in general equilibrium. You would have observed that there is constant job change that happens around us. This can result in temporary periods of unemployment in the labour market. Information, unlike in perfect markets is asymmetric in the real world and there is no proper information on the availability and nature of the jobs in the economy. If workers are currently unhappy in their present employment this will affect their job performance and they will be actively searching for a new position. Job search theory thus becomes relevant and is influenced by the individual's reservation wages, the nature of the matching

function and the search strategy of individuals. With a search and match view of the labour market, one can see that unemployment is frictional. It is a transitional process before arriving at a certain steady state of the economy. Let us discuss the new theories of labour market in this unit.

Keywords

Diamond-Pissarides-Mortensen Model, Matching Theory, Search Model, Reservation Wages, Beveridge Curve

Discussion

4.3.1 New Microeconomic Theories of Labour Market

- Views on unemployment

Traditional theories of aggregate employment and output can be broadly categorised into Neoclassical and Keynesian perspectives. Neoclassical theories, emphasising market-oriented principles, face challenges in explaining prolonged periods of involuntary unemployment, often attributing it to voluntary choices. In contrast, Keynesian theories attribute real-world unemployment to involuntary factors, particularly a deficiency in aggregate demand.

- Dynamic labour market theories

The world of microeconomic theories in the labour market is always changing, with a few main areas catching attention. One major focus is on developing the search and matching theory, which looks closely at how people search for jobs, how employers choose candidates, and what it means for unemployment and wages. Another trend in labour market studies is bringing in ideas from behavioural economics. This means looking at how our behaviours and decision-making will affect things like job searches, salary talks, and overall outcomes in the job market. There is also a growing interest in information economics, which looks at how differences in information between employers and workers impact hiring, salary discussions, and how well the job market works. Among the new theories of the labour market, let us discuss the Search and Match models.

4.3.1.1 Search and Match Models

- Negative correlation between unemployment rate and number of job vacancies

The search and match model holds significant relevance in explaining a key aspect of the labour market, particularly evident in the Beveridge curve. This curve highlights a notable observation i.e.; a negative correlation exists between the unemployment rate and the number of job vacancies. In other words, as the unemployment rate decreases, the number of job vacancies tends to increase, and vice versa. The search and match model directly addresses this scenario by emphasising the process of matching job seekers with available job openings. This correlation revealed by the Beveridge curve underscores the intricate relationship between unemployment and job vacancies, shedding light on the labour market and the importance of understanding the mechanisms involved in job search and matching.

- Time lag between searching for a job and getting one

Labour matching models are derived from the fact that when a worker becomes unemployed, he/she needs to look for a job and such a process is not sudden. There is always a time lag that occurs while you search for a job. He/she cannot simply occupy any vacancy, but has to search for a job in a certain area, in a certain profession which matches a list of criteria such as wage, hours of work and subjective factors like enjoyment of one's work. All these take time and require effort. Before such matching models were devised, economists assumed in their models that unemployment could instead be modelled by looking at the number of unemployed and the number of vacancies and then working out how many of the unemployed could take these jobs. This ignores the time required to find an occupation and the fact that the unemployed can only do certain jobs (an electrician cannot fill the role of a rocket scientist; at least not without retraining) and work in certain areas. It also requires some effort on the part of the unemployed job seekers to go out and look for a job.

4.3.2 Diamond- Mortensen- Pissarides Model

Why are so many people unemployed at the same time even when there are a large number of job openings? What can be the effect of economic policy on unemployment? The ground breaking work of economists Peter Diamond, Dale Mortensen,

and Christopher Pissarides, can be used to answer these questions and for this work, they were recognised with the Nobel Prize in Economics in 2010. Their contributions have significantly enhanced our understanding of unemployment and provide a more holistic perspective. The Diamond-Mortenson-Pissarides Search and Matching framework is based on the proposition that heterogeneity among workers and the frictions or gaps in the labour market prevent the instant matching of new workers vacancies and unemployed workers. This theory is also applicable to markets other than the labour market. In the labour market, there is always an ongoing search, as employers are looking for employees suitable for the particular job and workers who are trying to find jobs. Since the search process requires time, effort and money, it creates friction or gaps in the labour market. In such search markets, the demands of some buyers will not be met, while some sellers cannot sell as much as they would wish. There are both job vacancies and unemployment in the labour market. The Diamond model is a theoretical base for the search markets. Mortensen and Pissarides have used this framework and applied it to study labour markets. This model helps us to understand how unemployment, job vacancies, and wages are affected by regulation and economic policy. This includes government policy of unemployment insurance or general rules of hiring and firing. One important conclusion of the model is that more generous unemployment benefits give rise to higher unemployment and longer search times.

- Unemployment, wages and job vacancies are affected by policies and regulations

The job turnover rate (often referred to as the turnover ratio representing the percentage of employees in a workforce who leave their jobs over a certain period, typically a year) in most of the OECD countries is between 15 to 25% each year. This trend is roughly the same as in North America, with positive net employment rates being associated with very large job relocations. Turnover in the labour market can again be seen as voluntary and involuntary. Voluntary turnover is giving up of job as a free individual choice. This is not because of dismissals or cutting down of workforce but can be due to care responsibilities, ill health or non-work related reasons. Job reallocation is seen to be inversely correlated with capital intensity. The number of jobs being created and destroyed is more in services than in manufacturing. Some studies suggest that, as a firm's size and age increase, job creation is found to decrease. Institutional factors also affect job creation. The European labour market has stringent laws and regulations

- Voluntary turnovers and involuntary turnovers exist in labour markets

and therefore is slow in the job creation process. Pissarides and Wadsworth study of the UK market (1988) shows that about 50% of all the new hiring process that goes on in the labour market are of workers who already have jobs. For search and matching to be successful it is most important to be well informed in the labour market.

4.3.2.1 Information in the Labour Market

- Employers often better informed

It is a well-known fact in the labour market that workers move to new jobs, taking into account both monetary and non-monetary benefits. Workers would not just want to know about pay and hours; they also care about working conditions and the work environment. It is very difficult to procure this information from potential employers. It is often seen that employers are more informed than employees in the labour market, but in some particular cases, the reverse may also be true.

4.3.2.2 Job Search

The economics of job search theory involves answering the following questions

1. How do prospective workers search for jobs?
2. What types of job searches yield the best pay-offs?
3. What are the labour market implications of search theories?

- Reservation wage varies

The first question looks into the kind of jobs - formal, informal etc. The second question looks into the intensity of job search and reservation wages. The third question looks into the relevance of search models for wage and occupational distributions. Uncertainty is incorporated into the search market framework by assuming that workers sample wage offers from a distribution and accept only those that meet or exceed their acceptable reservation wages. Reservation wages refer to the lowest wages that are acceptable to the worker, given the individual's circumstances. Reservation wage may change with the period of time that the worker has been searching for a job and may be higher for jobs requiring geographical relocation or higher commuting costs or jobs that require a higher degree of responsibility.

Fig. 4.3.1. Wage Offers and Reservation Wages

In the figure 4.3.1, we assume the distribution of wage offers by the employers and shown it as a normal distribution. Individual workers are unaware of the fact about which particular firms will offer a particular wage rate. Then the individuals are faced with the choice of how much job searches he/she has to make within a particular time frame. The individual accepts the highest wage offer assuming that this is above the reservation wages. As the number of firms in the sample increases, the cost of search will rise and the expected gain will alter and together these will determine the optimal sample size of searching. In figure 4.3.1 above, WW determines the number of firms offering particular levels of wages as given by a normal distribution WW with a mean of W_0. We assume that W_r is the reservation wages, then hours of work will be positive if $W > W_r$ as in the case of W_c.

- Based on cost and expected gain

When can we assume that job searches are successful? Diamond suggests a shortcut that makes search analysis successful, is the matching function that gives the rate of meetings of workers and firms in the process of seeking employment as a function of the number of searching workers and job vacancies.

- Rate of worker-firm meetings

Mortensen notes that for any individual, the probability that the next offer will be accepted is 1-F(R). Here R represents the workers' reservation wages and F (w) is the cumulative wage offer distribution such as WW in above figure 4.3.1. R will equate the expected present value of the workers' future income of whether he or she will accept a new job offer, with the value of foregoing the employment opportunity by continuing to search for an alternative offer.

- Mortensen's view

- Search continue until expected benefits equal expected costs

A key question in this regard is whether a worker will accept the first reasonable offer made to him/her and continue to search for the ideal opportunity. Under a fixed sample size strategy, a worker will decide to sample particular number of firms and accept the best wage to be found among them. Under a sequential search strategy, the individual decides in each case whether to accept or reject an offer in favour of sampling one additional firm. The optimal stopping rule would be continued to search till the expected marginal benefits from further search is equal to the expected marginal search costs. It is known that the worker knows the distribution of wage offers and search costs so that the searcher is able to calculate the expected returns and costs for each possible number of searches. The choice of the sample size becomes crucial in this regard.

Let the distribution of wage offers be equal to $F(W)$ with a density function $F'(W)$. For the given sample size n, the job seeker estimates the maximum expected wage offer $E[\max W/n]$.

With constant unit search costs of C, this is given by

$$R(n) = E[\max W/n] - C_n$$

- Reservation wage is crucial

The additional gains from a job search will be subject to diminishing returns. An increase in the marginal search costs C will decrease the amount of search. This also leads to a reduction of wage offers. Under the sequential search model, the job seeker samples a wage offer in one period and then decides whether to accept or reject it and then sample another wage offer in the next period. In most models this decision is based on the reservation wages. The reservation wages is already chosen at the beginning of each period, in order to maximise the expected returns from the search. If the wage offer is equal to or greater than the reservation wage the job is taken. Sample size or the number of wages offers received is random rather than pre-determined.

What determines the reservation wages? Reservation wages critically depends on the expected mean wage offer and the number of wages offers. Its optimal path will reduce as the search continues through a finite number of opportunities. This raises the search costs and results in a financial drain for a job seeker. Failure to get a job through search will result in

- Reservation wages depend on expected offer, search costs, and unemployment

unemployment and this is often related to the reservation wages. A reduction in costs of search like unemployment benefit payments will increase the reservation wages and increase the time period of search. Assume a job is accepted that is expected to last m periods, then the return to search R is given by *(W/1 + i)m* where i equals the rate of interest. The reservation wage W^* must then satisfy the condition $= \frac{W^*}{(1+i)^m}$

The reservation wage is like the minimum acceptable salary for a person. It is the amount of money at which someone is equally willing to take a job or reject it. Imagine there is a point where you are not sure if you should accept a job offer or say no. That point is your reservation wage. It is the wage that makes both accepting the job and turning it down seem equally appealing.

In Figure 4.3.2, there is a notable increase in reservation wages from W^* *to* W^*_1. This upward shift is a response to the rise in returns to search, which has increased from R to R_1. The primary driver behind this shift in reservation wages is the reduction in the cost of search. As the cost of searching for employment decreases, individuals find it more financially feasible to extend their job search, thereby leading to an increase in the expected returns from continued search activities.

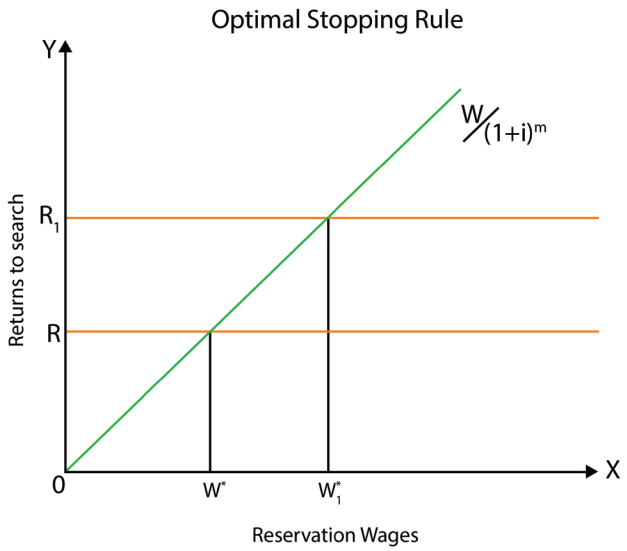

Fig. 4.3.2. Optimal Stopping Rule: Search Model

Is it valid to assume a short period unemployment before a new job?. Most people will leave a job, as soon as they have got a new one. People often search for jobs while currently employed rather than unemployed. Economists also point out that job searches are inefficient and unemployment helps workers to specialise in job search. Sometimes, unemployed individuals may quickly accept offers due to limited wage information. The geographical dimensions in searching for a job also become important in shaping individual's search preferences.

- On-job searches are inefficient

4.3.3 Matching Function

The adjustment process in the labour market is time consuming. The matching function is the core of the job search theory and is based on the work of Diamond, Mortensen and Pissarides. The matching function is associated with the ways by which potential employees and employers join together to form productive matches. This is shown in a functional form that gives the number of jobs at a particular moment in terms of number of people looking for a job, the number of employers looking for workers and a small number of other relevant variables.

- Matching function core of job search theory

The basic form of the matching function is represented as

$M = m\ (N, V)$

Here, M is the number of employers seeking workers, N is the count of unemployed individuals searching for jobs, and V is the number of available vacant job positions. This function captures the fundamental relationship in the labour market, illustrating how potential matches between job seekers and employers lead to the formation of productive employment opportunities.

The matching function exhibits constant returns to scale. It implies that a large economy is no more efficient at producing matches between workers and firms than a small economy, and vice versa. If the pool of workers and the jobs available are heterogeneous then the transition probabilities will be varied in the labour market. The mean duration of unemployment and vacancies also becomes varied. If only a single worker can take each job and there is no coordination among job seekers this will result in overcrowding in particular jobs and no applicants in other jobs. The dependence of mean

transition rates on the number of workers and firms engaged in a search gives rise to externalities. The average time it takes prospective employers to find new workers depends on the behaviour of workers. The more the number of workers that search for a job the more the labour market gets congested. The more employers are present in the labour market this acts as a positive externality for the workers, which increases the probability of obtaining a job in the given period.

- Size does not affect efficiency in worker-firm matches

Let us now look at a matching function. Let us assume that an individual can choose the intensity of the search, with the number of units of search being the main parameter. If individual k supplies S_k units of search and individual r, Sr units of search then over a given period individual k will be S_k / S_r times more likely than individual r to find a job. The ratio Sk / Sr signifies the relative likelihood of individual k finding a job compared to individual r over a given period. In other words, if individual k supplies more units of search *(Sk)* than individual *r (Sr)*, then individual k is Sk / Sr times more likely to secure employment. Each of the job seekers will optimise his/her search intensity depending on search costs, the costs of being unemployed and expected returns from employment.

- Optimising search intensity

The matching function thus looks like,

$$M = m\ (SN,\ V)$$

Here, M represents the number of employers seeking workers, SN is the aggregate search intensity of job seekers, and V is the number of vacant job positions. This function shows the relationship between the intensity of job search efforts by individuals (as represented by SN) and the availability of vacant job opportunities. The function is a crucial component in understanding how the matching process unfolds in the labour market, where the willingness of job seekers to search intensively influences the formation of productive employment matches with employers.

- Links job seekers' intensity *(SN)* to available job positions *(V)*

If we now know that there is a distribution of wage offers, an individual will choose a reservation wage and reject any wage being offered lower than the reservation wage. This is drawn from a probability distribution $f(w)$. If this distribution is available to people who look for a job, the optimal policy of an individual is characterised by a reservation wage R_n such that the job is accepted if w is greater than or equal to R_n or rejected if this does not hold.

- Matching function influenced by search costs and wages

Summarised Overview

The Search and Match model, crucial in understanding the labour market, addresses the negative correlation between unemployment rates and job vacancies, as evidenced by the Beveridge curve. Labour matching models recognise the time lag and effort required for job searches, highlighting that unemployment is not an immediate process.

The Diamond-Mortensen-Pissarides (DMP) model tackles the simultaneous presence of unemployment and job openings by highlighting the diverse nature of workers and inherent frictions in the labour market. The economics of job search theory deals with prospective workers' search for jobs, emphasising the type of jobs sought, the intensity of job searches, and the relevance of search models for wage and occupational distributions. Reservation wages mean the minimum acceptable wage for an individual, influenced by factors such as expected mean wage offers and search costs. Diamond and Mortensen's perspectives highlight the importance of the matching function, indicating the rate of worker-firm meetings and the probability of accepting subsequent job offers. The matching function deals with how unemployed workers and employers come together to form productive job matches. Developed by Diamond, Mortensen, and Pissarides, it expresses the number of employers seeking workers as a function of unemployed workers and vacant jobs. The matching function exhibits constant returns to scale, indicating that the efficiency of worker-firm matches is unaffected by the size of the economy.

Assignments

1. The role of reservation wages in the Search model is crucial. Why? Explain
2. Using a suitable diagram show how optimal stopping for job search is decided.
3. Derive a matching function for an individual A and individual B. What is its relevance in Search theory?
4. How does change in economic policy reflect in labour market? Use the Diamond- Pissarides- Mortensen model to substantiate your answer.

Reference

1. Richard T Froyen, Macro Economics; Theory and Policy, Macmillan Publishing Co., New York, 1990

2. Rosalind Levacic and Alexander Rebmann, Macro Economics: An Introduction to Keynesian-Neoclassical Controversies, The Macmillan Press Ltd, London

3. Sloaine,Peter, Paul,Latreille and O'Leary, Nigel(2015)Modern labour Economics, Routledge Publications : New York

Suggested Reading

1. Williamson Stephen D, Macro Economics, Pearson, Sixth ed, 2018.

2. Ehrenberg G Roland, Smith S Robert, Modern Labour Economics Theory and Public policy, Eleventh ed, 2009, Prentice Hall

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

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FIRST SEMESTER - MA ECONOMICS EXAMINATION

DISCIPLINE CORE - 01- M23EC01DC – MICROECONOMICS I

(CBCS - UG)

2023-24 - Admission Onwards

MODEL QUESTION PAPER SET I

Time: 3 Hours **Max Marks:70**

Section A

Answer any 10 questions. Each question carries 1 mark

(10 X 1=10 Marks)

1. What is the basic idea of dynamic version of demand function?
2. What is pragmatic approach to demand theory?
3. Define production function.
4. What are fair games?
5. What are restricted stock units in CEO Payments?
6. Give the mathematical representation of expected value.
7. What is the marginalist principle?
8. What are empirical functions?
9. What is the shape of the expansion path under the homothetic production function?
10. Name the production function and returns to scale when degree of homogeneity is equal to one.

11. Give the mathematical expression for Elasticity of Substitution.
12. What is price discrimination?
13. What is the payoff of a strategy?
14. What are the benefits received by managers according to Williamson's managerial discretion model?
15. What are cartels?

Section B

Answer any 5 questions. Each question carries 2 marks

(5X2=10 Marks)

16. What are the differences between traditional indifference curves and LES model?
17. What are the key components of full cost pricing?
18. Give the Constant Elastic Demand Function when demand is a function of price of the commodity, price of related goods, income of the consumer, and trend factor for tastes and preference. Explain the variables used in the function.
19. What are the different types of technical progress?
20. Give the difference between cardinal measure of utility under N-M Index and cardinal utility analysis.
21. Point out the key determinants that influence the entry preventing pricing strategies in oligopolistic markets
22. What is peak load pricing?
23. Graphically represent the shape of isoquants under LES model.
24. Why is CES production function considered as a generalised production function?
25. Give the value of (MP_K) and (MP_L) at different types of technical progress.

Section C

Answer any 5 questions. Each question carries 4 marks.

(5X4=20 Marks)

26. Explain the three types of dumping.
27. Explain Baumol's single product model with advertising.
28. Elucidate the concept of excess capacity under monopolistic competition.
29. Explain the absence of money illusion in the context of Constant Elastic Demand Function.
30. Discuss full cost pricing strategy.
31. LAC under modern cost theory is not an envelope of SAC. Explain.
32. Explain Stock Adjustment Model.
33. Explain how functions are classified into homogenous and non-homogenous functions.

Section D

Answer any 3 questions. Each question carries 10 marks.

(3X10=30 Marks)

34. Explain in detail about the Sylos - Labini Model of limit pricing.
35. What are the three price discriminations under monopoly? Explain third degree price discrimination in detail.
36. Elucidate the Houthakker and Taylor demand function.
37. Explain in detail about the important elements of Cyert and March behavioural theory of firms.
38. Explain the shape of AFC, AVC, TC graphically for short-run under modern cost theory.
39. What are the characteristics of monopolistic competition? Explain the equilibrium with new firms entering the industry.

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(CBCS - UG)

2023-24 Admission Onwards

MODEL QUESTION PAPER SET II

Time: 3 Hours **Max. Marks: 70**

Section A

Answer any 10 questions. Each question carries 1 mark

(10 X 1=10 Marks)

1. What is price elasticity of demand?
2. What are isoquants?
3. Define monopoly market structure.
4. What is desired level of quantity demanded?
5. What are the two basic assumptions of price discrimination?
6. What is full cost pricing?
7. Give the general form of Cobb Douglas Production Function.
8. What is the Elasticity of Substitution under CES production?
9. What is the expected value under fair game?
10. What is GPM?

11. What is Sylos Postulate?
12. Define duopoly.
13. What is oligopoly?
14. What is sales maximisation?
15. Define kinked demand curve.

Section B

Answer any 5 questions. Each question carries 2 marks

(5X2=10 Marks)

16. What are Constant Elastic Demand Functions?
17. What happens to the shape of indifference curve and isoquant when production is subject to technical progress.
18. What are the factors influencing CEO Payment?
19. Explain two-part tariff.
20. What are the choices an established firm have when the entry preventing limit price P_L is given?
21. Point out the reasons why managers prioritise sales maximising?
22. Distinguish between tying and bundling
23. List out the assumptions of Neo classical theory of firm.
24. Distinguish between collusive and non-collusive oligopoly.
25. What is barometric price leadership?

Section C

Answer any 5 questions. Each question carries 4 marks.

(5X4=20 Marks)

26. Present consumption of durable goods is based on past behaviour. Explain.
27. Prove that each factor undergoes diminishing returns under the Cobb-Douglas Production Function.

28. Explain the constraints in the Marris model of managerial enterprise.
29. Explain second degree price discrimination using a diagram.
30. Write a note on Bain's Limit pricing theory.
31. What are the superiorities of CES production function?
32. Explain fair and non-fair game while using the example of tossing a coin.
33. Explain intertemporal price discriminations

Section D

Answer any 3 questions. Each question carries 10 marks.

(3X10=30 Marks)

34. Describe zero sum game using an individual and combined payoff matrix of two firms.
35. Explain long run cost curves graphically.
36. Elucidate about a representative model of average cost pricing.
37. What are price leadership models? Explain the three price leadership models in detail.
38. What are empirical production functions? Explain various empirical production functions.
39. Explain Expected Utility and Bernoulli Hypothesis as a solution to St. Petersburg Paradox.

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(CBCS - UG)

2023-24 - Admission Onwards

MODEL QUESTION PAPER SET I

Time: 3 Hours **Max. Marks: 70**

Section A

Answer any 10 questions. Each question carries 1 mark

(10 X 1=10 Marks)

1. What constitutes M3 in money supply?
2. Who stated ‘supply creates its own demand’?
3. Who proposed the concept of permanent income hypothesis?
4. What happens to LM curves when the central bank purchases bonds under open market operations?
5. Which economic phenomenon is associated with the term ‘too much money chasing too few goods’?
6. Which type of market is subject to the Pigou effect?
7. What are the factors determining investment according to Keynes?
8. According to the life cycle hypothesis, what are the factors that determine the consumption of an individual?
9. What is the main focus of Jorgenson’s Neoclassical Investment Model?

10. What are the major components of aggregate demand?
11. Define transitory income.
12. Name the leading economists behind the DMP Model
13. Which policy is more effective in controlling aggregative income in the Mundell-Fleming model with a floating exchange rate?
14. According to search theory, how does information impact the effectiveness of the labour market?
15. What happens to the Phillips curve when there is a positive supply shock?

Section B

Answer any 5 questions. Each question carries 2 marks

(5X2=10 Marks)

16. Define effective demand.
17. Write a short note on wage-price flexibility.
18. Define monetary policy.
19. Write a short note on general equilibrium with the help of IS- LM curves.
20. Write a brief note on the consumption puzzle.
21. Explain the Tobin 'q' ratio.
22. What do you mean by demonstration effect?
23. Define Moral suasion.
24. What is NAIRU?
25. Elucidate the fisher's equations of exchange.

Section C

Answer any 5 questions. Each question carries 4 marks.

(5X4=20 Marks)

26. Diagrammatically explain the Philips curve.
27. Briefly describe the relative income hypothesis.
28. Explain search theory.
29. Discuss the effectiveness of fiscal policy under IS-LM.

30. Explain Friedman's restatement of the quantity theory of money.
31. Explain the accelerator theory of investment.
32. Elucidate the AD and AS with the help of diagrams.
33. Discuss the Keynesian liquidity preference approach.

Section D

Answer any 3 questions. Each question carries 10 marks.

(3X10=30 Marks)

34. Critically evaluate the classical theory of output and employment.
35. Describe Jorgenson's theory of investment.
36. Explain the quantitative and qualitative credit control measures of RBI.
37. Describe the strategies to control inflation.
38. Discuss the various approaches to demand for money.
39. Elucidate the DMP model.

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2023-24 - Admission Onwards

MODEL QUESTION PAPER SET II

Time: 3 Hours **Max. Marks: 70**

Section A

Answer any 10 questions. Each question carries 1 mark

(10 X 1=10 Marks)

1. What is the shape of the AS curve at full employment level?
2. Who proposed the idea of a wage cut to attain full employment?
3. Who is the author of the book 'Income, Saving, and the Theory of Consumer Behaviour'?
4. Which policy is more effective in the Mundell-Fleming model with a fixed exchange rate system?
5. Define Marginal Product of Labour.
6. What is the term used to describe people imitating the consumption pattern of others?
7. Who introduced the concept of the random walk hypothesis?
8. What is the relationship between bond price and rate of interest?
9. Define stagflation.

10. What is the primary focus of Tobin's approach to money demand?
11. What is the relationship between speculative motive and interest rate under liquidity preference theory?
12. Define Bank Rate.
13. What is the shape of the long run Phillips curve?
14. What significance does adaptive expectations have in economic theory?
15. What is the main cause of inflation, in accordance with the monetarists?

Section B

Answer any 5 questions. Each question carries 2 marks

(5X2=10 Marks)

16. What do you mean by neoclassical synthesis?
17. Explain the concept of super multiplier.
18. What is liquidity trap?
19. Distinguish between CRR and SLR.
20. What do you mean by inside money and outside money?
21. What is high powered money?
22. How open market operation can be used as a strategy to control inflation?
23. Define matching theory.
24. Distinguish between long run and short run Phillips curves.
25. Explain the concept of stagflation.

Section C

Answer any 5 questions. Each question carries 4 marks.

(5X4=20 Marks)

26. Graphically illustrate the effectiveness of monetary policy under a fixed exchange rate system.
27. What are the major differences between Classical and Keynesian theory of Output and employment?

28. Explain the concept of drift hypothesis.
29. Briefly explain the Modigiliani-Miller theory of investment.
30. Explain the behavioural model of money supply.
31. Discuss the Baumol approach of demand for money.
32. Explain expectation augmented Phillips curve.
33. Write a short note on search theory.

Section D

Answer any 3 questions. Each question carries 10 marks.

(3X10=30 Marks)

34. Elucidate the concept of aggregate demand and aggregate supply.
35. Describe the financial theory of investment.
36. Discuss the money multiplier and its determination process.
37. Discuss the implications of Life Cycle Hypothesis for individuals' consumption behaviour over their lifetime.
38. Examine the fiscal policy effectiveness under a fixed and flexible exchange rate system with the help of a diagram.
39. Explain the monetarist theory of inflation.

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ISBN 978-81-967121-3-6