CENTRE FOR DISTANCE & ONLINE EDUCATION
UNIVERSITY OF JAMMU

JAMMU

SELF LEARNING MATERIAL

MA ECONOMICS SEM-II

Subject: Advanced Macroeconomics No. of Credits 6 Unit : I – IV

Course No: ECO-202 **Lesson No. : 1-28**

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Course coordinator

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Advanced Macroeconomics

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M.A Economics under Non-CBCS (CDOE)

Semester-I1

Syllabus for the examination to be held in May 2026, 2027 & 2028

Course Code: ECO-202 **Title – Advanced Macroeconomics**

Credits:6 **Max. Marks: 100**

Internal Assessment: 30 **Time: 3 Hours** **Semester Exam: 70**

Course Outcomes

- Understand, explain and constructively criticise well known macroeconomic models Evaluate the extent to which well-known macroeconomic models can explain real-world data and macroeconomic experiences
- Use well known macroeconomic models to illuminate current debates about macroeconomic policy
- Read and understand original research articles about Macroeconomics in academic journals

UNIT-1 Classical Macroeconomics System

Classical Macroeconomics: output and Employment the classical revolution, production, employment-labour demand and supply, equilibrium output and employment, the determinants of output and employment, factors that do not affect output Classical Macroeconomics Money, prices. and Interest- the quantity theory of money, the Cambridge approach to the quantity theory, the classical aggregate demand curve, the classical theory of the interest rate, policy implications of the classical equilibrium model.

UNIT-II: The Keynesian Macroeconomics System

The Keynesian System- the problem of unemployment, the simple Keynesian model conditions for equilibrium output, the components of aggregate demand, determining equilibrium income, changes in equilibrium income, fiscal stabilization policy, export and imports in the simple Keynesian model The Keynesian System money, interest, and income-money in the Keynesian system interest rates and aggregate demand the Keynesian theory of the interest rate the Keynesian theory demand- the sutal demand for money-the effect of an increase in the money supply.

UNIT-III: The Keynesian System Versus Classical

The Keynesian system: aggregate supply and demand- The Keynesian aggregate demand schedule, The Keynesian aggregate demand schedule combined with the classical theory of aggregate supply, A contractual view of the labour market-sources of wage rigidity, flexible price-fixed money wage model, labour supply and variability in the money wage-classical and Keynesian theories of labour supply, the Keynesian aggregate supply schedule with a variable money wage, policy effects in the variable wage Keynesian model, the effects of shifts in the aggregate supply schedule, factor that shift the aggregate supply schedule, Keynesian versus classical theories of aggregate demand and supply.

UNIT- IV: Output, Inflation and Unemployment: Alternative Views

Inflation and Unemployment-the Philips curve, The Natural rate theory, Monetary policy, output and inflation: Friedman's Monetarist view in the short and long run, Keynesian view of the output –inflation trade-off in the short and long run stabilisation policies for output and employment, Evolution of the natural rate concept-determination of the natural rate concept – determination of the natural rate of unemployment .

New Classical Economics- the new classical position, the Keynesian counter critique, Real Business cycle models-agents optimize and markets clear, a simple business cycle model, New Keynesian Economics-sticky price (menu cost), efficiency wage models and insider-outsider models.

Note for Paper Setting

The term end examination shall be of 70 marks. There shall be two types of questions in each

unit, two short answer type (each of 250words) and two medium answer type (each of 600 words). The candidate will have toattempt one short answer type question and one medium answer type question fromeach unit. Each short answer type question shall carry 4.5 marks and each medium answer type question shall carry 13 marks.

Basic Reading List

1. Abel Andrew B, & Ben S. Bemanke (2006). Macroeconomics, Pearson Education inc., New York.
2. Ackly, G (1978) Macroeconomics Theory and Policy, Macmillan, New York.
3. Black house, R. and A. Salansi (Eds) (2000), Macroeconomics and the Real World (2Vols.). Oxford University Press, London.
4. Branson, WA (1989) Macroeconomic Theory and Policy, (3rd Edition), Harper and Row ,New York.
5. Dorsbusch R. and F. Stanley (1997), Macroeconomics, McCaw Hill Inc., New York.
6. Froyen, T. R. (2015), Macroeconomics: theories and policies, Pearson India Education Services Pvt Ltd, Noida, India, ISBN 9789132518322.
7. Hall R E and J.B. Taylor (1986), Macroeconomics, WW Norton, New York.
8. Heijra, BJ. and V.P. Fredrick (2001), Foundations of Modern Macroeconomics, Oxford University Press, New Delhi.
9. Jha, R. (1991) Contemporary Macroeconomics Theory and Policy, Wiley Eastern Ltd., New Delhi.
10. Romer, D.L. (1996), Advanced Macroeconomics. McGraw Hill Company Ltd., New York.
11. Scarfe, BL. (1977), Cycles, Growth and Inflation, McGraw Hill, New York .
12. Shapiro, F. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.

Unit-1: Classical Macroeconomic System

Classical Macroeconomics: Output and Employment-

M.A. Eco. Sem 1I The Classical Revolution Unit–I

ECO- 202 Lesson 1

STRUCTURE

1.0 Objectives

After completing this lesson, learners will be able to:

- Understand the origins and core principles of Classical Macroeconomics.
- Differentiate between Classical, Neoclassical, and Keynesian schools of thought.
- Examine how classical theories addressed key economic questions on output, employment, and market equilibrium.
- Explore the classical critique of mercantilism and its implications for macroeconomic analysis.
- Recognize the role of money, market mechanisms, and government intervention as viewed by classical economists.

1.1. Learning Outcomes

Upon successful completion of this lesson , learners will be able to:

- Explain the historical context in which classical macroeconomics emerged.
- Describe the main assumptions and conclusions of classical macroeconomic models.
- Analyze the classical views on full employment, output, and the self-regulating nature of markets.
- Critically assess the classical rejection of mercantilist doctrines.
- Evaluate how classical thought influenced later macroeconomic theories and policies.

1.2. Introduction

The term **macroeconomics** came into academic usage during the 1930s, a period marked by significant developments in the study of the economy as a whole. During the early 20th century, the focus of economics started shifting from micro-level analysis of individual markets and firms to broader macroeconomic concerns, particularly those related to income, employment, and price levels. This shift was accelerated by the global economic crisis that began in 1929, commonly known as the Great Depression.

In response to the crisis, economists developed new theories to understand business cycles and recommended policies for stabilizing economic fluctuations. A prominent contribution to this field was made by **John Maynard Keynes** through his groundbreaking work, *The General Theory of Employment, Interest and Money* (1936). Keynes's ideas, known collectively as the **Keynesian Revolution**, challenged the prevailing economic framework, which he referred to as **Classical Economics**.

To appreciate the Keynesian critique and the evolution of macroeconomic thought, it is essential to understand the **Classical Macroeconomic System**. While Keynes and his followers initially dismissed classical theory as outdated, many classical concepts later re-emerged in modified forms within both Keynesian and post-Keynesian schools of thought. Classical economics also laid the groundwork for theories developed by monetarists, new classical economists, and real business cycle theorists.

1.3 Explanation - The Classical Revolution

Classical economics emerged as a challenge to **mercantilism**, the dominant economic doctrine in Europe from the 16th to 17th centuries. Mercantilists believed that national prosperity depended on accumulating precious metals and advocated for extensive state intervention to

control trade and industry. They sought to maintain trade surpluses through export promotion, import restrictions, and colonial exploitation.

In contrast, **classical economists**, led by figures like **Adam Smith, David Ricardo**, and **John Stuart Mill**, argued that a nation's wealth derived from the **productive capacity of its economy**, particularly the accumulation of capital, labor, and technological progress. They emphasized that the **free market**, if left largely unregulated, would allocate resources efficiently and align individual interests with the public good.

Classical economists also rejected the mercantilist belief that governments needed to stimulate consumption to absorb production. Instead, they held that **supply creates its own demand**, an idea later formalized as **Say's Law**. Thus, they gave little attention to aggregate demand management, assuming that markets would clear naturally, even in the short run.

Key Features of Classical Macroeconomic Thought

1. **Real Factors Dominate Economic Outcomes**
   Classical theorists focused on real variables such as output, employment, and investment, downplaying the role of money, which they saw merely as a medium of exchange.
2. **Self-Regulating Markets**
   Classical models asserted that the economy tends toward **full employment equilibrium** automatically. Government interventions to manage demand were considered not only unnecessary but potentially harmful, as they could distort the natural adjustment processes of the market.
3. **Neutral Role of Money**
   Unlike mercantilists, classical economists contended that **money does not influence real economic variables**, particularly in the long run. An increase in the money supply would only lead to higher prices, not increased output or employment.
4. **Critique of State Intervention**
   Classical economists championed **laissez-faire policies**, advocating minimal government involvement in the economy except to ensure the rule of law, enforce contracts, and maintain competition.

1.4 Let Us Sum Up

Classical macroeconomics, originating as a reaction to mercantilism, laid the foundation for modern economic thought by emphasizing **real factors, the efficiency of markets, and**

limited government intervention. While Keynesian economics later challenged these views, many classical concepts remain relevant in economic theory and policy today. Understanding classical thought is crucial for comprehending the evolution of macroeconomic analysis.

1.5 Key words

- **Macroeconomics**: The branch of economics dealing with the performance, structure, and behavior of an economy as a whole.
- **Mercantilism**: An economic theory that emphasized the accumulation of wealth, particularly gold and silver, through a positive balance of trade and strong state control over the economy.
- **Bullionism**: The belief that the wealth of a nation is determined by its stock of precious metals.
- **Say's Law**: The classical doctrine asserting that supply creates its own demand.
- **Full Employment Equilibrium**: The level of output where all available resources are utilized efficiently.

1.6 Suggested Readings

- Keynes, J.M. *The General Theory of Employment, Interest and Money*.
- Smith, Adam. *The Wealth of Nations*.
- Ricardo, David. *Principles of Political Economy and Taxation*.
- Mill, John Stuart. *Principles of Political Economy*.
- Blaug, Mark. *Economic Theory in Retrospect*.
- Froyen, T. Richard. *Macroeconomics Theories and Policies*

1.7 Hints to Check Your Progress

- Define key features of classical macroeconomics.
- Compare classical and mercantilist approaches to economic management.
- Explain how classical economists viewed the role of money and government.
- Discuss the assumptions underlying the classical model of full employment equilibrium.

1.8 Examination Oriented Questions

1. Critically explain the basic assumptions and policy implications of classical macroeconomic theory.

2. Discuss the classical economists' critique of mercantilism with examples.
3. Explain the role of money in the classical economic system.
4. How did classical economists address the problem of unemployment and output determination?
5. What is Say's Law? Discuss its significance in classical macroeconomic thought.

Lesson 2: Production, Employment—Labour Demand and Supply

STRUCTURE

2.0 Objectives

- To explain the classical aggregate production function and its characteristics.
- To examine how firms determine labor demand in the short run.
- To analyze individual labor supply decisions based on income-leisure trade-offs.
- To explore how equilibrium employment levels are determined through the interaction of labor demand and supply.

2.1 Learning Outcomes

Upon completing this lesson, learners will be able to:

- Interpret the classical production function and understand the concepts of constant, diminishing, and negative returns to labor.
- Describe how firms determine the optimal quantity of labor to hire based on the marginal product of labor and real wage rates.

- Explain the individual decision-making process regarding labor supply considering real wages and leisure preferences.
- Analyze the interplay between labor demand and supply in determining employment levels and wage rates.

2.2 Introduction

This lesson delves into the classical economic framework that explains the interaction between production processes and the labor market. A core aspect of the classical model is the **aggregate production function**, which illustrates the relationship between inputs—primarily labor and capital—and output. The lesson further explores the dynamics of labor demand and supply in a perfectly competitive market, where wages adjust freely, ensuring market equilibrium. Classical economists emphasize that the production process, labor employment decisions, and wage determination are interconnected, driven by firms' profit-maximizing behavior and workers' utility-maximizing choices.

2.3 Production

A central relationship in the classical model is the aggregate **production function**. The production function, which is based on the technology of individual firms, is a relationship between the level of output and the level of factor inputs. For each level of inputs, the production function shows the resulting; level of output and can be written as

$$Y = F(\overline{K}, N) \qquad (2.1)$$

where Y is real output, $\overline{K}$ the stock of capital (plant and equipment), and N the quantity of the homogeneous labor input.[1] For the short run, the stock of capital is assumed to be fixed, as indicated by the bar over the symbol for capital. The state of technology and the population are also assumed to be constant over the period considered. For this short-run period, output varies solely with variations in the labor input (N) drawn from the fixed population.

The numbers in Table 2.1 illustrate the fundamental relationship between a change in labor input and the resulting change in output, holding the capital stock constant, $\overline{K}$. The values from Table 2.1 are plotted in Figures 2.1a and 2.1b.

In Figure 3.1a, the production function, Y = F($\overline{K}$, N), indicates the output that would be produced by the efficient utilization of each level of labor input. As drawn, the production function has several characteristics. At low levels of labor input, the function is a straight line. The slope of the line gives the increase in output for a given increment in labor input, so this straight-line (constant-slope) portion of the production function exhibits constant returns to scale. For very low levels of labor utilization, it might be presumed that additional workers could be applied to a given amount of plant and equipment without a fall in the productivity of the last worker hired. For the most part, however, we consider situations where adding additional labor will result in increased total output, but where the size of the increases to output declines as more labor is employed. This portion of the production function exhibits diminishing returns to scale. Negative returns to scale occur when additional labor input results in decreased total output. Firms would not operate on this portion of the production function, since hiring additional labor results in a decrease in total output.

In Figure 2.1b, we plot the change in output given a change in labor input. This is the **marginal product of labor (MPN)**. The marginal product of labor is the slope of the production function (ΔϒΔN) in Figure 2.1a.

Table 2.1 The Relationship between Output, Fixed Capital Stock and Labour

	N = LABOR	Y = OUTPUT	ΔϒΔN	
A	0	0		
B	1	10	10	Constant returns
C	2	20	10	
D	3	28	8	Diminishing returns
E	4	33	5	
F	5	34	1	
G	6	32	-2	Negative returns
On line A,	0 units of labor (N) are hired, and total output (Y) is 0.			
On line B,	1 unit of labor (N) is hired, and total output (Y) is 10 units.			
	ΔϒΔN the change in output given a change in labor, is 10/1 = 10.			
	This is the marginal product of labor. The MPN of worker 1 is 10, since output increased by 10 units when labor increased by 1 unit.			
On line C,	2 workers are hired, and total output (Y) is 20 units.			
	ΔY/ΔN the change in output given a change in labor, is (20 - 10)/1 = 10.			
	The marginal product of labor of worker 2 is the same as the marginal product of labor of worker 1, since output increased by 10 units when labor increased by one unit.			
	This is the area of constant returns to scale.			

On line D,	3 workers are hired, and total output (Y) is 28 units. $\Delta Y/\Delta N$ the change in output given a change in labor, is (28 - 20)/l = 8. The MPN of worker 3 is 8 units. The increase in output when worker 3 was hired is less than the marginal product of worker 2. This is the area of diminishing returns to scale. In this area on the production function, total output increases as an additional unit of labor is hired, but marginal output diminishes. Output increases at a diminishing rate due to the law of diminishing returns. This law states that as variable inputs (in this case, homogeneous labor) are added to a fixed input (the capital stock, which is being held constant), beyond some point, the amount by which output increases will diminish.
On line E,	4 workers are hired, and output (Y) is 33 units. The MPN of worker 4 is 5 units.
On line F,	5 workers are hired, and output (Y) is 34 units. The MPN of worker 5 is 1 unit.
On line G,	6 workers are hired, and output (Y) is 32 units. This is the area of negative returns. The MPN of worker 6 is negative (- 2). At this point, both total output and marginal output decreased. Firms would not hire in the area of negative returns to scale.

In the range of constant returns to scale, as N increases, the slope of the line is flat. As more workers are hired, however, the slope becomes negative, indicating that while the marginal product of each worker hired is positive, it is less than the marginal product of the previous worker. This area represents diminishing returns to scale. The marginal product of the additional worker is below the horizontal axis in the area of negative returns to scale.

The short-run production function plotted in Figure 2.1a is a technological relationship that determines the level of output given the level of labor input (employment). The capital stock, along with the existing level of technology and skill level of the workforce, is being held constant. Classical economists assumed that the quantity of labor employed would be determined by the forces of demand and supply in the labor market, as explained in the next section.

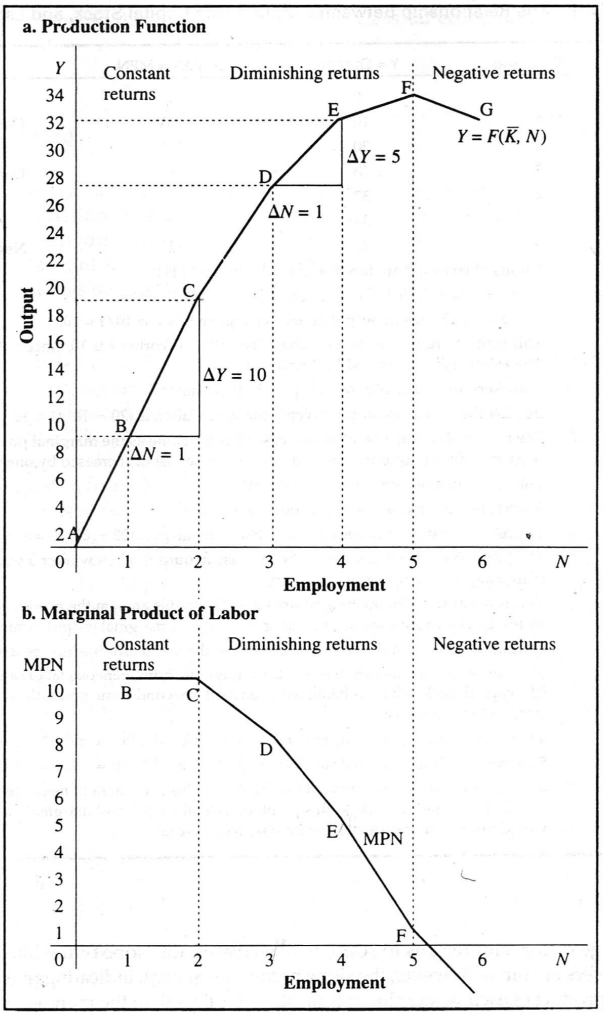


Figure. 2.1 Production Function and Marginal Product of Labor Curves

2.4 EMPLOYMENT

The hallmark of classical labor market analysis is the assumption that the market works well. Firms and individual workers optimize. They have perfect information about relevant prices. There are no barriers to the adjustment of money wages; the market clears.

Labor Demand

On the demand side of the market, purchasers of labor services are firms that produce commodities. To see how the aggregate demand for labor is determined, we begin by considering the demand for labor on the part of an individual firm, denoted the *i*th firm. In the classical model, perfect competitors are firms that choose their output level so as to maximize profits. In the short run, output is varied solely by changing the labor input so-that choice of the level of output and quantity of the labor input are one decision. The perfectly competitive firm will increase output until the marginal cost of producing a unit

of output is equal to the marginal revenue received from its sale. For the perfectly competitive firm, marginal revenue is equal to product price (P). Because labor is the only variable factor of production, the marginal cost of each additional unit of output is the marginal labor cost. Marginal labor cost equals the money wage divided by the number of units of output produced by the additional unit of labor. We defined the units of output produced by the incremental unit of labor employed as the marginal product of labor (MPN). Thus marginal cost for the *i*th firm (MC,) is equal to the money wage (W) divided by the marginal product of labor for that firm (MPN,).

$$MC_i = \frac{W}{MPN_i} \tag{2.2}$$

The condition for short-run profit maximization in the purely competitive market is:

$$P = MC_i \tag{2.2a}$$

Substituting the expression for marginal cost (MC) from (3.2) into (3.2a) shows the short-run profit-maximizing position for the firm buying labor in the market for inputs:

$$P = W/MPN_i \tag{2.3}$$

In the input market, firms maximize profits by hiring labor services up to the point where MR = MC; in this market, where $P = W/MPN_i$, multiplying both sides of equation (3.3) by MPN and dividing both sides by P gives the expression:

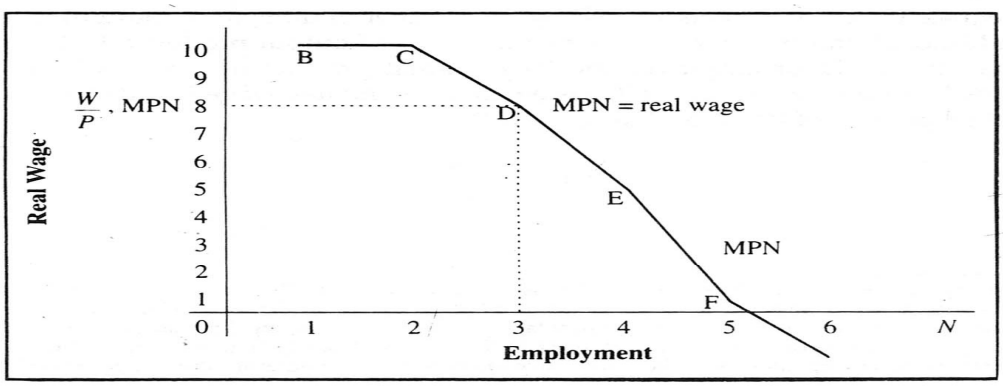
$$\frac{W}{P} = MPN_i \tag{2.4}$$

The profit maximization condition in (2.4) can be explained as follows: The firm will hire up to the point where the additional output obtained by hiring one more worker (MPN) is just equal to the real wage (W/P) paid to hire that worker.

The condition for profit maximization in equation (2.4) is illustrated in Figure 2.2. The demand for labor schedule for the firm, plotted against the real wage, is the marginal product of labor schedule. The labor demand curve is downward-sloping due to the law of diminishing returns. In Table 2.2, using a product price of $1, the data from Table 2.1 are used to indicate how much labor the firm will hire. At a real wage such as $8 (e.g., a money wage of $8 and a product price of $1), the firm will hire 3 workers. At a quantity of labor below 3, say 2, the marginal product of labor (10) exceeds the real wage (8.0). The payment to the worker in real terms is less than the real product produced. Profits will be increased by hiring additional units of labor. Alternatively, at quantities of labor input

above 3, if the real wage is $8, the real wage is above the marginal product of labor. The payment to labor exceeds the real product of the marginal worker, and marginal cost exceeds product price. The firm will reduce labor to increase profit.

Figure 2.2: Labor Demand for a Firm in Real Terms



The condition for profit maximization is met at the point where the real wage (W/P) is equated with the marginal product of labor (MPN), as shown in equation (3.4). If the real wage is $8, then the firm will maximize profits by hiring 3 workers, since the marginal product of labor, (MPN), is 8. This is shown at point D on the graph of the demand for labor, MPN. In order to get the firm to hire more labor, the real wage must fall since the additional output produced by each additional worker is declining.

Table 2.2 Profit-Maximizing Position of a Firm Hiring Labor

	N = Labor	Y = Output	MPN	P = Price
A	0	0		
B	1	10	10	$1
C	2	20	10	$1
D	3	28	8	$1
E	4	33	5	$1
F	5	34	1	$1
G	6	32	-2	$1

The condition for profit maximization is met at the point where the real wage (W/P) is equated with the marginal product of labor (MPN), as shown in equation (3.4). If the real wage is $8, then the firm will maximize profits by hiring 3 workers, since the real wage of the third worker is $8 and the marginal product of the third worker is 8 units. This is shown in line D, which is in bold

Thus, the profit-maximizing quantity of labor demanded by a firm at each level of the real wage is given by the quantity of labor input that equates the real wage and the marginal product of labor. The marginal product curve is the firm's demand curve for labor. The implication is that labor demand depends inversely on the level of the real wage. The labor demand curve is downward-sloping due to the law of diminishing returns. The higher the real wage, for example, the lower the level of labor input that will equate the real wage to the marginal product of labor. In Figure 2.2, if the wage were $5, instead of $8, labor demand would be 4 instead of 3. The demand curve for labor is an economy-wide aggregation of the individual firms' demand curves. For each real wage, this curve will give

the sum of the quantities of labor input demanded by the firms in the economy. We write this aggregate labor demand function (Nd) as $N^d = f\left(\frac{W}{P}\right)_{(-)}$

(2.5)

where in the aggregate, as with individual firms, an increase in the real wage lowers labor demand.

Labor Supply

The last relationship necessary for determining employment and output in the classical system is the labor supply curve. Labor services are supplied by individual workers in the economy. Classical economists assumed that the individual attempts to maximize utility (or satisfaction). The level of utility depends positively on both real income, which gives the individual a command over goods and services, and leisure. There is, however, a trade-off between the two goals because income is increased by work that reduces available leisure time.

Consider, for example, how individual *j* allocates one 24-hour period between leisure hours and hours worked: (N_j^s), is the individual's supply of labor. Figure 2.3 illustrates the choice facing the individual. On the horizontal axis, we measure hours of leisure per day. The maximum, of course, is 24 hours. The horizontal intercept, where the individual chooses no labor and all leisure, is 24. The number of hours worked are, therefore, 24 minus the number of hours of leisure selected. Real income is measured on the vertical axis and is equal to the real wage, W/ P, multiplied by the number of hours the individual works. Each vertical intercept is the real wage multiplied by 24 hours in the day, which would occur if the individual chose all labor and zero leisure—i.e., (W/P . 24). The curved lines in the graph (labeled U_1, U_2, U_3) are indifference curves. Points along one of these curves are combinations of income and leisure that give equal satisfaction to the individual; hence, the person is indifferent as to which point along a given curve is selected. The slope of the indifference curve gives the rate at which the individual is willing to trade off leisure for income—that is, the increase in income the person would have to receive to be just as well off after giving up a unit of leisure. In fact, the cost of choosing each hour of leisure is the real wage, W/P, since the individual is choosing not to work for each hour of leisure. In addition, all points along U_2, for example, yield greater satisfaction to the individual than any point on U_1, since any point on an indifference curve that sits farther to the right indicates a larger income, given leisure (or the same number of hours worked). Therefore, the individual attempts to achieve the "northern-most" possible indifference curve. The

higher the real wage, the higher the satisfaction the individual can select (represented by an indifference curve that sits farther to the right).

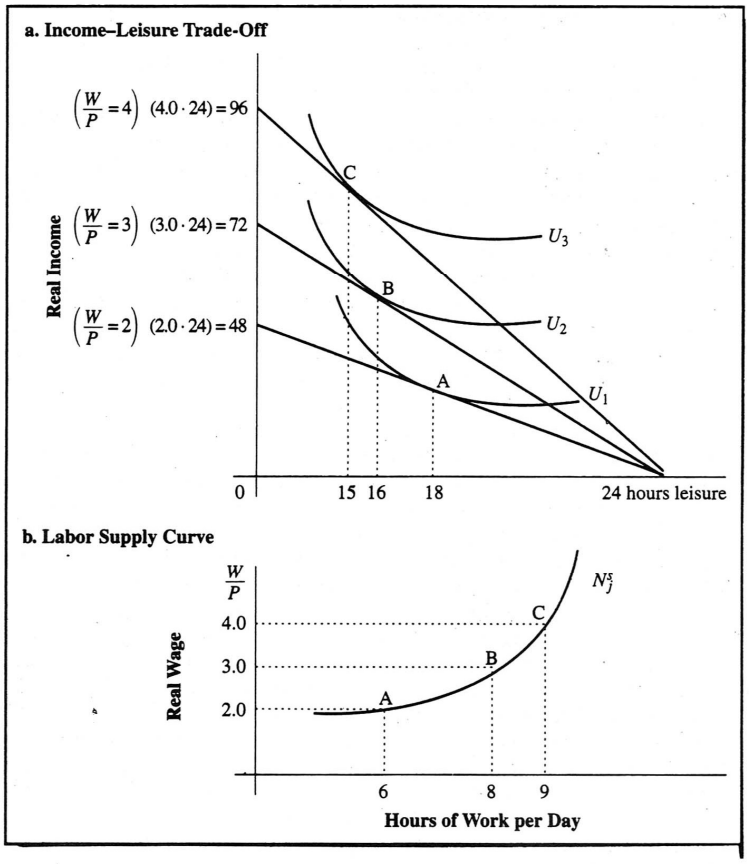


Figure 2.3: Individual Labor Supply Decision

Part a depicts the individual's labor-leisure choice. The individual will supply labor (N_j^s) up to the point where the rate at which labor may be traded for leisure in the marketplace, which is given by the real wage (W/P), is equated with the rate at which the individual is willing to trade labor (give up leisure) in return for income, which is measured by the slope of the individual's indifference curves (U_1, U_2, U_3). At a real wage of 2.0, the individual will choose 18 hours of leisure, point A on the Income-Leisure trade-off graph. Hours of work chosen will then be 6 (24 hours in the day - 18 hours of leisure). This is shown at point A on the labor supply curve. At a real wage of 3.0, the individual will choose 16 hours of leisure, point B on the Income-Leisure trade-off graph. Hours of work chosen will then be 8 (24 hours in the day — 16 hours of leisure). This is shown at point B on the labor supply curve. At a real wage of 4.0, the individual will choose 15 hours of leisure, point C on the Income-Leisure trade-off graph. Hours of work chosen will then be 9 (24 hours in the day — 15 hours of leisure). This is shown at point C on the labor supply curve.

The straight-line rays originating at the point of 24 hours on the horizontal axis give the budget lines facing the individual. Starting from 24 hours (no work, all leisure), the individual can trade off leisure for income at a rate equal to the hourly real wage, W/P. The slope of the budget line is the real wage. The higher the real wage, the steeper the budget line, reflecting the fact that at a higher real wage, an individual who increases hours of work by one unit (moves one unit to the left along the horizontal axis) will receive a larger increment of income (move farther up the vertical axis along the budget line) than he or she would have received at the lower real wage. Three budget lines, corresponding to real wage rates of 2.0, 3.0, and 4.0, are shown in Figure 2.3a. Notice that at a higher real wage, the individual can choose an indifference curve that yields greater satisfaction.

In Figure 2.3b, we construct the labor supply curve for the *i*th individual. This supply curve consists of points such as A, B, and C from Figure 2.3a, giving the amount of labor the individual will supply at each real wage. This aggregate labor supply curve can be written as:

$$N^s = \underset{(+)}{g\left(\frac{W}{P}\right)} \qquad (2.6)$$

Two features of the classical labor supply theory require further comment. First, note that the wage variable is the real wage. Labor supply is determined by the real wage, not the money wage. The worker receives utility ultimately from consumption, and in making the labor-leisure decision, the individual is concerned with the command over goods and services received for a unit of labor. For example, starting at point C on the income-leisure trade-off graph: If the money wage is \$4 and the price is 1.0, the real wage is \$4 $\left(\frac{4}{1}\right)$ and the individual will choose 15 hours of leisure and work 9 hours (point C on the labor supply curve). If the money wage is still \$4, but the price is now 2.0, the individual's real wage is \$2 $\left(\frac{4}{2}\right)$. The individual will now select point A on the income-leisure trade-off graph, choosing 18 hours of leisure. Hours of work decrease to 6 (24 - 18), which is point A on the labor supply curve. Clearly, as the *real wage increases* (decreases), leisure decreases (increases) and *hours of work increase* (decrease). This is the significance of equation (2.6). Since the real wage (W/P) is measured along the vertical axis on the labor supply curve, if either the money wage or price (or both) change, the number of hours worked are determined by moving along the labor supply curve.

Second, by the construction of Figure 2.3, the labor supply curve is positively sloped; more labor is assumed to be supplied at higher real wage rates. This relation reflects the fact that a higher real wage rate means a higher price for leisure in terms of forgone income. At this higher price, we assume that the worker will choose less leisure. This effect is analogous to the "substitution effect" in the theory of consumer demand. There is another effect: the equivalent of the "income effect" in consumer demand theory. As the real wage increases, the worker is able to achieve a higher level of real income. At higher levels of real income, leisure may become more desirable relative to further increments in income. With successive increases in the real wage, a point may be reached at which the worker chooses to supply less labor as the real wage increases and consumes more leisure. At this point, the income effect outweighs the substitution effect; the labor supply curve assumes a

negative slope and bends back toward the vertical axis. Almost certainly, at extremely high wage rates, we would reach a backward-bending portion of the labor supply curve, and perhaps wage rates need not be so "extremely" high. Although the empirical evidence on this question is inconclusive, we will assume that for wage rates that have been observed in industrialized nations, the aggregate labor supply curve does have a positive slope; the substitution effect outweighs the income effect.

2.5 Let Us Sum Up

In the classical framework, output is determined by the production function, with labor being the variable input in the short run. Firms maximize profits by hiring labor up to the point where the marginal product of labor equals the real wage. Workers, on the other hand, supply labor based on the trade-off between real income and leisure. The intersection of labor demand and supply determines the equilibrium level of employment and wage rate in the economy.

2.6 Key words

- **Aggregate Production Function:** Technological relationship between inputs and output.
- **Marginal Product of Labor (MPN):** Extra output generated by an additional unit of labor.
- **Returns to Scale:** How output responds to a proportional increase in inputs.
- **Real Wage (W/P):** Wage adjusted for price level, indicating purchasing power.
- **Indifference Curve:** Represents combinations of leisure and income providing the same satisfaction.
- **Budget Line:** Shows all possible combinations of leisure and income given the real wage.

2.7 Suggested Readings

1. Mankiw, N.G. (2020). *Principles of Economics*. Cengage Learning.
2. Blanchard, O. (2017). *Macroeconomics*. Pearson.
3. Dornbusch, R., Fischer, S., & Startz, R. (2014). *Macroeconomics*. McGraw Hill.
4. Froyen, T. Richard. *Macroeconomics Theories and Policies*

2.8 Hints to Check Your Progress

- Review the characteristics of the production function at different levels of labor input.

- Understand the derivation of the marginal product of labor and its relation to labor demand.
- Revisit how individual preferences shape labor supply decisions.
- Ensure clarity on how equilibrium is established in the labor market using the classical model.

2.9 Examination Oriented Questions

1. Explain the classical aggregate production function and discuss the concepts of constant, diminishing, and negative returns to scale.
2. How do firms determine the optimal quantity of labor to hire under perfect competition?
3. Discuss the individual labor supply decision using the income-leisure framework.
4. Explain how labor demand and supply interact to determine equilibrium employment and real wages.
5. Using diagrams, illustrate the labor demand and labor supply curves in the classical model.

Lesson 3, Equilibrium output and employment, the determinants of output and employment, factors that do not affect output.

STRUCTURE

3.0 Objectives

- To understand the classical model of output and employment determination.
- To analyze the roles of labor demand, labor supply, and the production function in achieving equilibrium.
- To identify the key determinants of output and employment in the classical system.
- To comprehend factors that do not influence output and employment levels.
- To construct and interpret the classical aggregate supply function.

3.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Explain the process of output and employment equilibrium in the classical model.
- Identify endogenous and exogenous variables in output and employment determination.
- Illustrate how technical progress, capital formation, and labor supply changes impact equilibrium.

- Understand why factors like changes in aggregate demand do not affect output in the classical framework.

3.3 Introduction

In classical economic theory, the determination of output and employment is fundamentally governed by the interaction of labor demand and supply within the broader production process. This lesson explores how equilibrium output and employment levels are established, the factors influencing these variables, and why certain elements do not impact output. We will delve into the classical model, examining the behavior of the aggregate production function, labor demand and supply schedules, and the resulting aggregate supply function.

3.4 EQUILIBRIUM OUTPUT AND EMPLOYMENT

So far, the following relationships have been derived:

$$Y = F(\overline{K}, N) \text{ (aggregate production function)} \quad (3.1)$$

$$N^d = f\left(\frac{W}{P}\right) \text{ (labor demand schedule)} \quad (3.5)$$

$$N^s = g\left(\frac{W}{P}\right) \text{ (labor supply schedule)} \quad (3.6)$$

These relationships, together with the equilibrium condition for the labor market,

$$N^s = N^d \quad (3.7)$$

determine output, employment, and the real wage in the classical system. In common terminology, output, employment, and the real wage are designated as the *endogenous variables* in the model to this point, where an endogenous variable is one that is determined within the model.

Equilibrium within the classical model is illustrated in Figure 3.4. Graph a shows the determination of the equilibrium levels of employment (N_0) and the real wage $(W/P)_0$ at the point of intersection between the aggregate labor demand and labor supply curves. This equilibrium level of labor input (N_0) results in an equilibrium level of output (Y_0) given by the production function, as shown in Figure 3.4b.

The Determinants of Output and Employment

We now consider which factors are the ultimate determinants of output and employment in the classical theory. What are the exogenous variables that, when changed, in turn cause changes

in output and employment, where exogenous variables are those determined outside the model? In the classical model, the factors that determine output and employment are those factors that determine the positions of the labor supply and demand curves and the position of the aggregate production function.)

The production function is shifted by technical change that alters the amount of £ output forthcoming for given input levels. As graphed in Figure 3.4b, the production function also shifts as the capital stock changes over time. The labor demand curve is the marginal product of labor curve, the slope of the production function. Consequently, the position of the labor demand curve will shift if the productivity of labor changes because of technical change or capital formation. From the derivation of the labor supply curve, one can see that this relationship would change as the size of the labor force changes. Population growth would, for example, shift the labor supply curve out to the right. The labor supply curve would also shift with changes in individuals' preferences regarding labor-leisure trade-offs (i.e., U_1, U_2, U_3 in Figure 3.3a).

A common feature of the factors determining output in the classical model is that all are variables affecting the supply side of the market for output—the amount firms choose to produce. *In the classical model, the levels of output and employment are determined solely by supply factors*.

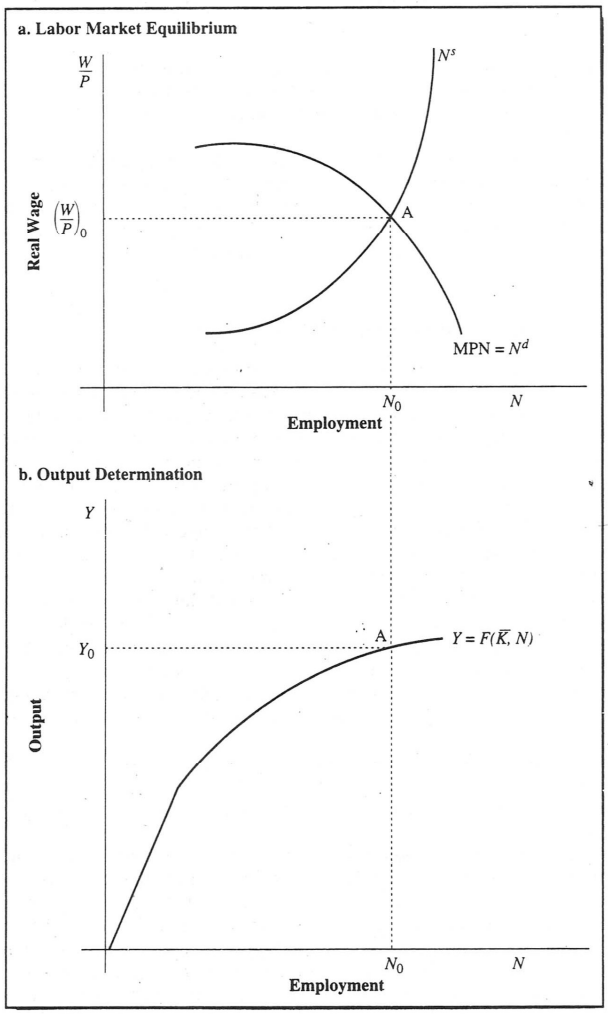


Figure 3.4: Classical Output and Employment Theory

Because the supply-determined nature of output and employment is a crucial feature of the classical system, it is worthwhile to demonstrate this property more formally. To do so, we further consider the properties of the labor supply and demand functions just discussed. Figure 3.5a reproduces the aggregate supply and demand curves for labor. Figure 3.5b plots labor supply and labor demand as functions of the money wage (W). We first consider the form of each of the latter relationships. For labor supply, we can draw a positively sloped curve such as $N^s(P_1)$, which gives the amount of labor supplied for each value of the money wage, given that the price level is P_1.

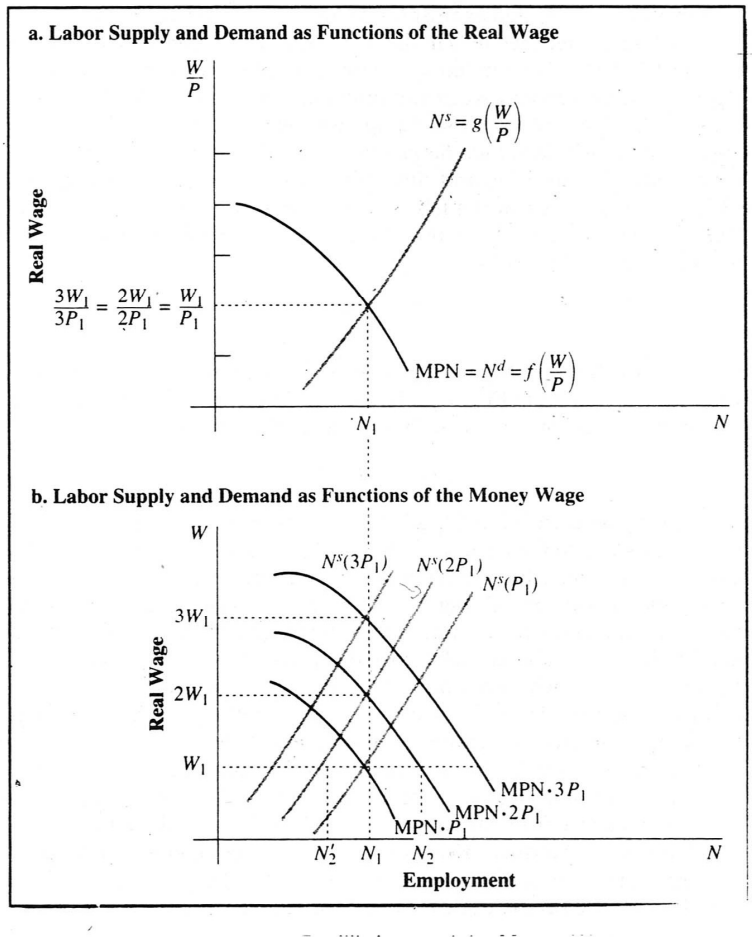


Figure 3.5: Labor Market Equilibrium and the Money Wage

The curve is upward-sloping because at the given price level a higher money wage is a higher real wage. Workers are interested in the real wage, so each price level will have a different curve. For a given money wage each price level will mean a different real wage and, hence, a different amount of labor supplied. At a price level of $2P_1$ or twice that of P_1, the labor supply curve in Figure 3.5b shifts to $N^s(2P_1)$; less labor is supplied for any money wage because at the higher price level a given money wage corresponds to a lower real wage. A rise in the price level shifts the labor supply curve (plotted against the money wage) upward to the left. That the individual worker is interested only in the real wage can be seen from the fact that the same level of labor (NJ is supplied at a money wage of W_1 and a price level of P_1 (real wage W_1/P_1) as at money wage and price combinations of $2W_1$, $2P_1$ or $3W_1$ $3P_1$ (real wage = W_1/P_1 at both points). Equi proportional increases (or decreases) in both money wages and the price level leave the quantity of labor supplied unchanged.

Now consider the labor demand curve plotted against the money wage, where in Figure 3.5 we use the fact that the labor demand [*f* (W/P)] and marginal product of labor (MPN) schedules are equivalent. Recall that the condition met at all points along the labor demand curve is

$$\frac{W}{P} = MPN \qquad (3.8)$$

If we want to know the quantity of labor that will be demanded at any money wage, as was the case for the quantity supplied, the answer depends on the price level. Given the money wage, the firm will choose the level of employment at which

$$W = MPN \cdot P \qquad (3.9)$$

At successively higher price levels (P_1, $2P_1$, $3P_1$) the labor demand curve plotted against the money wage shifts to the right (from MPN . P_1 to MPN . $2P_1$ to MPN . $3P_1$). For a given money wage, more labor is demanded at higher price levels because that money wage corresponds to a lower real wage rate.8 The demand for labor depends on the real wage. Equiproportional increases in the money wage and the price level from (W_1, P_1) to ($2W_1$, $2P_1$) and ($3W_1$; $3P_1$) leave labor demand unchanged at level N_1. They leave the real wage unchanged at W_1/P_1, which corresponds to the demand N_1 in Figure 35a.

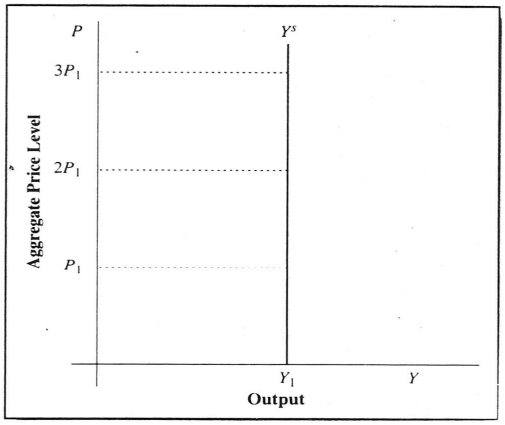
The information in Figure 3.5 is useful in constructing the classical **aggregate supply function**—a relationship that makes clear the supply-determined nature of output in the classical model. The aggregate supply curve is the macroeconomic analog to the microeconomic concept of the firm's supply curve. For the firm, the supply curve gives the output forthcoming at each level of the product price. For the perfectly competitive firm, profits are maximized, as we have seen, where marginal cost (W/MPN_i for the *i*th firm) equals Product Price (P), or equivalently where

$$MPNi = \frac{W}{P} \qquad (3.10)$$

the marginal product equals the real wage. The individual firm takes the money wage as given in deciding on the optimal output to supply and therefore the quantity of labor to hire. One firm would not expect its effort to hire more labor to cause the money wage to change because the firm is a small part of the overall market. Because the money wage is assumed to be fixed, the output supply curve for the firm is positively sloped. Higher prices mean lower real wages, and consequently the firm demands more labor and produces more output. In constructing the aggregate supply curve for the economy, we cannot assume that the money wage remains fixed as output and labor input are varied. The money wage must adjust to maintain equilibrium in the labor market. With this important difference, the aggregate supply curve addresses the same question as its microeconomic analog: How will the level of output supplied vary when we change the product price?

In Figure 3.6 we construct the classical aggregate supply function. Consider output supplied at the three successively higher price levels, P_1, $2P_1$ and $3P_1$ which were plotted in Figure 3.5. At price level P_1 and money wage W_1, employment was N_1 and we assume that the resulting output is Y_1, as shown in Figure 3.6. How will output supplied vary as we go to a price level of $2P_1$? At a price level of $2P_1$, if the money wage remained at W_1, we can see from Figure 3.5b that labor demand would increase to N_2. The higher price would mean a lower real wage, and firms would try to expand both employment and output. The money wage will not, however, remain at W_1. At a price level of $2P_1$ the labor supply curve in Figure 3.5b will have shifted to N^s

($2P_1$), and at a money wage of W_1, labor supply will be only N_2' units. There will be an excess demand for labor equal to (N_2 - N_2') units and the money wage will rise.



The vertical classical aggregate supply curve reflects the fact that higher values of the price level require proportionately higher levels of the money wage for labor market equilibrium. The real wage, employment, and therefore level of output are the same at P_1, $2P_1$ and $3P_1$. The vertical aggregate supply curve implies that output is supply-determined in the classical system.

Figure 3.6: Classical Aggregate Supply Curve

3.4 Let Us Sum Up

In the classical framework, equilibrium output and employment levels are determined by supply-side variables such as technology, capital accumulation, labor supply, and preferences for leisure. These endogenous variables are unaffected by demand-side factors like money supply or price level changes. The classical aggregate supply curve, derived from these principles, is vertical, emphasizing that output is dictated solely by production capabilities and not by aggregate demand.

3.5 Key words

- **Aggregate Production Function**: Relationship showing output generated from labor and capital.
- **Labor Demand Curve**: Depicts how much labor firms demand at each real wage level.
- **Labor Supply Curve**: Shows labor supplied by workers at different real wages.
- **Real Wage**: Wage adjusted for inflation, representing purchasing power.
- **Exogenous Variables**: Influences outside the model affecting supply conditions.
- **Endogenous Variables**: Variables determined within the economic model.

3.6 Suggested Readings

- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics.*
- Mankiw, N. G. *Principles of Macroeconomics.*
- Samuelson, P. A., & Nordhaus, W. D. *Economics.*
- Snowdon, B., & Vane, H. R. *Modern Macroeconomics: Its Origins, Development and Current State.*
- Froyen, T. Richard. *Macroeconomics Theories and Policies*

3.7 Hints to Check Your Progress

1. What are the key variables that determine equilibrium output and employment in the classical model?
2. Why do changes in the money supply not affect output in the classical framework?
3. How does technological progress influence the production function and output?

3.8 Examination Oriented Questions

1. Explain how equilibrium output and employment are determined in the classical model.
2. Discuss the key determinants of output and employment in classical theory.
3. Illustrate why changes in aggregate demand do not influence output in the classical model.
4. Construct and explain the classical aggregate supply curve.
5. Differentiate between endogenous and exogenous variables with examples from the classical model.

Lesson 4, The Quantity Theory of Money, The Cambridge Approach to the Quantity Theory, and the Classical Aggregate Demand Curve

STRUCTURE

4.0 Objectives

After studying this lesson, learners will be able to:

- Understand the classical Quantity Theory of Money and its implications.
- Analyze the Cambridge approach to money demand and its relation to price levels.
- Illustrate the classical aggregate demand curve using the quantity theory.
- Evaluate the classical view on the effectiveness of monetary and fiscal policies.

4.1 Learning Outcomes

On successful completion of this lesson, learners will be able to:

- Explain how the quantity of money affects the price level in the classical model.
- Describe the Fisherian and Cambridge versions of the quantity theory.

- Depict the classical aggregate demand curve and analyze its characteristics.
- Discuss the classical policy stance on government interventions.

4.2 Introduction

In this lesson, we delve into the classical macroeconomic model, focusing specifically on the determination of the price level, the demand for money, and interest rate formation. The lesson outlines the classical perspective on how money supply influences aggregate demand and prices through the Quantity Theory of Money. We also explore the Cambridge approach, which presents a more demand-oriented interpretation of the theory. Additionally, the lesson introduces the classical aggregate demand curve and concludes with policy implications concerning fiscal and monetary interventions in the classical framework.

4.3 Classical Macroeconomics: Money, prices, and Interest

In this chapter we complete our discussion of the classical model. We analyze the classical theory of aggregate price level determination, which brings-in the demand side of the model. Determination of the interest rate is also discussed. Next, we consider the policy conclusions that emerge from the classical model—classical views on monetary and fiscal policy.

4.4 THE QUANTITY THEORY OF MONEY

To understand the determination of the price level in the classical system, we analyze the role of money. In the classical theory, the quantity of money determines aggregate demand, which in turn determines the price level.

The Equation of Exchange

The starting point for the classical quantity theory of money is the equation of exchange, an identity relating the volume of transactions at current prices to the supply of money times the turnover rate of each dollar. This *turnover rate* for money, which measures the average number of times each dollar is used in transactions during the period, is called the velocity of money. In the form used by the prominent American quantity theorist, Irving Fisher, this identity is expressed as

$$MV_T = P_T T \qquad (4.1)$$

where M is the quantity of money, V_T the transactions velocity of money, P_T the price index for the items traded, and T the volume of transactions. This relationship is an identity because of the *ex post* definition of velocity. If, for example, over a given period the value of transactions in current dollars ($P_T T$) were \$3,600 billion and the money stock (M) were \$300

billion, we define the transactions velocity (or turnover rate) of money as the number of times the average dollar was used in transactions:

$$\mathrm{Vr} = \frac{\mathrm{PTT}}{\mathrm{M}} = \frac{3600}{300} = 12 \qquad (4.2)$$

The transaction variable (T) includes not only sales and purchases of newly produced goods but also exchanges of previously produced goods and financial assets. Another expression of the equation of exchange focuses only on income transactions:

$$MV = PY \qquad (4.3)$$

M is again the quantity of money, and V is now the income velocity of money, the number of times the average dollar is used in a transaction involving current output. The price index for currently produced output is given by P, and the level of current output by V. Again, this relationship would be an identity as long as income velocity was defined residually, as the level necessary to make the equality hold:

$$\mathrm{V} = \frac{\mathrm{PY}}{\mathrm{M}} \qquad (4.4)$$

In equation (4.3), the variables are easier to measure and more central to our concerns, so we focus on this form of the equation.

The equation of exchange is a truism and does not explain the variables it contains. Fisher and other quantity theorists, however, postulated that the *equilibrium* values of the elements in the equation of exchange, with the exception of the price level, were determined by other forces. Thus, the equation of exchange served to determine the price level. As Fisher put it:

> We find that, under the conditions assumed, the price level varies (1) directly as the quantity of money in circulation (M), (2) directly as the velocity of its circulation (V), (3) inversely as the volume of trade done by it (T). The first of these three relations is worth emphasis. It constitutes the "quantity theory of money."[1]

Output (or transactions) is a measure of real economic activity. As we saw in Chapter 3, classical economists regarded this variable as supply-determined. Most simply, money was assumed to be a metallic money such as gold, but considering paper money and bank deposits does not seriously complicate the analysis. The important assumption was that the quantity of money was exogenously controlled by the monetary policy authority.

Fisher argued that, in equilibrium, the velocity of money was determined by the payment habits and payment technology of society. For example, factors such as the average length of the pay period, the practice of using charge accounts or bank charge cards, and the prevalence of trade credit among businesses all affect the velocity of circulation. Shorter pay periods lead to smaller average money holdings over the pay period for any given income level, hence an increase in velocity. Frequent use of charge accounts by consumers or trade credit by businesses also increases velocity, the number of transactions per unit of money. According to Fisher and other quantity theorists, *the equilibrium level of velocity was determined by such institutional factors and could be regarded as fixed for the short run.*

If velocity is predetermined and not simply defined residually to equate *MV* and PY, the equation of exchange is not merely a definition. With output fixed from the supply side, the equation of exchange now expresses a relationship of proportionally between the exogenously given money supply and the price level:

$$M\overline{V} = P\overline{Y} \qquad (4.5)$$

or

$$P = \frac{\overline{\mathrm{V}}}{\mathrm{Y}}\mathrm{M} \qquad (4.6)$$

The bar over the *V* and *Y* indicates that these terms can be taken as given. Equation (4.6) indicates the dependence of the price level on the supply of money. A doubling of *M* doubles P, or a 10-percent increase in M leads to a 10-percent increase in P. This is the basic result of the quantity theory of money: *The quantity of money determines the price level.*

The Cambridge Approach to the Quantity Theory

The mathematics of the quantity theory may be clear from equations (4.5) and (4.6), but what about the economics? How do changes in the money supply affect the price level? This question can be answered more easily after considering another variant of the quantity theory, the Cambridge approach.

(The Cambridge approach, named after Cambridge University, the academic home of its originators Alfred Marshall and A. C. Pigou, demonstrated a proportional relationship between the quantity of and the aggregate price level) The foundation of this relationship was, however, less mechanistic than the transactions, or Fisherian (after Irving Fisher), version of the quantity theory. Marshall began by focusing on the individual's decision on the optimal amount of money to hold. Some money will be held because of the convenience that money provides

in transactions compared with other stores of value. Money also provides security by lessening the possibility of inconvenience or bankruptcy from failing to meet unexpected obligations. But as Pigou noted, "Currency held in the hand yields no income," so money will be held only insofar as its yield in terms of convenience and security outweighs the income lost from not investing in productive activity or the satisfaction lost by not simply using the money to purchase goods to consume. On these criteria, how much money will it be optimal to hold?

Marshall and the other Cambridge economists assumed that the demand for money would be a proportion of income. The Cambridge equation is written as

$$M^d = kPY \qquad (4.7)$$

Money demand (M^d) is assumed to be a proportion *(k)* of nominal income, the price level (P) times the level of real income (Y). The primary desirable property of money is its usefulness for transactions, so it follows that the demand for money depends on the level of transactions, which may be supposed to vary closely with the level of income. The proportion of income that would be optimal to hold in the form of money *{k)* is assumed to be stable in the short run, depending, as in the Fisherian formulation, on the payment habits of the society.

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

$$M = M^d - kPY \qquad (4.8)$$

With *k* treated as fixed in the short run and real output (Y) determined, as before, by supply conditions, the Cambridge equation also reduces to a proportional relationship between the price level and money supply. As in the Fisherian approach, the quantity of money determines the price level.

The formal equivalence of the Cambridge equation and Fisher's version of the equation of exchange can be seen by rewriting (4.8) as

$$M\frac{1}{k} = P\overline{Y} \text{-l} = P\,Y \qquad (4.9)$$

By comparing this with Fisher's equation (4.5), we can see that the two formulations are equivalent, with *V* equal to 1/k. For example, if individuals wish to hold an amount equal to one-fourth of the nominal income in the form of money, the number of times the average dollar is used in income transactions will be four.

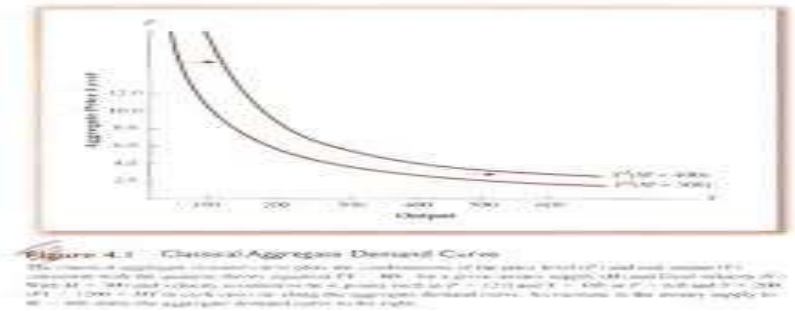
Although the two formulations of the quantity theory are formally equivalent, the Cambridge version represents a step toward more modern monetary theories. The Cambridge focus was

on the quantity theory as a theory of the demand for money. The proportional relationship between the quantity of money and the price level resulted from the fact that the proportion of nominal income people wished to hold in the form of money (A:) was constant and the level of real output was fixed by supply conditions. Following up on Pigou's analysis of the alternatives to holding wealth in the form of money, Keynes attacked the quantity theory by providing a new theory of money demand. Monetarists, as we will see, also take the Cambridge form of the quantity theory as the starting point for their theory of money demand.

In addition, the Cambridge focus on money demand leads to an answer to the question about the way money affects the price level. Let us suppose that we begin at equilibrium and then consider the effects of doubling the quantity of money. Initially, there is an excess of money supply over the amount demanded. Individuals try to reduce their money holdings to the optimal proportion of their income by putting this excess into alternative uses of consumption and investment. They increase their demand for commodities. This increased demand for commodities puts upward pressure on prices. In the language of classical economists, there is too much money chasing too few goods. If output is unchanged, as it would be in the classical model, and *k* is constant, a new equilibrium will be reached only after the price level is doubled. At that point, nominal income, and hence money demand, will have doubled. This was the link in the classical system between money and prices; an excess supply of money led to increased demand for commodities and upward pressure on the price level.

The Classical Aggregate Demand Curve

The quantity theory was thus the *implicit* theory of the aggregate demand for output within the classical system. We can use the quantity theory to construct the classical aggregate demand curve in Figure 4.1. For concreteness, we assign numerical values to the variables with which we are concerned. Let the value of *k* be one-fourth so that velocity is 4. Initially, let the supply of money be 300 units. In order for either equation (4.8) or (4.5) to hold, PxY (nominal income) must be equal to 1,200 (4 x 300). In Figure 4.1, with price on the vertical axis and real output on the horizontal axis, the line labeled Y^d (M = 300) connects all the points where PxY equajs 1,200 units.[2] Points lying on the schedule, for example, are real income levels of 300 and 600 with accompanying price levels of 4.0 and 2.0, respectively.



Now consider a higher value of the money supply of, for example, 400 units. To satisfy either equation (4.8) or (4.5), with *k* still equal to one-fourth *(V* = 4), P x Y must now equal 1,600. The schedule Y^d (M = 400) corresponding to a value of M equal to 400 lies above and to the right of the Y^d (M = 300) chedule and shows all ***P*** x Y combinations of 1,600. ***An increase in the money supply shifts the aggregate demand curve to the right.***

For a given supply of money, we trace out a downward-sloping aggregate demand curve that can be put together with the vertical aggregate supply curve in Figure 3.6 to illustrate the determination of price and output in the classical model. This is done in Figure 4.2.

Figure 4.2 reproduces the vertical aggregate supply curve ***(Y{)*** from Figure 3.6 and shows several aggregate demand curves [$Y^d(M_1)$, $Y^d(M_2)$, $Y^d(M_3)$\ drawn for successively higher values of the money supply (M_1, M_2, M_3). As just explained, increasing the money supply shifts the aggregate demand curve upward to the right. Because the supply curve is vertical, increases in demand do not affect output. Only the price level increases. Also note that for a given value of ***k*** (or ***V), a change in the quantity of money is the only factor that shifts the aggregate demand curve.***

Because the equilibrium value of ***k*** (or ***V)*** was considered to be stable in the short run, aggregate demand varied only with the supply of money.

The classical theory of aggregate demand has been termed an ***implicit*** theory, and it is worthwhile to consider its nature more carefully. The theory is not explicit in the sense that it focuses on the components of aggregate demand and explains the factors that determine their level. Instead, in the classical theory, a given value of ***MV*** [or M OA)] implies the level of ***P*** x Y that is required for equilibrium in the money market—for money demand to equal the existing money supply. If money demand exceeds (falls short of) money supply, there will be a spillover to the commodity market as individuals try to reduce (increase) their expenditures on commodities. Points along the Y^d schedule are points at which firms and households are in equilibrium

Figure 4.2 Aggregate Supply and Demand in the Classical System

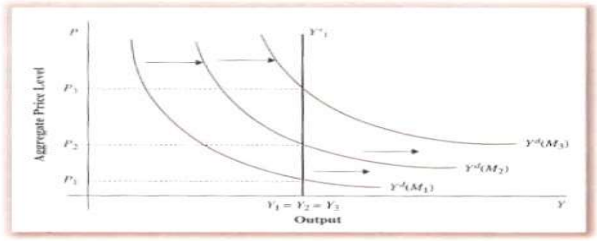


Figure 4.2 Aggregate Supply and Demand in the Classical System

Successive increases in the money supply, from M_1 to M_2 and then to M_3, shift the aggregate demand curve to the right, from $Y^d(M_1)$ to $Y^d(M_2)$ to $Y^d(M_3)$. The price level rises from P_1 to P_2 to P_3. Output, which is supply-determined, is unchanged ($Y_1 = Y_2 = Y_3$).

with regard to their money holdings and, therefore, are also at equilibrium rates of expenditures on commodities.

4.5 Let Us Sum Up

- The classical model posits that the money supply determines the price level through the quantity theory.
- The Cambridge approach introduced a demand-side perspective focusing on money demand as a proportion of income.
- The classical aggregate demand curve is derived from the quantity theory and shifts only with changes in the money supply.
- Historical hyperinflations validate the core classical assertion that excessive money supply leads to uncontrollable price increases.

4.6 Key words

- **Quantity Theory of Money**: A theory stating that money supply determines the price level when velocity and output are stable.
- **Velocity of Money**: The frequency with which money changes hands in the economy.
- **Cambridge Equation**: A formulation where money demand is a fixed proportion of nominal income.
- **Aggregate Demand Curve**: A curve showing the relationship between the overall price level and the quantity of goods and services demanded.
- **Hyperinflation**: Extremely high and typically accelerating inflation, often associated with excessive growth in the money supply.

4.7 Suggested Readings

- Fisher, I. (1911). *The Purchasing Power of Money*. Macmillan.
- Pigou, A.C. (1917). *The Value of Money*.

- Friedman, M. (1956). *Studies in the Quantity Theory of Money*. University of Chicago Press.
- Dornbusch, R., Fischer, S., & Startz, R. (Latest Edition). *Macroeconomics*.
- Froyen, T. Richard. *Macroeconomics Theories and Policies*

4.8 Hints to Check Your Progress

1. Review the distinction between the Fisherian and Cambridge versions of the quantity theory.
2. Practice drawing the classical aggregate demand curve and explain how it shifts.
3. Reflect on the real-world examples of hyperinflation and relate them to the classical theory.
4. Test yourself on the assumptions of the classical model, particularly regarding output and money velocity.

4.9 Examination Oriented Questions

1. Explain the classical Quantity Theory of Money using Fisher's equation of exchange.
2. Critically examine the Cambridge approach to the Quantity Theory of Money.
3. How does the classical model derive the aggregate demand curve? Explain with the help of diagrams.
4. Discuss the relationship between money supply, price level, and output in the classical model.
5. Analyze the phenomenon of hyperinflation in the context of the quantity theory.
6. Compare and contrast the classical and Keynesian views on the effectiveness of monetary policy.

Lesson 5, The classical theory of the interest rate

STRUCTURE

5.0 Objectives

- To understand the classical explanation of interest rate determination.
- To analyze the roles of savings, investment, and government borrowing in influencing interest rates.
- To explore the stabilizing role of interest rates in the classical economic system.
- To examine how shifts in investment expectations impact the interest rate and economic equilibrium.

5.1 Learning Outcomes

Upon completing this lesson, learners will be able to:

- Explain the classical theory of the interest rate.
- Differentiate between the demand and supply of loanable funds.
- Describe the inverse relationship between interest rates and investment.
- Assess the stabilizing function of interest rates within the classical framework.

5.2 Introduction

The classical theory of the interest rate is a foundational component of classical economics. It explains how the interest rate is determined through the interaction of savings (supply of loanable funds) and investment (demand for loanable funds). In this framework, the interest rate serves as a balancing mechanism, ensuring that the amount of funds individuals are willing to lend matches the amount others wish to borrow. This mechanism stabilizes the economy by neutralizing the effects of changes in consumption, investment, or government spending on overall demand.

5.3 Explanation

In the classical system, the components of commodity demand—consumption, investment, and government spending—play their explicit role in determining the interest rate. It is, in fact, the interest rate that guarantees that exogenous changes in the particular components of demand do not affect the aggregate level of commodity demand.

The equilibrium interest rate in the classical theory was the rate at which the amount of funds individuals desired to lend was just equal to the amount others desired to borrow. For simplicity, we assume that borrowing consists of selling a standard bond, a promise to pay certain amounts in the future. Lending consists of buying such bonds. Later, we consider the properties of bonds in more detail, but for now the simplest assumption is that the standard bond is a "perpetuity," a bond that pays a perpetual stream of interest payments with no return of principal. The rate of interest measures the return to holding bonds and, equivalently, the cost of borrowing. The interest rate depends on the factors that determine the levels of bond supply (borrowing) and bond demand (lending).

In the classical system, the suppliers of bonds were the firms, which financed all investment expenditures by the sale of bonds, and the government, which might sell bonds to finance spending in excess of tax revenues.[3]

The level of the government deficit (excess of spending over revenues) as well as the portion of the deficit the government might choose to finance by selling bonds to the public are exogenous policy variables. In the classical model, the level of business investment was a function of the expected profitability of investment projects and the rate of interest. The expected profitability of investment projects was assumed to vary with expectations of product demand over the life of these projects, and the state of these expectations was subject to exogenous shifts.

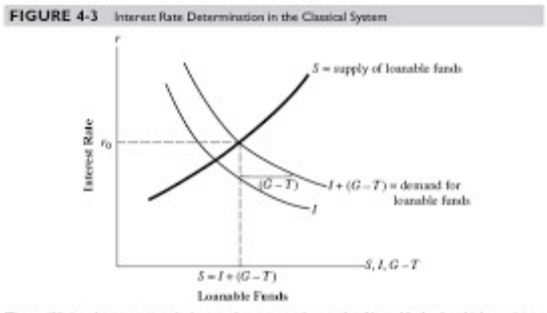
For a given expected profitability, investment expenditures varied inversely with the interest rate. Classical economists explained this relationship as follows. A firm would have a number

of possible investment projects offering various expected returns. It could rank these projects in order of the level of expected profits. The rate of interest represents the cost of borrowing funds to finance these investment projects. At a high interest rate, fewer projects will be profitable, net of interest costs. At successively lower rates of interest (lower borrowing costs), more and more projects will become profitable net of interest costs, and investment will increase. We look at investment in more detail later but obtain the same general result. Investment depends inversely on the rate of interest. Thus, on the supply (borrowing) side of the bond market, government bond supply is exogenous, and the business supply of bonds equals the level of investment expenditure. Investment varies inversely with the interest rate and is also influenced by exogenous shifts in the expected profitability of investment projects.

On the demand (lending) side of the bond market are the individual savers who purchase the bonds. In the classical model, saving was taken to be a positive function of the rate of interest. The act of saving is the act of forgoing current consumption to have a command over goods in a future period, a trade-off of current consumption for future consumption. As the interest rate increases, the terms of the trade-off become more favorable. A dollar saved today will earn a higher interest return for the saver, a greater command over consumption goods in future periods. Classical economists assumed that individuals would take advantage of this more favorable trade-off; they would save more at higher rates of interest.

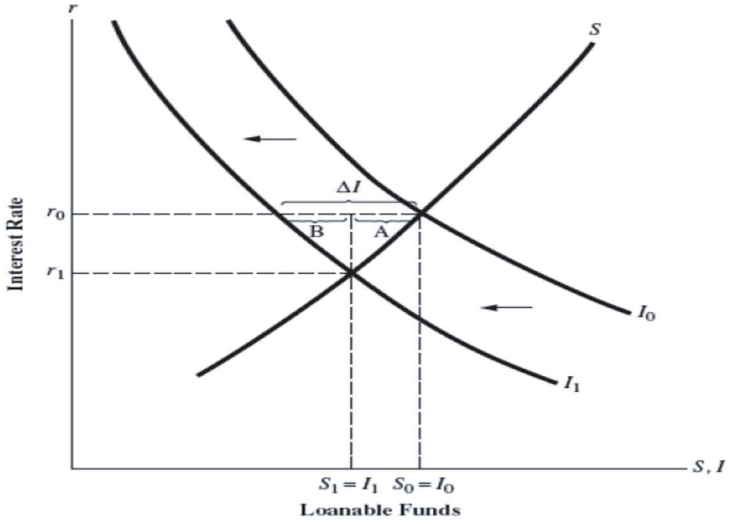
But saving need not go into bonds; money is also a potential store of wealth. Because money paid no interest, classical economists assumed that bonds would be preferred as a store of wealth. As discussed previously/ some money would be held for the convenience and security it offered. However, wealth accumulated through new saving would be held in bonds. Classical economists believed that people might shift their wealth into the form of money in times of severe general economic distress. At such times, with bank panics and bankruptcies prevalent, people might worry about bond default and "hoard" money, but for normal times the classical assumption was that saving was a demand for bonds.

Determination of the interest rate is illustrated in Figure 4.3. Saving (S) is plotted as an upward-sloping function of the rate of interest. Saving provides the demand for bonds, or as the classical economists called it, the *supply of loanable funds.* Investment (D is a negatively sloped schedule plotted against the interest rate. Investment plus the exogenously determined government deficit (G - T), all of which we assume to be financed by selling bonds, equals bond supply. In classical terminology, this is the *demand for loanable funds.* In the diagram, r_0 is the equilibrium interest rate, the rate of interest that equates the demand and supply for loanable funds.



The interest rate plays a stabilizing role in the classical system, as can be seen by examining the effects of a change in the expected profitability of investment. Recall that in the short run, investment depends on the interest rate and the expected future profitability of investment projects. Let us suppose that as a result of an exogenous event (e.g., fear of a future war), business managers in general lower their expectation about future profits from investment. The effect would be reduced investment and, hence, a reduced demand for loanable funds *at each interest rate.*

Figure 4.4 illustrates the effect of this autonomous decline in investment demand. For simplicity, we assume that the government budget is balanced (G = T), so there is no government borrowing. Investment is the only source of the demand for loanable funds. The fall in expected profitability of investment projects is shown as a shift in the investment schedule downward from I_0 to I_1 At a given rate of interest, the amount of the decline in investment is measured by ΔI in Figure 4.4.



At the initial equilibrium interest rate of r_0, after the fall in investment, the supply of loanable funds exceeds demand, putting downward pressure on the rate of interest. As the rate of interest

declines, two adjustments occur. First, saving declines; thus, consumption (C) increases. The amount of this decline in saving and the equal increase in current consumption demand is given by the distance marked A in Figure 4.4.[4] Second, investment is somewhat revived by the decline in the interest rate. This interest-rate-induced increase in investment is measured by the distance B in Figure 4.4. Equilibrium is restored at interest rate with saving (the supply of loanable funds) again equal to investment (the demand for loanable funds). At the new equilibrium, the increase in consumption (fall in saving) plus the increase in investment caused by the drop in the interest rate, the distance A + B in Figure 4.4, is just equal to the original autonomous decline in investment demand, the distance ΔI in Figure 4.4. Because of the adjustment of the interest rate, the sum of private-sector demands (C + l) is unaffected by the autonomous decline in investment demand.

This stabilizing role of the interest rate is important to the classical system. The interest-rate adjustment is the first line of defense for full employment. Shocks that affect consumption demand, investment demand, or government demand will *not* affect the demand for output as a whole. These shocks will not shift the aggregate demand curve in Figure 4.2. Even if they did, there would be no effect on output or employment because of the self-adjusting properties of the classical labor market as reflected in the vertical aggregate supply curve—the second line of defense for full employment.

5.4 Let Us Sum Up

The classical theory views the interest rate as the mechanism that equilibrates savings and investment. By adjusting in response to shifts in investment expectations or saving behavior, the interest rate ensures that the economy remains in equilibrium, stabilizing aggregate demand. Thus, the interest rate serves as an automatic stabilizer, maintaining full employment and preventing demand shocks from impacting output levels.

5.5 Key words

- **Interest Rate:** The price of borrowing funds, expressed as a percentage.
- **Loanable Funds:** Funds available for lending, typically sourced from savings.
- **Perpetuity:** A bond that pays a perpetual stream of interest without principal repayment.
- **Exogenous Variable:** A factor determined outside the economic model.
- **Autonomous Change:** A change that occurs independently of the current state of the economy.

5.6 Suggested Readings

- Dornbusch, R., Fischer, S., & Startz, R. (2014). *Macroeconomics*. McGraw-Hill Education.
- Blanchard, O., & Johnson, D. R. (2013). *Macroeconomics*. Pearson.
- Samuelson, P. A., & Nordhaus, W. D. (2010). *Economics*. McGraw-Hill.
- Froyen, T. Richard. *Macroeconomics Theories and Policies*

5.7 Hints to Check Your Progress

- What are the key determinants of the interest rate in the classical theory?
- How does the classical model explain the inverse relationship between investment and the interest rate?
- What happens to savings and consumption when the interest rate declines in the classical model?
- How does the classical interest rate act as a stabilizer in the economy?

5.8 Examination-Oriented Questions

1. Explain the classical theory of the interest rate with the help of the loanable funds framework.
2. How does the interest rate equilibrate savings and investment in the classical model?
3. Discuss the stabilizing role of the interest rate in the classical economic system.
4. Illustrate with a diagram how a fall in the expected profitability of investment affects the interest rate and savings.
5. Describe the assumptions behind the classical theory of interest rate determination

Lesson 6, Policy Implications of the Classical Equilibrium Model

M.A. Eco. Sem 1I Policy implications of the classical equilibrium model Unit–I

ECO- 202 Lesson -6

STRUCTURE

6.0 Objectives

- To explain the classical perspective on fiscal and monetary policy impacts.
- To analyze how government spending, taxation, and money supply influence aggregate demand, output, and employment.
- To discuss the role of interest rate adjustments and crowding-out effects.
- To understand supply-side impacts of taxation changes.

6.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Describe the classical model's assumptions regarding policy effectiveness.
- Explain the crowding-out mechanism in fiscal policy.
- Analyze the effects of tax policy from demand and supply sides.
- Evaluate the role of monetary policy in determining price levels, not real variables.

6.2 Introduction

In classical economic theory, the economy is viewed as inherently self-correcting, with mechanisms that ensure full employment and price stability. The classical equilibrium model suggests that output and employment are determined by real factors, independent of fiscal or monetary policies. This lesson examines how fiscal and monetary interventions are perceived within the classical framework, particularly focusing on their implications for output, employment, price level, and interest rates.

6.3 Explanation

In this section we analyze the effects of fiscal and monetary policy actions within the classical model. We consider the effects that various policy shifts will have on output, employment, the price level, and the interest rate.

Fiscal Policy

Fiscal policy is the setting of the federal budget and thus comprises decisions on government spending and taxation. In considering the classical view of fiscal policy, it is convenient to begin with government spending.

Government Spending

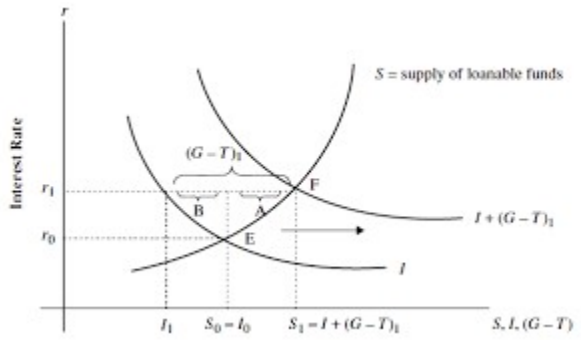
Consider the effects of an increase in government spending. The question of how the increased spending is financed arises first. Like a business or household, the government has a budget constraint, the condition that all expenditures must be financed from some source. The government has three sources of funds: taxation, selling bonds to the public (borrowing funds from the public), or creating new money. The creation of new money can take several forms, but in our discussion of the classical system, it will do no harm to assume that the government simply prints new currency to finance its spending.

To increase spending, then, the government must increase taxation, sell additional bonds to the public, or increase the money supply. For now, to avoid bringing in a monetary policy change, we assume that the money supply is fixed. We also assume that tax collections are fixed. The increased government expenditures are therefore assumed to be financed by selling bonds to the public.

It follows from our analysis to this point that a bond-financed increase in government spending will *not* affect the equilibrium values of output or the price level. This must be the case, because we constructed both the aggregate demand and aggregate supply curves, which together

determine output and the price level, without reference to the level of government spending. Output is not affected by changes in government spending, so employment must also be unaffected. To understand these results, we examine how a change in government spending affects the interest rate.

Figure 4.5 shows the effect in the loanable funds market of an increase in government spending financed by a sale of bonds to the public. If government spending is greater than tax revenue, then (G - D is positive, where G is total government spending, *T* is tax revenue, and (G - T) is the government deficit. We assume that before the increase in government spending the government budget was in balance—that is, (G = T) The government deficit is then equal to the increase in



government spending, (G - $T)_1$,. Initially, with no government deficit, the loanable funds market is in equilibrium at point E. Assuming there is no government borrowing, the equilibrium interest rate, r_0, equates the supply of loanable funds with the demand for loanable funds. Initially investment, I, is the only source of demand for loanable funds. If the increase in government spending is financed by selling bonds, then total demand for loanable funds includes both investment, J, and government borrowing, (G - $T)_1$ The increase in demand for loanable funds is shown as a right-ward shift in demand, from I to I + (G - $T)_1$ moving from equilibrium point E to equilibrium point F. Note that the distance of the horizontal shift in the curve measures the amount of the increase in government deficit spending. This amount is measured by the distance (G — $T)_1$ in Figure 4.5.

The increase in government spending creates an increased demand for loanable funds as the government sells bonds to the public to finance the new spending. This creates an excess of borrowers over lenders at the initial interest rate r_0, and the interest rate is pushed up to r_1 The increase in the interest rate has two effects. Saving increases from S_0 to *S,* this is the distance A in Figure 4.5. As was explained in the preceding section, an increase in saving is mirrored by an equal decline in consumption. Second, the quantity of investment declines with the higher interest rate. At r_1, we can read the new level of investment as I_1 along the I schedule. The investment decline is the distance B in Figure 4.5.

The figure shows that the amount of the decline in consumption, which equals the amount of increased saving (distance A) plus the decline in investment (distance B), just equals the amount of the increase in government spending $(G - T)_1$ The increase in government spending financed by selling bonds to the public pushes the interest rate up by enough to "crowd out" an equal amount of private expenditure (consumption plus investment). Private expenditures are discouraged because the higher interest rate causes households to substitute future consumption for current consumption—in other words, to save more. Investment declines because fewer projects appear profitable with higher borrowing costs. It is this crowding out that keeps aggregate demand from increasing when the government component of demand rises. Because aggregate demand is not changed, increases in government expenditures financed by bonds do not affect the price level.

What are the effects of an increase in government spending if, alternatively, the government prints money to finance the new spending? Here, because the quantity of money is changed, the price level will change proportionately. We have previously analyzed the way an increase in the money supply shifts the aggregate demand curve up along the vertical aggregate supply curve, raising the price level (see Figure 4.2). In the classical system, the source of the increase in the money supply does not matter. A given change in the money supply has the same effect whether it enters the economy to finance an increase in government spending or in another manner. Put differently, and this is the crucial point, *the increase in government spending has no independent effect on aggregate demand.*

Tax Policy

Demand-Side Effects. As long as we consider only the effects on demand, analysis of a change in taxes produces results that are analogous to those for government spending. For example, by increasing the disposable income of households, a tax cut would stimulate consumption. If, however, the government sold bonds to the public to replace the revenues lost by the tax cut, the same crowding-out process would follow, as in the case of a bond-financed increase in government spending. The equilibrium interest rate would rise, investment would fall, and there would also be an interest-rate-induced rise in saving, meaning that consumption would fall back toward the pre-tax-cut level. In the case of a tax cut, as with an increase in spending, aggregate demand would not be affected.

If revenues lost because of the tax cut were replaced by printing new money, then, as with an increase in government spending, the money creation *would* increase aggregate demand, and the tax cut would cause the price level to rise. Again, though, it would simply be the increase

in the money supply that affected the price level. The tax cut would have no *independent* effect on aggregate demand.

Supply-Side Effects. If the tax cut were a lump-sum cut, meaning, for example, that every household received a tax cut of SI 00, then the demand-side effects would be all that we would need to consider.[5] But suppose the tax cut was in the form of reduced income tax rates. Suppose the marginal income tax rate were cut from an initial rate of 40 percent to a new rate of 20 percent. Instead of 40 cents of every additional dollar being taken as a tax payment, only 20 rents would be taken. In the classical model, such a change would have an incentive effect on labor supply. The change would affect the supply side of the model and would affect output and employment.

Figure 4.6 illustrates the effect of a cut in the marginal income tax rate within the classical model. Part *a* shows the effects in the labor market. A cut in the tax rate would increase labor supply at any value of the (pretax) real wage and shift the labor supply schedule out to the right. This shift follows because the worker is concerned about the *after-tax* real wage, which in this case is $(1 - t^y)$ *W/P,* where is the marginal income tax rate. If we had included an income tax in our classical model in Chapter 3, the labor supply function would have been

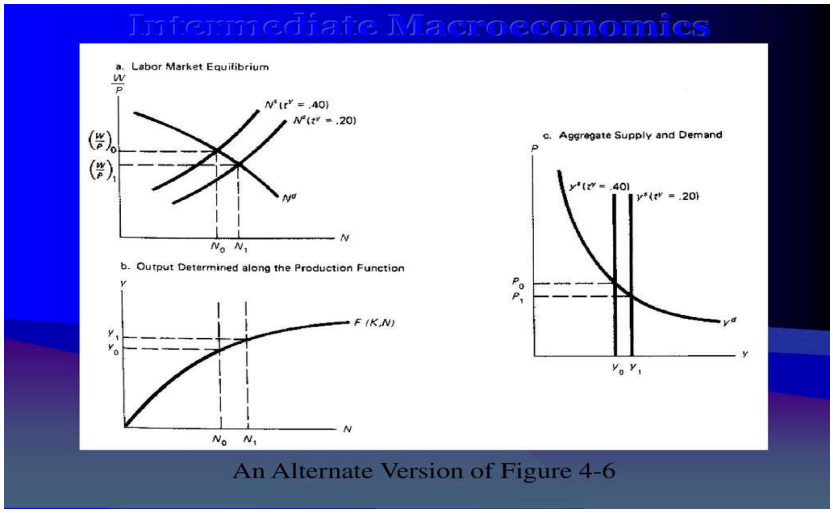
$$N^s = g\left[(1 - t^y)\frac{W}{P}\right]$$

For a given pretax real wage (W/P), a cut in the income tax represents an increase in the after-tax real wage and therefore increases labor supply.

In Figure 4.6n, as the marginal income tax rate falls from 0.40 to 0.20, the labor supply schedule shifts from N^s ($t^y = 0.40$) to N^s ($t^y = 0.20$). Equilibrium employment increases from N_0 to N_1 Part *b* of Figure 4.6 shows the aggregate production function. The increase in employment from N_0 to N_1 as a result of the increase in labor supply leads to an increase in output from Y_0 to Y_1.

In part *c* of the figure, this increase in the supply-determined level of output (from Y_0 to Y_1) is shown as a shift to the right in the aggregate supply curve from Y^s ($t^y = 0.40$) to Y^s ($t^y = 0.20$). Because the level of aggregate demand is unchanged (determined by the level of the money supply), this increase in aggregate supply results in a fall in the price level.[6]

In summary, changes in government spending or taxes have no independent effects on aggregate demand because of the interest-rate adjustment and resulting crowding-out effects on components of private-sector demand. Changes in marginal /Income tax rates have additional supply-side effects. A reduction in the marginal income tax rate, for example, stimulates labor supply and leads to an increase in employment and output.



Monetary Policy

In the classical system, the quantity of money determines the price level and, for a given real income, the level of *nominal* income. In this sense, monetary policy was quite important to classical economists. Stable money was a requirement for stable prices.

In another sense, money was not important. The quantity of money did not affect the equilibrium values of the real variables in the system: output, employment, and the interest rate. The supply-determined nature of output and employment was the subject of Chapter 3. The theory of the equilibrium interest rate we have constructed here is a real theory that did not mention the quantity of money. Factors determining the interest rate were real investment demand, real saving, and the real value of the government deficit—what the classical economists called the forces of "productivity and thrift."

To classical economists, money was a "veil" that determined the nominal values in which we measure such variables as the level of economic activity, but had no effect on real quantities.

CONCLUSION

Classical economists stressed the *self-adjusting tendencies of the economy.* Free from destabilizing government actions, the private sector would be stable, and full employment would be achieved. The first of these self-stabilizing mechanisms is the interest rate, which adjusts to keep shocks to sectoral demands from affecting aggregate demand. The second set of stabilizers consists of freely flexible prices and money wages, which keep changes in aggregate demand from affecting output. Flexibility of prices and wages is crucial to the full-employment properties of the classical system. The inherent stability of the private sector led classical economists to *noninterventionist* policy conclusions. To be sure, many of the

interventionist mercantilist policies that classical economists opposed (tariffs, trading monopolies, etc.) were a far cry from the macroeconomic stabilization policies of today, but the model itself argues for nonintervention in a very general sense.

6.4 Let Us Sum Up

In the classical equilibrium framework:

- Fiscal policy, whether through spending or taxation, does not influence real output or employment due to crowding-out effects.
- Tax rate reductions can have positive supply-side effects, stimulating labor supply and increasing output.
- Monetary policy affects only the price level, with no impact on real economic indicators.

  Classical economists advocate for minimal government intervention, emphasizing self-correcting market mechanisms through flexible prices, wages, and interest rates.

6.5 Key words

- **Crowding Out**: Reduction in private spending due to increased government borrowing.
- **Loanable Funds Market**: A theoretical market where savers supply funds for borrowers.
- **Marginal Income Tax Rate**: The rate at which the last dollar of income is taxed.
- **Self-Correcting Mechanisms**: Automatic adjustments in the economy that restore equilibrium.

6.6 Suggested Readings

- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
- Blanchard, O. *Macroeconomics*.
- Samuelson, P.A., & Nordhaus, W.D. *Economics*.
- Mankiw, N.G. *Principles of Macroeconomics*.
- Froyen, T. Richard. *Macroeconomics Theories and Policies*

6.7 Hints to Check Your Progress

- Reflect on how the interest rate acts as a stabilizer in the classical model.
- Compare demand-side and supply-side effects of tax policy changes.

- Think about why monetary policy impacts only nominal variables in the classical model.

6.8 Examination Oriented Questions

1. Discuss the classical view on the effectiveness of fiscal policy.
2. Explain the concept of crowding out with the help of the loanable funds market.
3. Analyze the supply-side effects of a reduction in marginal income tax rates.
4. Describe the role of monetary policy in the classical model.
5. Why do classical economists argue for non-interventionist economic policies?

Unit-11

The Keynesian Macroeconomics System

STRUCTURE

7.0 Objectives

After studying this lesson, learners will be able to:

- Understand the historical context leading to the rise of Keynesian economics.
- Explain Keynes's critique of classical economic theory regarding unemployment.
- Analyze Keynes's theory of aggregate demand and its role in resolving unemployment.
- Identify the policy measures recommended by Keynes to combat economic depressions.

7.1 Learning Outcomes

Upon completing this lesson, students will be able to:

- Describe the causes of unemployment during the Great Depression.
- Compare classical and Keynesian approaches to unemployment and economic policy.

- Evaluate the significance of government spending and fiscal policy as tools for managing demand.
- Apply Keynesian concepts to contemporary issues of unemployment and economic downturns.

7.2 Introduction

The Keynesian economic theory emerged during the severe global depression of the 1930s, a period marked by soaring unemployment rates and plummeting economic activity, especially in industrialized nations like the United States and Great Britain. British economist John Maynard Keynes proposed a revolutionary approach to understanding and addressing unemployment, challenging the classical economic doctrines that failed to offer viable solutions to the crisis. Keynes argued that unemployment was primarily due to insufficient aggregate demand, and he advocated for active government intervention through fiscal and monetary policies to boost demand and stimulate economic recovery.

7.3 Explanation of the Keynesian System and Unemployment Problem

Keynesian economics developed against the background of the world depression of the 1930s. The effect of the Depression on the U.S. economy can be seen in Figure 6.1, which shows the annual unemployment rates for the years 1929-41. The unemployment rate rose from 3.2 percent of the labor force in 1929 to 25.2 percent in 1933, the low point for economic activity during the Depression. Unemployment remained at over 10 percent throughout the decade. Real gross national product (GNP) fell by 30 percent between 1929 and 1933, and did not reach the 1929 level again until 1939.

The British economist John Maynard Keynes, whose book The General Theory of Employment, Interest and Money is the foundation of the Keynesian system, was more heavily influenced by events in his own country than those in the United States. In Great Britain, high unemployment began in the early 1920s and persisted into and throughout the 1930s. The high unemployment in Great Britain led to a debate among economists and policymakers over the causes and the proper policy response to increased unemployment. Keynes was a prominent participant in this debate, during the course of which he developed his revolutionary theory of macroeconomics.

According to Keynes's theory, high unemployment in Great Britain and the United States (as well as in other industrialized countries) was the result of a deficiency in aggregate demand. Aggregate demand was too low because of inadequate investment demand. Keynes's theory provided the basis for economic policies to combat unemployment by stimulating

aggregate demand. At the time of the Depression, Keynes favored fiscal policy measures, primarily government spending on public works projects, to stimulate demand. More generally, the Keynesian theory advocates using monetary and fiscal policies to regulate aggregate demand. To understand the revolutionary nature of this theory, consider the state of macro-economic thinking about unemployment as an economic policy question at the time Keynes's thought was developing.

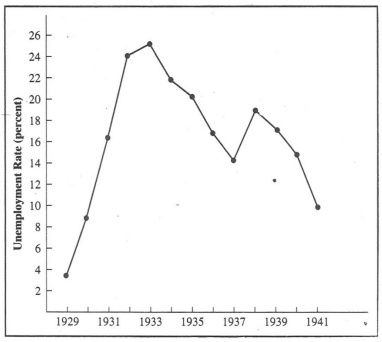


Figure 6.1: U.S Unemployment Rate, 1929-41

Classical economists recognized the human cost of unemployment, as stated, for example, by Alfred Marshall:

> Forced interruption to labour is a grievous evil. Those, whose livelihood is secure, gain physical and mental health from happy and well-spent holidays. But want of work, with long continued anxiety, consumes a man's best strength without any return. His wife becomes thin; and his children get, as it were, a nasty notch in their lives, which is perhaps never outgrown.

But Marshall had little to say about the causes of unemployment. He-noted that unemployment existed in early times and argued that knowledge was the cure, in that it would increase the skills of labor and also keep laborers and firms from making poor economic decisions that would result in business failures and unemployment. When Marshall suggested ways to diminish fluctuations in employment, the following was the first given:

> Those causes of discontinuity which lie within our scope, and are remediable, are chiefly connected in some way or other with the want of knowledge; but there is one which is willful: it is fashion. Until a little while ago only the rich could change their clothing at the capricious order of their dressmakers: but now all classes do it. The histories of the alpaca trade, the lace trade, the straw hat trade, the ribbon trade, and a multitude of others, tell of bursts of feverish activity alternating with deadening idleness.

To the modern reader, this analysis must appear quaint; it was hardly a basis for meaningful solutions to the unemployment problem of Britain in the 1920s. Marshall and the other economists relying on the classical theory had little else to offer.

Much of the debate over economic policy in Great Britain at that time focused on the desirability of government spending on public works as a cure for unemployment, what we would now term an expansionary fiscal policy action. Keynes and others argued that such actions would increase output and employment. Such expenditures would act both directly and indirectly because they would increase the income and hence consumer expenditure of those employed by the public works projects, thus generating secondary employment.

Those arguing against Keynes's view drew primarily on the classical analysis we have presented in Chapters 3 and 4. Increases in government expenditure, unless financed by money creation and thus changes in monetary policy, would not affect either employment or the price level. If public works projects were financed by creating money, the price level but not the levels of output or unemployment would be affected. This classical theory was the basis for the official position of the Conservative Party in Great Britain, which was in power for most of the 1920s and early 1930s. As Winston Churchill explained, "It is the orthodox Treasury dogma, steadfastly held, that whatever might be the political or social advantages, very little employment can, in fact, as a general rule, be created by state borrowing and state expenditure."

In the United States, classical policy prescriptions were also influential. Far from trying to raise demand and stimulate output and employment during the height of the Depression in 1932, the administration of Herbert Hoover engineered a large tax increase. Hoover's reason for increasing tax rates was to balance the federal budget in the wake of falling tax revenues as income declined. Because, in the classical system, fiscal policy had no effect on income, prudent budget management had come to mean simply balancing spending with tax revenues. When Franklin Roosevelt ran against Hoover for the presidency in 1932, he attacked Hoover for failing to balance the budget and argued for cuts in government spending. Bernard Baruch, an advisor to several presidents, expressed the conventional policy prescription as follows:

> Balance budgets, stop spending money we haven't got. Sacrifice for frugality and revenue. Cut government spending—cut it as rations are cut in a siege. Tax—tax everybody for everything.

Would not the increase in taxes or cut in government spending lower aggregate demand, output, and employment? Not in the classical system, because output and employment were supply-determined. In any case, in the classical model, fiscal policy did not affect aggregate demand.

As we will see, such a tax increase or spending cut is just the opposite of the "correct" policy action indicated by the Keynesian model.

In sum, the situation in the early 1930s was one of massive unemployment that was not well explained by the classical system and for which classical economics provided no remedy. Many economists and political figures argued in favor of various policy actions, including public works projects, to try to increase aggregate demand. Such policies would not work in the classical system, where output and employment were not demand-determined. As Keynes pointed out: "The strength of the self-adjusting school depends on its having behind it almost the whole body of organized economic thinking and doctrine of the last hundred years."6 Keynes ranged himself among the "heretics" to the classical View of the self-adjusting properties of the economy. Of the heretics, he wrote: "They are deeply dissatisfied. They believe that common observation is enough to show that facts do not conform to the orthodox reasoning. They propose remedies prompted by instinct, by flair, by practical good sense, by experience of the world—half right, most of them, half wrong." Keynes felt that the heretics would never prevail until the flaw in the orthodox classical theory had been found. He believed that flaw to be the lack of an explicit theory of the aggregate demand for output and, hence, of the role of aggregate demand in determining output and employment. We discuss next the theory provided by Keynes and his followers to fill this gap.

7.4 Let Us Sum Up

In this lesson, we explored the emergence of Keynesian economics as a response to the failures of classical theory during the Great Depression. Keynes's key insight was that unemployment was primarily due to deficient aggregate demand. He proposed that governments could and should intervene through fiscal and monetary policies to stimulate demand and reduce unemployment. This approach fundamentally changed macroeconomic policy-making in the 20th century.

7.5 Key words

- **Aggregate Demand:** Total demand for goods and services in the economy.
- **Fiscal Policy:** Government use of taxation and spending to influence the economy.
- **Classical Economics:** Economic theory emphasizing market self-regulation and supply-side factors.
- **Depression:** A prolonged, severe downturn in economic activity.
- **Public Works:** Government-funded infrastructure projects aimed at creating employment.

7.6 Suggested Readings

- Keynes, J.M. (1936). *The General Theory of Employment, Interest, and Money*.
- Skidelsky, R. (2009). *Keynes: The Return of the Master*.
- Blanchard, O. (2021). *Macroeconomics*.
- Mankiw, N.G. (2020). *Principles of Macroeconomics*.
- Froyen, Richard T. (2013). *Macroeconomics Theories and Policies*

7.7. Hints to Check Your Progress

1. Why did Keynes believe that classical economics failed to address the problem of unemployment during the Depression?
2. How does Keynes's theory of aggregate demand explain unemployment?
3. What policies did Keynes advocate to stimulate aggregate demand?
4. Compare the classical and Keynesian views on the role of government in economic crises.

7.8 Examination Oriented Questions

1. Discuss the historical context of the Great Depression and its influence on the development of Keynesian economics.
2. Explain Keynes's criticism of classical economics in dealing with unemployment.
3. Analyze the significance of aggregate demand in Keynes's theory of employment determination.
4. Describe the policy recommendations of Keynes for overcoming economic depressions.
5. Distinguish between the classical and Keynesian approaches to unemployment and economic stabilization.

Lesson 8

The Simple Keynesian Model: Conditions for Equilibrium Output

STRUCTURE

8.0 Objectives

- To understand the basic conditions for equilibrium output in the simple Keynesian model.
- To explain the concepts of aggregate demand and its components.
- To analyze the role of leakages and injections in the circular flow of income.
- To explore how desired and realized investments affect equilibrium.
- To interpret equilibrium conditions using different approaches.

8.1 Learning Outcomes

By the end of this lesson, learners will be able to:

- Define the simple Keynesian model of income determination.
- Describe the components of aggregate demand.
- Explain the three equivalent conditions for equilibrium output.
- Understand the role of unintended inventory accumulation or depletion.

- Analyze how imbalances in aggregate demand and output lead to economic adjustments.

8.2 Introduction

In the Keynesian framework, equilibrium output is a situation where the total production of goods and services in an economy equals the total planned or desired spending. This lesson explains the conditions required for the economy to reach this equilibrium. The simple Keynesian model assumes a closed economy and focuses on the relationship between aggregate output, consumption, investment, and government spending. Understanding these relationships is crucial for analyzing how the economy adjusts to changes in demand and output.

8.4 Explanation

A central notion in the Keynesian model is that an equilibrium level of output requiresthat output be equal to aggregate demand. In our model, this condition for equilibrium can be expressed as

$$Y = E \tag{6.1}$$

where Y is equal to total output (GDP) and £ equals aggregate demand or desired expenditures on output. Aggregate demand (E) consists of three components: house-hold consumption (C), desired business investment demand (J), and the government sector's demand for goods and services (G). Thus, in equilibrium we have

$$Y = E = C + I + G \tag{6.2}$$

The simple form of (6.2) and of the identities discussed later results from neglecting some complexities in the definitions of GDP and national income. These simplifications, discussed in Chapter 2, are noted here briefly again. Exports and imports do not appear in equation (6.2). For now, we are dealing with a "closed" economy, neglecting foreign trade. The roles of imports and exports in the simple Keynesian model will be considered in section 6.7. Notice that for a closed economy we need not distinguish between gross domestic product and gross national product, the other output measure defined in Chapter 2. Depreciation is also neglected, so we do not need to distinguish between GDP and net national product. We also assume that GDP and national income are equivalent. This means we do not include items in the model that cause a discrepancy between the two totals (primarily indirect business taxes). A final assumption relates to the units in which each of the variables is measured. For this chapter, we

assume that the aggregate price level is fixed. All variables are real variables, and all changes are changes in real terms.

With national product V also measuring national income, we can write

$$Y = C + S + T \tag{6.3}$$

Equation (6.3) is an accounting definition, or identity, stating that national income, all of which is assumed to be paid to households in return for factor services (wages, interest, rents, dividends), is either consumed (C), paid out in taxes (D, or saved (S). In addition, from the fact that Y is national product, we can write

$$Y = C + I_r + G \tag{6.4}$$

Equation (6.4) defines national product as equal to consumption plus realized investment (I_r) plus government spending.

Using the definitions given in equations (6.3) and (6.4), we can rewrite the condition for equilibrium income given in equation (6.2) in two alternative ways, which will help us understand the nature of equilibrium in the model. By (6.2), Y must equal (C + I + G) in equilibrium, and from (6.3), Y is defined as (C + S + T); in equilibrium therefore,

$$C + S + T = V = C + I + G$$

or, equivalently,

$$S + T = I + G \tag{6.5}$$

In similar fashion, from equations (6.2) and (6.4) we can see that in equilibrium

$$C + I_r + G = Y = C + I + G$$

or, by cancelling terms,

$$I_r = I \tag{6.6}$$

There are then three equivalent ways to state the condition for equilibrium in the model:

$$Y = E = C + I + G \tag{6.2}$$

$$S + T = I + G \tag{6.5}$$

$$I_r = I \tag{6.6}$$

To help interpret these conditions, we turn to the flowchart in Figure 6.2. Each magnitude in the chart (each of the variables in our model) is a flow variable. The magnitudes are measured in dollars per period. In the national income accounts, they are measured as billions of dollars per quarter or year. The flow marked with the uppermost arrow in the diagram is the flow of national income from the business sector to the household sector. This flow consists of payments for factor services. Such payments sum to national income, which is equal to national product. There is a corresponding flow from the household sector to the business sector, consisting of the factor services supplied by the household sector. This flow and similar flows are not shown in the diagram because they are not money flows.

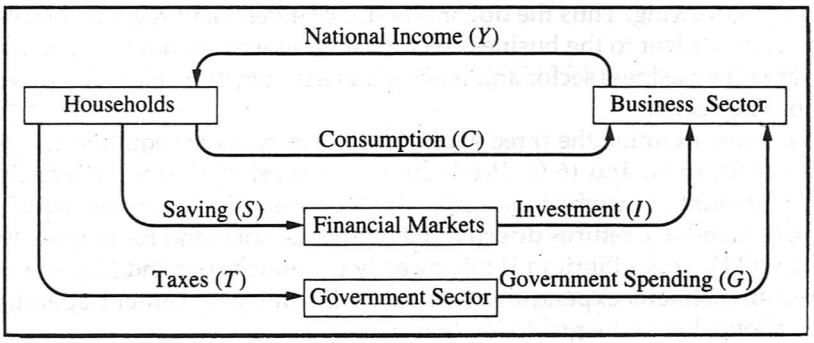


Figure 6.2: Circular Flow of Income and Output

National income is distributed by households into three flows. One is a flow of consumption expenditures that goes back to the business sector as a demand for the output. Thus the inner loop of our diagram depicts a process whereby firms produce output (Y), which generates an equal amount of income to the household sector, which in turn generates a demand for the output produced (C).

Not all national income returns directly to the firms as a demand for output. There are two flows out of the household sector in addition to consumption expenditure— the saving flow and the flow of tax payments. If we regard the inner loop of our diagram, linking the households (as suppliers of factor services and demanders of output) and the business sector (as suppliers of output and demanders of factor services) as the central income- and output-generating mechanism, the saving and tax flows are leakages from this central loop.

The saving leakage flows into financial markets, which means that the part of income that is saved is held in the form of some financial asset (currency, bank deposits, bonds, equities, etc.). The tax flow is paid to the government sector. The tax flow in the diagram is net taxes—that is, gross tax payments minus transfer payments from the government to the

household sector (Social Security benefits, welfare payments, unemployment compensation, etc.). Consequently, in later discussions, a tax increase or a tax cut can be interpreted equivalently as a change in the opposite direction in the level of transfer payments.

Although each dollar of output and, hence, national income does not directly generate one dollar of demand for output on the part of the household sector, this does not mean that total demand must fall short of output. There are additional demands for output on the part of the business sector itself for investment and from the government sector. In terms of the circular flow, these are injections into the central loop of our diagram. The investment injection is shown as a flow from financial markets to the business sector. The purchasers of the investment goods are actually the firms in the business sector themselves. These purchases must, however, be financed by borrowing. Thus the dollar amount of investment represents an equivalent flow of funds lent to the business sector. Government spending is a demand for the output of the business sector and is shown as a money flow from the government to the business sector.

We can now examine the three equivalent expressions for equilibrium given by equations (6.2), (6.5), and (6.6). Production of a level of output, Y, generates an equivalent amount of income to households. A portion of this income, equal to consumption demand (C), returns directly to the firms as a demand for output. The level of output will be at equilibrium if this directly generated demand (C), when added to desired investment expenditures of firms (I) and government spending (G), produces a total demand equal to Y—that is, if

$$Y > E = C + I + G \tag{6.2}$$

From the second version of the condition for equilibrium income

$$S + T = I + G \tag{6.5}$$

we see that a flow rate of output will be an equilibrium rate if the leakages (S + T) from the central loop of our diagram are just balanced by injections (7 + G) into this central income and output circular flow. This rate ensures that the amount of income households do not spend on output (S + T), and therefore the amount of output that is produced but not sold to households (Y - C ≡ S + T), is just equal to the amount the other two sectors wish to buy (I + G). This is equivalent to saying that total output equals aggregate demand and is thus also equivalent to the first way of stating the condition for equilibrium.

The third way of expressing the condition for equilibrium, equation (6.6) ($I = I_r$), states that in equilibrium desired investment must equal realized investment. What does it mean for desired investment to differ from realized investment? The GDP accountant computes investment as the total volume of business spending on plant and equipment, plus inventory

investment, the increase (or decline) in inventories. We assume that desired spending on plant and equipment equals actual spending as recorded by the GDP accountant. It is in the last category, inventory investment, that desired and realized totals may differ. The GDP accountant will record all goods that are produced by a firm and not sold as inventory investment—whether such investment was intended or not.

To see how realized and intended inventory investment can differ, consider what happens when a level of output ($Y = C + I_r + G$) is produced that exceeds aggregate demand ($E = C + I + G$). In this case,

$$\begin{aligned} Y &> E \\ C + I_r + G &> C + I + G \\ I_r &> I \end{aligned} \qquad (6.7)$$

where $I_r - I$ is the unintended inventory accumulation. The amount by which output exceeds aggregate demand ($I_r - J$) will be unsold output over and above the amount of inventory investment the firm desired. This excess is unintended inventory accumulation.

In the reverse situation, in which aggregate demand exceeds output, we have

$$\begin{aligned} E &> Y \\ C + I + G &> C + I_r + G \\ I &> I_r \end{aligned} \qquad (6.8)$$

where $I - I_r$, is the unintended inventory shortfall. Demand is greater than output, and firms sell more than was planned. Inventories end up at less than the desired level. The equilibrium point ($I = I_r$) is a level of production that, after all sales are made, leaves inventory investment at just the level desired by firms. As can be seen from equation (6.7) or (6.8), this is the level at which output equals aggregate demand and hence is equivalent to the other two ways of expressing the condition for equilibrium.

This third way of expressing the condition for equilibrium in the model shows clearly why there cannot be an equilibrium at any other point. If, at a given level of output, firms are accumulating undesired inventories or are seeing their inventories depleted, there is a tendency for output to change. If production exceeds demand ($Y > E$), firms are accumulating unwanted inventories ($I_r > I$), and there is a tendency for output to fall as firms cut production to reduce the level of inventories. If, alternatively, demand is outstripping production ($E > Y$), there is an inventory shortfall ($I_r < I$) and a tendency for output to rise as firms try to prevent further falls

in inventories. Only when aggregate demand equals output will firms be satisfied with their current level of output. There is neither an unintended inventory build-up nor a shortfall and, therefore, no tendency for output to change. This situation is what is meant by equilibrium.

8.5 Let Us Sum Up

The Keynesian model shows that for the economy to be in equilibrium:

- Output must match aggregate demand.
- Leakages (savings and taxes) should equal injections (investment and government spending).
- Desired investment must equal realized investment, avoiding unwanted changes in inventories.
- When these conditions are not met, output adjusts accordingly until equilibrium is restored.

8.6 Key words

- **Aggregate Demand (E)**: Total planned expenditure in the economy.
- **Gross Domestic Product (GDP)**: Total market value of all final goods and services produced.
- **Leakages**: Income not spent on domestic output (e.g., savings, taxes).
- **Injections**: Additions to income flow (e.g., investments, government spending).
- **Inventory Investment (Ir)**: Changes in firms' inventory levels.
- **Equilibrium Output**: Level at which total output equals aggregate demand.

8.7 Suggested Readings

- Keynes, J.M. *The General Theory of Employment, Interest and Money*.
- Samuelson, P.A. & Nordhaus, W.D. *Economics*.
- Dornbusch, R., Fischer, S. & Startz, R. *Macroeconomics*.
- Branson, W.H. *Macroeconomic Theory and Policy*.
- Froyen, Richard T. (2013). *Macroeconomics Theories and Policies*

8.8 Hints to Check Your Progress

- Recall the three conditions for equilibrium output.
- Explain what happens when aggregate demand is less than output.
- Distinguish between desired and realized investment.

- Describe how leakages and injections interact in the circular flow.

8.9 Examination Oriented Questions

1. What are the main components of aggregate demand in the simple Keynesian model?
2. Explain the three equivalent conditions for equilibrium output using appropriate equations.
3. Discuss the role of leakages and injections in determining equilibrium output.
4. How do unintended inventory changes affect output in the Keynesian model?
5. Illustrate the circular flow of income in a closed economy.

Lesson 9

The Components of Aggregate Demand, Determining Equilibrium Income, and Changes in Equilibrium Income

STRUCTURE

9.0 Objectives

- To understand the components of aggregate demand and their role in income determination.
- To analyze the Keynesian consumption and saving functions.
- To explain how equilibrium income is established in the Keynesian model.

- To explore how changes in autonomous expenditures affect equilibrium income.
- To examine the multiplier effect of autonomous expenditures on income.

9.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Identify and explain the key components of aggregate demand.
- Interpret the Keynesian consumption and saving functions and their implications.
- Calculate equilibrium income using the aggregate demand approach.
- Illustrate the impact of changes in investment, government spending, and taxes on equilibrium income.
- Explain the concept of the multiplier and its role in income fluctuation.

9.2 Introduction

In the Keynesian model, the determination of national income is driven by aggregate demand, which comprises consumption, investment, and government spending. Keynes emphasized that fluctuations in these components, particularly investment, are central to understanding changes in income and output levels. Consumption, while stable and closely linked to disposable income, plays a supporting role, whereas investment and government expenditure are seen as autonomous components, influencing income independently of current income levels.

9.3 Explanation

We have expressed the condition for equilibrium in the simple Keynesian model in terms of the components of aggregate demand. To see the factors that determine the level of income, we consider the factors that affect the components of aggregate demand: consumption, investment, and government spending. Saving and taxes also enter into our discussion.

9.3.1 Consumption

Consumer expenditure is the largest component of aggregate demand, amounting to between 60 and 70 percent of GDP in recent years.

Keynes believed that the level of consumer expenditure was a stable function of disposable income, where disposable income (Y_D) in our simple model is national income minus net tax payments ($Y_D = Y - T$). Keynes did not deny that variables other than income

affect consumption, but he believed that income was the dominant factor determining consumption. In a first approximation, other influences could be neglected.

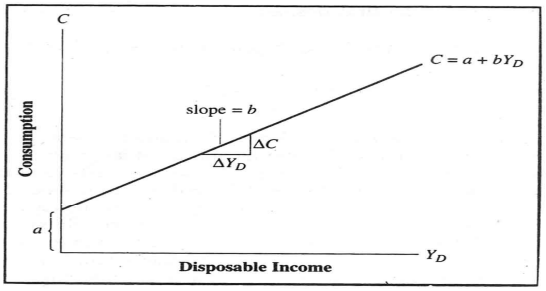


Figure 6.3 Keynesian Consumption Function
The consumption function shows the level of consumption (C) corresponding to each level of disposable income (Y_D). The slope of the consumption function ($\Delta C/\Delta Y_D$) is the marginal propensity to consume (b), the increase in consumption per unit increase in disposable income. The intercept for the consumption function (a) is the (positive) level of consumption at a zero level of disposable income.

The specific form of the consumption-income relationship, termed the **consumption function**, proposed by Keynes was as follows:

$$C = a + bY_D, \qquad a > 0, \quad 0 < b < 1 \qquad (6.9)$$

Figure 6.3 graphs this relationship. The intercept term a, which is assumed to be positive, is the value of consumption when disposable income equals zero. As such, a can be thought of as a measure of the effect on consumption of variables other than income, variables not explicitly included in this simple model. The parameter b, the slope of the function, gives the increase in consumer expenditure per unit increase in disposable income. In notation, we frequently use

$$b = \frac{\Delta C}{\Delta Y_D} \qquad (6.10)$$

where, as in Chapter 3, the differencing symbol, A, indicates the change in the variable it precedes. The value of the increment to consumer expenditure per unit increment to income (b) is termed the **marginal propensity to consume (MPC)**. The Keynesian assumption is that consumption will increase with an increase in disposable income ($b > 0$) but that the increase in consumption will be less than the increase in disposable income ($b < 1$).

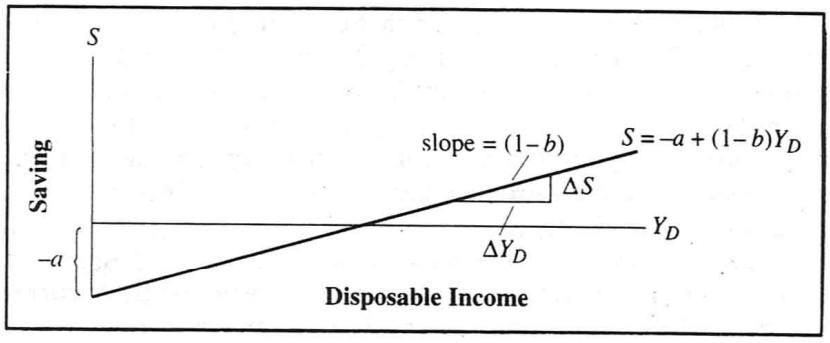


Figure 6.4 Keynesian Saving Function

The saving function shows the level of saving (S) at each level of disposable income (Y_D). The slope of the saving function is the marginal propensity to save ($1 - b$), the increase in saving per unit increase in disposable income. The intercept for the saving function ($-a$) is the (negative) level of saving at a zero level of disposable income.

From the definition of national income,

$$Y = C + S + T \tag{6.3}$$

we can write

$$Y_D = Y - T = C + S \tag{6.11}$$

which shows that disposable income is, by definition, consumption plus saving. Thus a theory of the consumption-income relationship also implicitly determines the saving-income relationship. In the case of the Keynesian theory, we have

$$S = - a + (1 - b)\, Y_D \tag{6.12}$$

If consumption is a units with Y_D equal to 0, then at that point

$$S = YD - C = 0 - a$$

$$= - a$$

If a one-unit increase in disposable income leads to an increase of b units in consumption, the remainder (1 – b) is the increase in saving:

$$\frac{\Delta S}{\Delta Y_D} = 1 - b \tag{6.13}$$

This increment to saving per unit increase in disposable income (1 – b) is called the **marginal propensity to save (MPS)**. The graph of the saving function is shown in Figure 6.4.

9.3.2 Investment

Investment was also a key variable in the Keynesian system. Changes in desired business investment expenditure were one of the major factors that Keynes thought were responsible for changes in income.

As noted previously, Keynes believed that consumption was a stable function of disposable income. This view did not imply that the level of consumption expenditures would not vary over time. It did imply that, in the absence of other factors that caused income to change, consumption expenditures would not be an important independent source of variability in income. Consumption was primarily induced expenditure, meaning expenditure that depends directly on income.

To explain the underlying causes of movements in aggregate demand and, hence, income, Keynes looked to the autonomous components of aggregate demand. These components were determined, in large part, independently of current income. When these expenditure components varied, they caused income to vary. Keynes believed that investment was the most highly variable of the autonomous components of aggregate demand. He believed that variable investment spending was primarily responsible for income instability.

Table 6.1 contains figures for investment and consumption as percentages of gross national product in selected years. The data contrast investment and consumption spending in prosperous years (1929, 1955, 1973, 1979, 1989) with corresponding spending in subsequent depression or recession years (1933, 1958, 1975, 1982, 1991). Investment spending does appear to be more volatile and is a logical choice as a factor explaining income variability. The question remains: What determines investment?

Keynes suggested two variables as primary determinants of investment expenditures in the short run: the interest rate and the state of business expectations.

In explaining the relationship between investment and the rate of interest, Keynes's analysis did not differ from the classical view. The level of investment is assumed to be inversely related to the level of the interest rate. At higher interest rates, fewer investment projects have a prospective return high enough to justify borrowing to finance them. This link will be important in Chapter 7. For now, because we have not explained how the interest rate is determined in the Keynesian model, we neglect the effect of the interest rate on investment. We focus on the second factor determining investment, the expected yield on investment projects.

Business managers' expectations about the future profitability of investment projects are a central element in Keynes's analysis. Keynes emphasized the "uncertain knowledge" upon

which expectations of the future must be based. In planning the profitability of a project that will produce output over 20 or 30 years, a manager needs a great deal of knowledge about the future. He needs to know the future demand for the product, which requires knowledge about future consumer tastes and the state of aggregate demand. He needs knowledge about future costs, including money wages, interest rates, and tax rates; a well-grounded forecast of such variables cannot be made for 20 or 30 years into the future.

Table 6.1 Consumption and Investment as a Percentage of Gross National Product, Selected Years

YEAR	INVESTMENT	CONSUMPTION
1929	15.7	74.8
1933	2.5	82.1
1955	17.1	63.5
1958	13.8	64.5
1973	16.1	62.6
1975	12.5	64,0
1979	16.0	62.7
1982	13.1	65.3
1989	11.0	67.1
1991	9.6	68.5

Nevertheless, investment decisions are made. Keynes felt that rational managers faced with the need to make decisions under such extreme uncertainty formed expectations using the following techniques:

1. They tended to extrapolate past trends into the future, ignoring possible future changes, unless there was specific information about a prospective change.

2. "Knowing that our own individual judgment is worthless, we endeavor to fall back on the judgment of the rest of the world which is perhaps better informed. That is, we endeavor to conform with the behavior of the majority or the average. The psychology of a society of individuals each of whom is endeavoring to copy the others leads to what we may strictly term a conventional judgment."

Keynes believed that an expectation formed in this manner would have the following property.

> In particular, being based on so flimsy a foundation, it is subject to sudden and violent changes. The" practice of calmness and immobility, of certainty and security, suddenly breaks down. New fears and hopes will, without warning, take charge of human conduct. The forces of disillusion may suddenly impose a new conventional basis of

valuation. All these pretty, polite techniques, made for a well-panelled board room, are liable to collapse. At all times the vague panic fears and equally vague and unreasoned hopes are not really lulled, and lie but a little way below the surface.

In summary, expectations of the future profitability of investment projects rested on a very precarious base of knowledge, and Keynes felt that such expectations could shift frequently, at times drastically, in response to new information and events. Consequently, investment demand was unstable. Investment expenditure is the main component of autonomous expenditures that Keynes believed to be responsible for income instability.

9.3.3 Government Spending and Taxes

Government spending (G) is a second element of autonomous expenditures. Government spending is assumed to be controlled by the policymaker and therefore does not depend directly on the level of income.

We assume that the level of tax receipts (T) is also controlled by the policymaker and is a policy variable. A more realistic assumption is that the policymaker sets the tax rate, and tax receipts vary with income. This assumption would complicate our calculations but would not change the essential conclusions.

9.3.4 DETERMINING EQUILIBRIUM INCOME

We now have all the elements needed to determine equilibrium income (output). The first form of the condition for an equilibrium level of income is

$$Y = E = C + I + G \qquad (6.2)$$

Equilibrium income (Y) is the endogenous variable to be determined. The autonomous expenditure terms I and G are given, as is the level of T; these are the exogenous variables determined by factors outside the model. Consumption is, for the most part, induced expenditure determined endogenously by the consumption function

$$C = a + bY_D = a + bY - bT \qquad (6.9)$$

where the second equality uses the definition of disposable income ($Y_D = Y - T$).

Substituting the equation for consumption given by (6.9) into the equilibrium condition (6.2), we can solve for $\overline{Y}$, the equilibrium level of income, as follows:

$$Y = C + I + G$$

$$Y = a + bY - bT + I + G$$

$$Y - bY = a - bT + I + G$$

$$Y(1 - b) = a - bT + I + G \qquad (6.14)$$

$$\bar{Y} = \frac{1}{1-b}(a - bT + I + G)$$

Figure 6.5 depicts the determination of equilibrium income. Income is measured along the horizontal axis, and the components of aggregate demand are measured along the vertical axis. The 45° line is drawn to split the positive quadrant of the graph. All points along this line indicate that aggregate expenditures equal aggregate output. The value of the variables measured on the vertical axis, (C + I + G), is equal to the value of the variable measured on the horizontal axis, (Y). The consumption function ($C = a + bY_D$) is shown on the graph, and we have also plotted the (C + I + G) or aggregate expenditure (E) schedule, which is obtained by adding the autonomous expenditure components, investment and government spending, to consumption spending at each level of income. Because the autonomous expenditure components (I, G) do not depend directly on income, the (C + I + G) schedule lies above the consumption function by a constant amount.

As shown in Figure 6.5b, the line plotting these autonomous expenditure components alone, the I + G line, is horizontal because their level does not depend on Y.

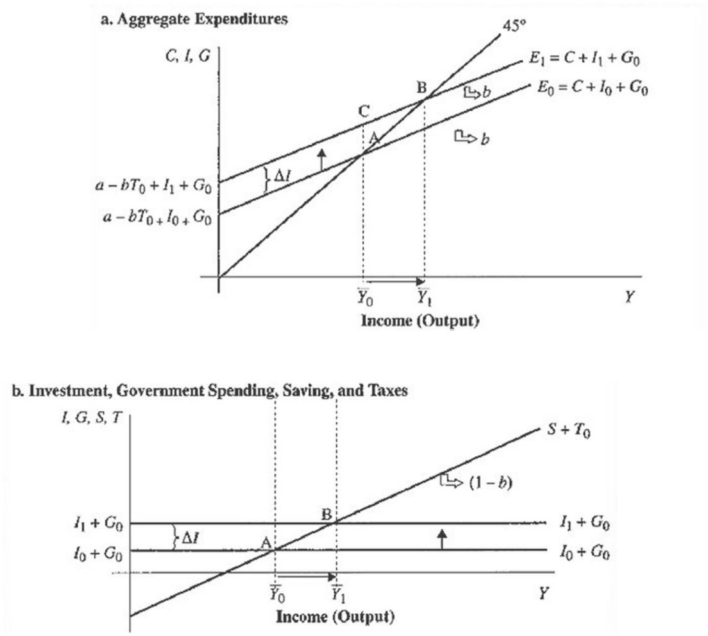


Fig. 6.5 : Effect of an Increase in Autonomous Investment on Equilibrium Income

Figure 6.5 Determination of Equilibrium Income

In part a, the equilibrium level of income is Y, at point A where the C + I + G = £ schedule intersects the 45° line. At that point, aggregate expenditures_equal output, (C + / + G) = Y. At point A in part b, at the equilibrium level of output, Y, the S + T and I + G schedules intersect, so S + T = I + G. At the level of income YL, which is less than equilibrium output Y, aggregate demand exceeds output, (C + / + G) > Y. At points greater than equilibrium output Y, output exceeds aggregate demand.

upward-sloping line, marked S + T in the graph, plots the value of saving plus taxes. This schedule slopes upward because saving varies positively with income.

In Figure 6.5a, the equilibrium level of income is shown at the point where the (C + I + G) schedule crosses the 45° line, and aggregate demand is therefore equal to income (y). This intersection illustrates the equilibrium condition expressed in equation (6.2). In equilibrium, it must also be true that the (S + T) schedule intersects the (I + G) horizontal schedule. This intersection, shown in Figure 6.5b, illustrates the equilibrium condition expressed in equation (6.5).

The understanding of the properties of an equilibrium level of income is aided by considering why other points on the graph are not points of equilibrium. Consider a level of income below Y, for example, the point marked Y_L in Figure 6.5a.

A level of income equal to Y_L generates consumption as shown along the consumption function. When this level of consumption is added to the autonomous expenditures (I + G), aggregate demand exceeds income; the (C + I + G) schedule is above the 45° line. Equivalently, at this point / + G is greater than S + T, as can be seen in Figure 6.5b. It also follows that with demand outstripping production, desired investment will exceed actual investment at points such as Y_L (C + I+ G>Y = C + I_r + G; there-fore, I > I_r). There will be an unintended inventory shortfall at such points below Y and therefore a tendency for output to rise.

Conversely, at levels of income above Y in Figure 6.5a, and 6.5b, output will exceed demand (the 45° line is above the C + I+G schedule), and unintended inventory investment will be taking place (Y = C + I_r + G > C + I + G; therefore, I_r > T), and there will be a tendency for output to fall. It is only at Y that output is equal to aggregate demand; there is no unintended inventory shortfall or accumulation and, consequently, no tendency for output to change.

Returning to our expression for equilibrium income, equation (6.14), we can rewrite this equation in a form that gives the essence of Keynes's view of income determination. Our expression for equilibrium consists of two parts:

$$\bar{y} = \frac{1}{1-b}(a - bT + 1 + G)$$

$$\underbrace{\left\{\quad\right\}}\qquad\underbrace{\left\{\quad\right\}}$$

$\bar{y}$ = "autonomous expenditure" Multiplier x autonomous expenditures

(6.15)

The first term, 1/(1 — b), is called the **autonomous expenditure multiplier.** Note that b is the fraction of any increment to disposable income that goes to consumption—the marginal propensity to consume (MPC). The term 1/(1 - b) or 1/(1 - MFG) is then 1 divided by a fraction and, hence, some number greater than 1. Some examples are as follows:

b = 0.5: $\frac{1}{1-b} = \frac{1}{1-0.5} = \frac{1}{0.5} = 2$

b=0.8: $\frac{1}{1-b} = \frac{1}{1-0.8} = \frac{1}{0.2} = 5$

b=0.9: $\frac{1}{1-b} = \frac{1}{1-0.9} = \frac{1}{0.1} = 10$

We call this term the autonomous expenditure multiplier because every dollar of autonomous expenditure is multiplied by this factor to get its contribution to equilibrium income.

The second term in the expression is the level of autonomous expenditures. We have already discussed two elements of autonomous expenditures, investment (f) and government spending (G). The first two terms (a and — bT) require a few words of explanation. These terms measure the autonomous component of consumption expenditures (a) and the autonomous effect of tax collections on aggregate demand (-bT), which also works through consumption. Consumption is, for the most part, induced expen¬ditures, as explained previously. The two terms (a and - bT), however, affect the amount of consumption for a given level of income (Y). In terms of Figure 6.5, they determine the height of the consumption function. Like G and L they affect the amount of aggregate demand for a given level of income rather than being themselves directly determined by income. They are thus appropriately included as autonomous factors affecting aggregate demand.

Keynes's theory in its simplest form can be stated as follows. Consumption is a stable function of income; that is, the marginal propensity to consume is stable. Changes in income come primarily from changes in the autonomous components of aggregate demand, especially from, changes in the unstable investment component. A given change in an autonomous component

of aggregate demand causes a larger change in equilibrium income because of the multiplier, for reasons we explain later. Equation (6.15) makes clear that, in the absence of government policies to stabilize the economy, income will be unstable because of the instability of investment. From equation (6.15) one can also see that by appropriate changes in government spending (G) and taxes (T), the government could counteract the effects of shifts in investment. Appropriate changes in G and T could keep the sum of the terms in parentheses (autonomous expenditures) constant even in the face of undesirable changes in the I term.

9.3.5 CHANGES IN EQUILIBRIUM INCOME

Consider the effect on equilibrium income of a change in autonomous investment demand. We assume that the other determinants of autonomous expenditures, the other items in parentheses in equation (6.15), are fixed. We solve for the change in equilibrium income from equation (6.15) as follows:

$$\Delta\overline{Y} = \frac{1}{1-b}\Delta l \qquad (6.16)$$

or

$$\frac{\Delta\overline{Y}}{\Delta l} = \frac{1}{1-b} \qquad (6.17)$$

A one-unit change in investment causes a change in income of 1 / (1 — b) units. If b is 0.8, for example, Y changes by five units for each one-unit change in investment. Why does income change by a multiple of the change in investment, and why by the precise amount 1/(1 — b}?

One analogy to the process behind the multiplier is the "ripple effect" of a stone dropped in a pond. There is the initial effect as the stone disturbs the water. Added to this is the effect on the rest of the water surface as the water displaced by the stone spreads out to the adjoining water, with intensity that diminishes with the distance from the initial point of impact. The investment change is the initial disturbance; let us assume this equals 100 units. As some firms experience increased demand as a result of this increased investment, their output increases. In consequence, their pay-ments to factors of production (wages, rents, interest, dividends) increase. To the households, this is an increase in income and, because taxes are fixed, an equal increase in disposable income. Consumption will then increase, although by less than the increase in income. This is the beginning of the indirect effects of the shock. With \1 equal to 100 as assumed, if the MPC were 0.8, for example, there would now be an additional 80 units of consumer demand.

The process does not stop here; the 80 units of new consumer expenditure, with the resulting increase in production, generate a second-round increase in income for some households of 80 units. There will be a further increase in consumer demand (64 units if the MPC is 0.8). Thus, the reason that income rises by more than the autonomous rise in investment is that the rise in investment leads to induced increases in consumer demand as income increases.

Why is the increase in income per dollar increase in investment just equal to 1/(1- b)? Wit. the other elements of autonomous expenditures fixed, we can write the change in equilibrium income as investment varies as

$$\Delta Y=\Delta l + \Delta C \qquad (6.18)$$

Restoring the equality of income and aggregate demand requires that equilibrium income rise by an amount equal to the increase in investment (A7) plus, the income-induced increase in consumer demand. Rearranging terms in equation (6.18), we have

$$\Delta Y-\Delta C = \Delta l$$

Or

$$\Delta S=\Delta l \qquad (6.19)$$

Equation (6.19) also follows from our second way of expressing the condition for equilibrium income:

$$S+T=l+G \qquad (6.5)$$

With T and G fixed, to restore equilibrium, S must rise by the amount of the increase in 7, as required by equation (6.19). Restoring equilibrium requires that income rise by enough to generate new saving equal to the new investment.

Because AS is equal to (1 — b)ΔY, we have, from equation (6.19),

$$(1 - b)\Delta Y = \Delta l$$

$$\frac{\Delta \overline{Y}}{\Delta l} = \frac{1}{1-b} = \frac{1}{1-\text{MPC}} = \frac{1}{\text{MPS}} \qquad (6.20)$$

For example, if b equals 0.8, the marginal propensity to save (MPS = 1 - b) is equal to 0.2. Each dollar increase in income will generate 20 cents worth of new saving, and a five-dollar increase in income will be required to generate the one dollar of new saving to balance a one-dollar increase in investment. The value of the multiplier in this case is 5.

The effect of an increase in autonomous investment is illustrated in Figure 6.6. Initially, with investment at I_0 and government spending and taxes at G_0 and T_0, equilibrium income is at Y_0. Now let investment increase to the higher level, I_1The aggregate demand (E) schedule shifts up by the amount ($\Delta_I = I_1 - I_0$), from E_0 (= C + I_0 + G_0> to E_1 (= C + I_1, + G_0). The (7 + G) schedule shifts up by the same amount. Equilibrium is restored at Y_1; where income is now equal to the higher value of aggregate demand. Note that the increase in income is equal to the initial increase

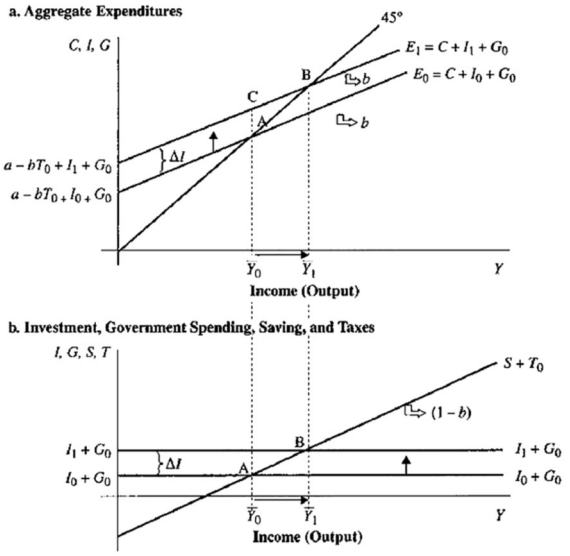


Fig. 6.6 : Effect of an Increase in Autonomous Investment on Equilibrium Income

Figure 6.6 Effect of an Increase in Autonomous Investment on Equilibrium Income

In part a, beginning at equilibrium A, an increase in autonomous investment, from I_0 to I_1 shifts the aggregate expenditure schedule upward from $E_0 = C + I_0 + G_0$ to $E_1 = C + I_1 + G_0$. Equilibrium income increases from point A to point B, Y_0 to Y_1]. The increase in income is equal to the initial increase in investment (shown as an increase in the intercept), I_0 to I_1, plus an income-induced increase in consumption. This increase in consumption is shown as we move along the higher expenditure function, E,, from point C to point B. In part b, beginning at equilibrium A, the I + G schedule shifts up from $I_0 + G_0$ to I_1, + G_0. Equilibrium income increases from point A to point B, Y_0 to Y_1].

in investment plus an induced increase in consumption (ΔC), as shown in the graph. Note also that at the new equilibrium, saving has increased by the same amount as investment ($\Delta S = \Delta I$).

The multiplier concept is central to Keynes's theory because it explains how shifts in investment caused by changes in business expectations set off a process that causes not only investment but also consumption to vary. The multiplier shows how shocks to one sector are transmitted throughout the economy. Keynes's theory also implies that other components of autonomous expenditure affect the overall level of equilibrium income. The effect on

equilibrium income of a change in each of the two policy-controlled elements of autonomous expenditures, government spending and taxes, can be calculated from equation (6.15).

We proceed just as we did in considering the effects of a change in investment and let one component of autonomous expenditures change while each of the others is held constant. For a change in government spending (G), we have

$$\Delta\overline{Y} = \frac{1}{1-b}\Delta G \tag{6.21}$$

$$\frac{\Delta\overline{Y}}{\Delta G} = \frac{1}{1-b}$$

For a change in taxes, we have

$$\Delta\overline{Y} = \frac{1}{1-b}(-B)\Delta T$$

$$\frac{\Delta\overline{Y}}{\Delta T} = \frac{-b}{1-b} \tag{6.22}$$

For government spending, a one-dollar increase has the same effect as a one-dollar increase in investment. Both are one-dollar increases in autonomous expenditures. The multiplier process, whereby the initial increase in income generates induced increases in consumption, is the same for an increase in government spending as for investment.

In terms of Figure 6.6, in part a, an increase in government spending of AG would shift up the expenditure schedule by the same amount as an equal increase in investment. In this case, the intercept would shift up due to an increase in government spending. In part b, an increase in government spending of AG would shift up the I + G schedule from $I_0 + G_0$ to $I_0 + G_1$ the same amount as an equal increase in investment. In both figures, ΔY will be the same; Y_0 to Y_1.

From equation (6.22) we see that the effect of an increase in taxes is in the opposite direction to those of increased government spending or investment. A tax increase lowers the level of disposable income (Y — T) for any level of national income (Y). This effect shifts the aggregate demand schedule down because it reduces consumption spending for any level of national income. The effect on equilibrium income from a tax increase is illustrated in Figure 6.7. We assume that taxes rise by ΔT from T_0 to T_1 The aggregate demand schedule shifts from $(C + I + G)_0$ down to $(C + I + G)_1$ This is the consequence of the downward shift in the consumption function caused by the rise in taxes from T_0 to T_1 Equilibrium income falls from Yn to Yj.

Notice that the aggregate demand schedule shifts down by (—bΔT), that is, by only a fraction (b) of the increase in taxes. The reason is that, at a given level of income, a one-dollar increase in taxes reduces disposable income by one dollar but lowers the consumption component of aggregate demand by only b dollars. The rest of the decline in disposable income is absorbed by a fall of (1 — b) dollars in saving. Unlike changes in government expenditures and investment, which have a dollar-for-dollar effect on autonomous aggregate demand, a one-dollar change in taxes shifts the aggregate demand schedule by only a fraction (- b) of one dollar. This fraction (-b) times the autonomous expenditure multiplier, 1/(1 - b), gives the effect on equilibrium income of a one-dollar change in taxes, -b/(I - b).

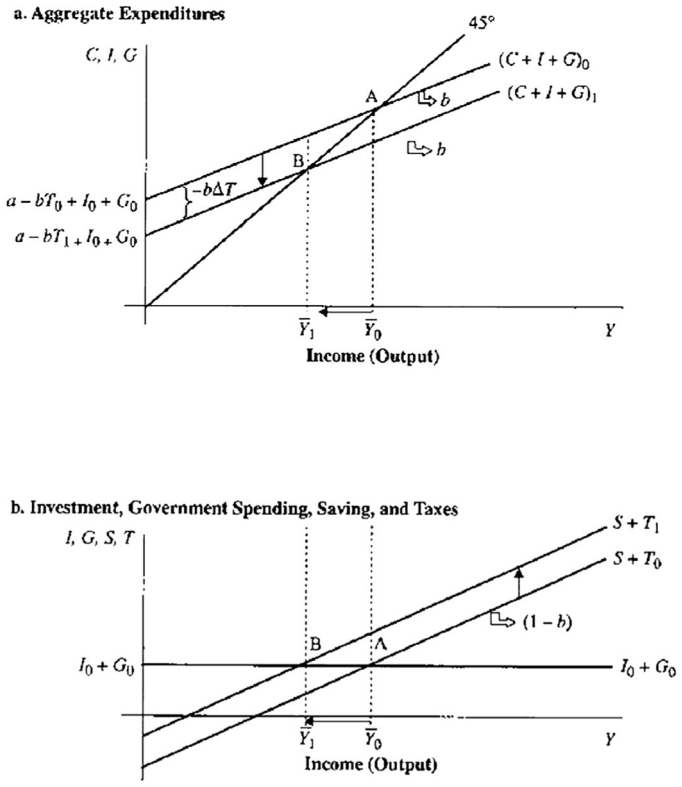


Fig. 6.7 : Effect of an Increase in Taxes on Equilibrium Income

There is a relationship between the absolute values of tax and government expenditure multipliers, which can be seen in the following examples:

b = 0.5: $\frac{1}{1-b} = \frac{1}{1-0.5} = 2;$ $\frac{-b}{1-b} = \frac{-0.5}{1-0.5} = -1$

b=0.8: $\frac{1}{1-b} = \frac{1}{1-0.8} = 5;$ $\frac{-b}{1-b} = \frac{-0.8}{1-0.8} = -4$

b=0.9: $\frac{-b}{1-b}=\frac{1}{1-0.9}=10$; $\frac{-b}{1-b}=\frac{-0.9}{1-0.9}=-9$

The tax multiplier is one less in absolute value than the government expenditure multiplier. This fact has an interesting implication for the effects of an increase in government spending accompanied by an equal increase in taxes, a balanced-budget increase. To find the effects of such a combination of policy changes, we add the two policy multipliers to get the following expression:

$$\frac{\Delta\bar{y}}{\Delta G}+\frac{\Delta\bar{y}}{\Delta T}=\frac{1}{1-b}+\frac{-b}{1-b}=\frac{1-b}{1-b}=1$$

A one-dollar increase in government spending financed by a one-dollar increase in taxes increases equilibrium income by just one dollar. This result, termed the balanced-budget multiplier gives the change in equilibrium output that results from a one-unit increase or decrease in both taxes and government spending balanced-budget multiplier, reflects the fact that tax changes have a smaller per-dollar impact on equilibrium income than do spending changes. The value of 1 for the multiplier results because the tax multiplier is one less in absolute value than the spending multiplier. The latter result does not carry through in many more complex models, but the result that tax changes affect aggregate demand by less per dollar than changes in government spending is quite general.

9.4 Let us Sum Up

- Aggregate demand comprises consumption, investment, and government spending.
- Consumption is mainly a function of disposable income, while investment and government spending are considered autonomous.
- Equilibrium income is where aggregate demand equals output, influenced by autonomous expenditures and the multiplier.
- Changes in investment or government spending have multiplied effects on income.
- Government fiscal policy can stabilize income levels by adjusting spending and taxation.

9.5 Key words

- **MPC (Marginal Propensity to Consume)**: The portion of additional income that is spent on consumption.
- **MPS (Marginal Propensity to Save)**: The portion of additional income that is saved.

- **Autonomous Expenditure**: Spending that does not depend on the current level of income.
- **Equilibrium Income**: Income level at which aggregate demand equals aggregate output.
- **Multiplier**: The factor by which an initial change in spending is magnified in the economy.

9.6 Suggested Readings

- Keynes, J. M. *The General Theory of Employment, Interest, and Money.*
- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics.*
- Mankiw, N. G. *Principles of Macroeconomics.*
- Froyen, Richard T. (2013). *Macroeconomics Theories and Policies*

9.7 Hints to Check Your Progress

- Explain the consumption function and identify the role of MPC.
- What is the relationship between saving and income?
- How is equilibrium income determined in the Keynesian model?
- What happens to output when aggregate demand exceeds or falls short of output?
- Describe the role of investment and government spending in determining equilibrium income.

9.9 Examination Oriented Questions

1. Define and explain the components of aggregate demand.
2. Derive the Keynesian consumption and saving functions and explain their significance.
3. How is equilibrium income determined? Illustrate with the help of diagrams.
4. What is the multiplier effect? Explain its role in the Keynesian model of income determination.
5. Discuss how changes in investment affect equilibrium income.
6. Explain the role of government spending and taxation in stabilizing income levels in the Keynesian framework.

Lesson 10

Fiscal Stabilization Policies and Export and Imports in the Simple Keynesian Model

STRUCTURE

10.0 Objectives

- stabilization policies in mitigating output fluctuations.
- To explain the working of the Keynesian model in an open economy context, incorporating exports and imports.
- To explore how trade impacts the equilibrium level of income.
- To analyze the multiplier effects of fiscal policies and international trade.

10.1 Learning Outcomes

After studying this lesson, learners will be able to:

- Explain fiscal stabilization mechanisms using the simple Keynesian model.

- Illustrate the impact of changes in investment, government spending, and taxes on aggregate demand and output.
- Analyze the effects of exports and imports on national income in an open economy.
- Discuss the implications of a more open economy on fiscal multipliers and aggregate demand management.

10.2 Introduction

In the Keynesian framework, equilibrium income is influenced by autonomous components of expenditure, including consumption, investment, and government spending. When these components fluctuate, particularly investment, they can cause instability in income and output levels. Fiscal stabilization policies—adjustments in government spending and taxation—can be employed to counteract these fluctuations and stabilize the economy at its potential output level. Additionally, the increasing role of exports and imports in the globalized economy has introduced further complexities into income determination. The open-economy Keynesian model incorporates net exports, reflecting the interaction of domestic output with global demand and supply forces.

10.3 Explanation: Fiscal Stabilization Policies in the Simple Keynesian Model

Because equilibrium income is affected by changes in government spending and taxes, these fiscal policy instruments can be varied to stabilize the total of autonomous expenditures and, therefore, equilibrium income, even if the investment component is unstable.

An example of fiscal stabilization policy is illustrated in Figure 6.8. The economy is assumed to be in equilibrium at a potential level Y_P, with aggregate demand at E_p equal to $(C + I_0 + G_0)$. We assume that from this point autonomous investment declines from I_0 to l_1 as a result of an unfavourable change in business expectations. In the absence of a policy action, aggregate demand declines to E_L, equal to $(C + I_1 + G_0)$. The new level of equilibrium income is below potential output at Y_1. Within the model, an appropriate fiscal policy response would be to increase government spending by an amount sufficient to restore equilibrium at YP. In the graph, a rise in government spending from G0 to G1 shifts the aggregate demand curve back up to E_p, now equal to $(C + I_1 + G_1)$. Alternatively, a tax cut could be used to restore the initial level of aggregate demand. Because the tax multiplier is smaller, the appropriate tax cut would be larger than the required spending increase.

Export and Imports in the simple Keynesian model

Both imports and exports have been growing as shares of GDP over recent decades. In 1960, U.S. imports of goods and services totalled 4.4 percent of GDP. By 2003, this figure was 13.8 percent of GDP. Exports rose from 4.9 percent of GDP in 1960 to

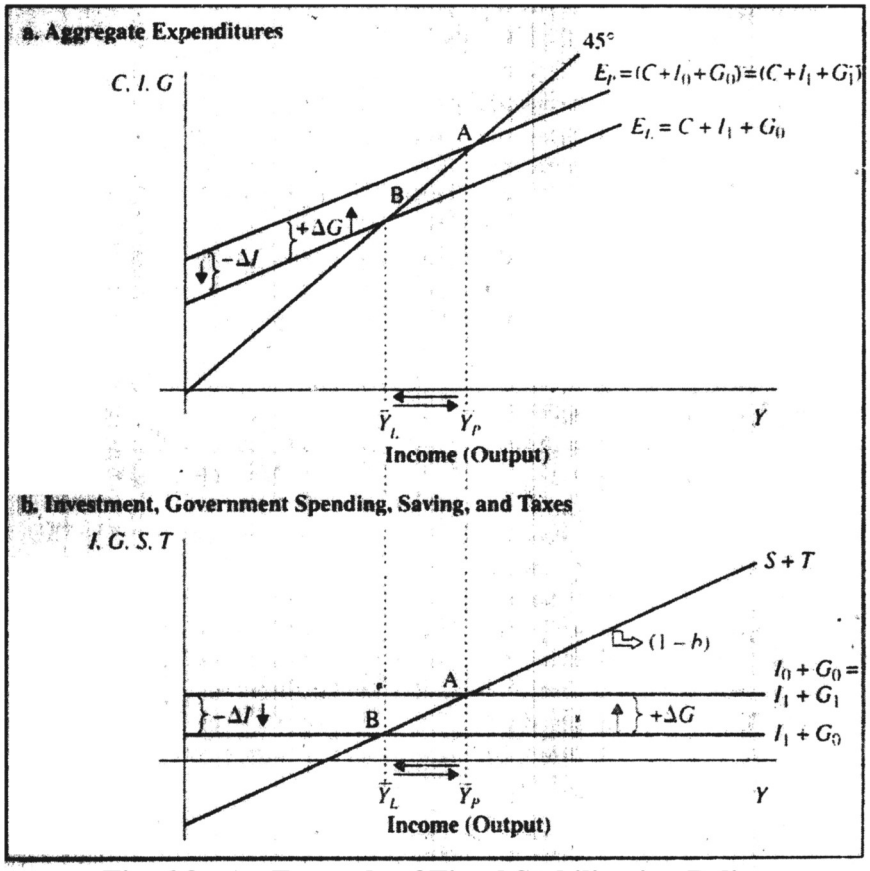


Fig. 6.8 : An Example of Fiscal Stabilization Policy

Figure 6.8 An Example of Fiscal Stabilization Policy

Beginning at equilibrium point A in part a, a decline in autonomous investment expenditure from l_0 to I_1, shifts the aggregate expenditure schedule downward from $E_p = (C + I_0 + G_0)$ to E_L - $(C + I_1 + G_0)$, moving to equilibrium point B. A compensating increase in discretionary government spending from G_0 to G_1 shifts the aggregate expenditure schedule back to equilibrium point A where $(C + I_1 + G_1) = E_p = (C + I_0 + G_0)$. Equilibrium income is again at Y_P . In part b, starting at equilibrium point A, the decline in autonomous investment expenditure shifts the I + G schedule downward, from $I_0 + G_0$ to I_1+ G_0, moving to equilibrium point B, decreasing income from Y_p to Y_L. A compensating increase in discretionary government spending from G_0 to G_1 shifts the I + G schedule upward, to $I_1 + G_1$ moving back to equilibrium point A, and increasing income back to Y_P.

9.7 percent in 2003. Overall, the U.S. economy has become much more closely linked to those of other nations over the past 40 years. This section focuses on the roles of imports and exports in determining equilibrium income in the simple Keynesian model. Recall from Chapter 2 that GDP (V) consists of consumption, investment, and government spending plus net exports. Net exports are exports minus imports. The condition for equilibrium output in the open economy (including exports and imports) is

$$Y= E= C+ I+ G+ X - Z \qquad (6.23)$$

Compared with equation (6.2), the condition for equilibrium in the closed economy, we have added exports (X) to aggregate demand and subtracted imports (Z). Exports are the foreign demand for domestic output and therefore part of aggregate demand. Also, because imports are included in C, I, and G but are not demands for domestic goods, we must subtract them out of aggregate demand.

To find an expression for equilibrium GDP in the open economy model, we follow the same procedure as for the closed-economy case; we take investment and government spending as exogenous—that is, as autonomous expenditure components. Consumption is given by the consumption function

$$C=a+bY \qquad (6.24)$$

where, because they play no essential role in our discussion here, we have left out taxes, and therefore do not need to distinguish between GDP (Y) and disposable income (Y_D = Y — T). To compute equilibrium output for the open-economy case, we need to specify the determinants of imports and exports.

To simplify our analysis, we assume that imports consist solely of consumption goods. The demand for imports is assumed to depend on income and to have an autonomous component.

$$Z=u+vY \quad u>0, \quad 0<v<1 \qquad (6.25)$$

The parameter u represents the autonomous component of imports. The parameter 0 is the marginal propensity to import, the increase in import demand per unit increase in GDP, a concept analogous to the marginal propensity to consume (b) in (6.24).[16]

The demand for U.S. exports is a part of the foreign demand for imports. The foreign demand for imports depends on the level of foreign income, being determined by an import demand

function analogous to equation (6.25). From the U.S. point of view, foreign income and, hence, the demand for our exports are exogenous.

Additional variables that we would expect to influence both U.S. demand for imports and foreign demand for U.S. exports are the relative price levels in the two countries and the level of the exchange rate. These variables determine the relative costs of the two countries' products to residents of either country. Note that for now we are assuming that price levels and the exchange rate are fixed. The effects on imports and exports of changes in the domestic price level or exchange rate are examined in Part IV.

With imports given by equation (6.25) and exports assumed to be exogenous, we can compute equilibrium income from equation (6.23) as follows:

$$Y=C+I+G+X-Z \tag{6.23}$$

$$\underbrace{C}_{a+bY}\ \underbrace{\qquad}_{+I+G+}\ \underbrace{-Z}_{X-u-vY}$$

$$Y - bY + vY = a + I + G + X - u$$

$$(1-b+v)Y=a+I+G+X-u \tag{6.26}$$

$$\overline{Y} = \frac{1}{1-b+v}(a+1+G+X-u)$$

To examine the effects of foreign trade in the model we compare equation (6.26) with the equivalent expression for equilibrium income from the closed economy model, equation (6.14). This expression, omitting the tax variable (T), can be written as

$$\overline{Y} = \frac{1}{1-b}(a+1+G) \tag{6.27}$$

> Note that, because consumption includes imports, b is the marginal propensity to consume both domestic and imported goods. Because v is the marginal propensity to import (consumption goods), b - v is the marginal propensity to consume domestic goods.

In both equations (6.26) and (6.27), equilibrium income is expressed as the product of two terms: the autonomous expenditure multiplier and the level of autonomous expenditures. Consider how each of these is changed by adding imports and exports to the model.

Take first the autonomous expenditure multiplier, 1/(1 - b + v) in equation (6.26) as opposed to 1/(1 - b) in equation (6.27) for the closed-economy model. Because v, the marginal

propensity to import, is greater than zero, the multiplier in (6.26), 1/(1 — b + v), will be smaller than the multiplier in (6.27), 1/(1 - b). For example, if b = 0.8 and v = 0.3, we would then have

$$\frac{1}{1-b} = \frac{1}{1-.08} = \frac{1}{0.2} = 5$$

$$\frac{1}{1-b+v} = \frac{1}{1-.08+0.3} = \frac{1}{0.5} = 2$$

From these expressions it can be seen that the more open an economy is to foreign trade (the higher v is), the lower will be the autonomous expenditure multiplier.

The autonomous expenditure multiplier gives the change in equilibrium income per unit change in autonomous expenditures. It follows, therefore, that the more open an economy is (the higher v is), the smaller will be the response of income to aggregate demand shocks, such as changes in government spending or autonomous changes in. investment demand. The decline in the value of the autonomous expenditure multiplier with a rise in v can be explained with reference to the multiplier process (section 6.5). A change in autonomous expenditures—a change in government spending, for example—will have a direct effect on income and an induced effect on consumption with a further effect on income. The higher the value of v, the larger the proportion of this induced effect that will be a change in demand for foreign, not domestic, consumer goods. Consequently, the induced effect on demand for domestic goods and, hence, on domestic income will be smaller.17 The increase in imports per unit of income constitutes an additional leakage from the circular flow of (domestic) income at each round of the multiplier process and reduces the value of the autonomous expenditure multiplier.

Now consider the second term in the expression for equilibrium income in the open economy case [equation (6.26)], the level of autonomous expenditures. In addition to the elements for a closed economy (a +1 + G), autonomous expenditures for the open economy include exports and the autonomous component of imports. Recall that the autonomous components of aggregate demand are not directly determined by income. Rather, shifts in the components of autonomous expenditures affect the level of aggregate demand for a given level of income and result in changes in equilibrium income. Thus, changes in exports and autonomous changes in import demand are additional shocks that will change equilibrium income.

From equation (6.26) we can compute the multiplier effects of changes in X and u.

$$\frac{\Delta \overline{Y}}{\Delta X} = \frac{1}{1-b+v} \qquad (6.28)$$

$$\frac{\Delta \overline{Y}}{\Delta u} = \frac{1}{1 - b + v} \qquad (6.29)$$

An increase in the demand for our exports is an increase in aggregate demand for domestically produced output and will increase equilibrium income just as would an increase in government spending or an autonomous increase in investment[18].

In contrast, an autonomous increase in import demand, an increase in u, will cause a decline in equilibrium income. An autonomous increase in import demand represents a shift from demand for domestic goods to demand for foreign goods. For example, because of the large rise in gasoline prices in the 1970s, U.S. consumers shifted demand from domestic to (smaller) foreign automobiles. As such, the autonomous increase in import demand is a decline in demand for domestic output and causes equilibrium income to decline.

In summary, an increase in the demand for our exports has an expansionary effect an equilibrium income, whereas an autonomous increase in imports has a contractionary effect on equilibrium income. This outcome should not be interpreted to mean that exports are good and imports harmful in their economic effects. Countries import goods that can be more efficiently produced abroad, and trade increases the overall efficiency of the worldwide allocation of resources. However, the expansionary effect of increases in exports and the contractionary effect of increases in imports do explain why at times nations have tried to stimulate the domestic economy by promoting exports and restricting imports.

CONCLUSION

The model in this chapter is incomplete. We need to consider money and interest rates and to explain the behavior of prices and wages before we complete our analysis of the Keynesian system. However, this simple model highlights several features of the Keynesian system.

The simple model clearly illustrates the role of aggregate demand determining income in the Keynesian system. As we will see later, It overstates the role of aggregate demand. Still, a key feature of all Keynesian models is that demand plays a crucial role in income determination. In the Keynesian view, changes in the autonomous elements of aggregate demand, especially investment demand, are key factors causing changes in the equilibrium level of income. By means of the multiplier process, such, changes in autonomous expenditures also induce changes in consumption spending. Inadequate investment, and a consequent low level of aggregate demand, was the' Keynesian explanation for massive unemployment in the Depression of the 1930s.

The model also illustrates the role of fiscal stabilization policy in managing aggregate demand to cushion equilibrium output from shifts in the unstable investment demand. Although the simple expressions we derive for the government expenditure and tax multipliers require modification, the principles behind them remain intact.

10.4 Let Us Sum Up

- Fiscal stabilization policies are crucial to counteract investment fluctuations and maintain output at potential levels.
- The inclusion of exports and imports in the Keynesian model highlights the openness of modern economies.
- Open economies have lower expenditure multipliers due to import leakages, making domestic policies less potent.
- Increases in exports stimulate domestic output, while increases in imports have a dampening effect.
- However, the long-term benefits of trade should not be overlooked, as they improve global resource allocation.

10.5 Key words

- **Autonomous Expenditure:** Spending not directly linked to income levels.
- **Fiscal Stabilization:** Government efforts to maintain stable economic growth.
- **Net Exports (X - Z):** The difference between exports and imports.
- **Marginal Propensity to Import (v):** The proportion of additional income spent on imports.
- **Expenditure Multiplier:** Ratio showing how much income changes in response to a change in autonomous expenditure.

10.6 Suggested Readings

- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics* (Latest Edition)
- Samuelson, P. A., & Nordhaus, W. D. *Economics*
- Mankiw, N. G. *Macroeconomics*
- Keynes, J. M. *The General Theory of Employment, Interest, and Money*
- Froyen, Richard T. (2013). *Macroeconomics Theories and Policies*

10.7 Hints to Check Your Progress

1. Explain how fiscal policy can be used to offset a decline in investment.
2. How do exports and imports affect aggregate demand in the Keynesian model?
3. Why is the multiplier smaller in an open economy?
4. What are the effects of an autonomous increase in import demand on domestic income?

10.8 Examination Oriented Questions

1. Discuss with the help of diagrams how fiscal policy can stabilize income in the face of declining investment.
2. Derive the equilibrium income equation for an open economy Keynesian model.
3. Explain the role of the marginal propensity to import in determining the size of the expenditure multiplier.
4. Compare and contrast the effects of increases in exports and imports on domestic income in the Keynesian framework.
5. Critically evaluate the argument that trade restrictions can be used as a tool for domestic income stabilization.

Lesson 11

Money in the Keynesian system- interest rates and aggregate demand

STRUCTURE

11.0 Objectives

By the end of this lesson, learners will be able to:

- Understand the function of money in the Keynesian system.
- Examine the relationship between interest rates and aggregate demand.
- Identify the channels through which monetary policy affects income.
- Evaluate how various sectors of the economy respond to interest rate changes.

11.1 Learning Outcomes

After completing this lesson, students will be able to:

- Describe how interest rates influence investment and consumption.
- Analyze the effects of monetary expansion on aggregate demand.
- Interpret graphical models demonstrating equilibrium income shifts.
- Assess the sensitivity of different components of aggregate demand to changes in interest rates.

11.3 Introduction

This lesson explores the central role of money and interest rates within the Keynesian economic framework. Keynesian economics emphasizes that changes in the money supply affect income levels indirectly—primarily through their impact on interest rates. A decline in interest rates, triggered by an increase in the money supply, can lead to increased aggregate demand and thereby higher national income. This unit focuses on the intricate linkages between monetary policy, interest rates, investment, and income, illustrating how changes in monetary variables shape macroeconomic outcomes.

11.4 Explanation- The Keynesian System: money, interest, and income-

Here we explain the role of the interest rate and money in the Keynesian system and construct a model that shows how the interest rate and income are jointly determined. earlier, we used this model to provide a more realistic view of how income depends on aggregate demand and to make clear how monetary policy can affect income by having an effect on aggregate demand.

MONEY IN THE KEYNESIAN SYSTEM

Fundamental to Keynes's theory of money was the view that money affects income via the interest rate. An increase in the money supply, for example, lowers the interest rate, and the lower interest rate, in turn, increases aggregate demand and income. We need to examine two links in the chain of events connecting changes in the money supply and changes in income. The first is the relationship between money and the interest rate. The second is the effect of the interest rate on aggregate demand. We begin with the latter one.

Interest Rates and Aggregate Demand

We have already considered the reasons why business investment demand depends on the interest rate. Briefly, an investment project will be pursued only if its expected profitability exceeds the cost of borrowing to finance the project by an amount sufficient to justify the risks of the project. At a high interest rate (borrowing cost), fewer projects satisfy this criterion.

When considering the possible influences of the interest rate, we also need to-consider components of aggregate demand other than business investment. The first of these is residential construction investment. Residential construction is a component of investment in the national income accounts, but the reason such investment is affected by the interest-rate level requires further explanation. The value of newly constructed houses enters the gross domestic product (GDP) accounts as the houses are built. One element of building cost is the cost of short-term borrowing to finance construction of a house. Higher interest rates mean higher costs to the builder and, other things equal, these higher costs discourage housing starts. Moreover, an important factor determining the rate of new housing construction is the overall state of demand for houses, existing and newly constructed. Most home purchases are financed by long-term borrowing in the mortgage market, and high interest rates include high rates of mortgage interest. High mortgage rates increase the cost of buying a house and reduce the demand for new and existing homes. This reduced demand in the housing market lowers the volume of new residential construction.

Additional components of aggregate demand are not counted as investment by the national income accounts but would be included in a broader definition of investment and may be affected by interest-rate changes. The first of these is consumer expenditures on durable goods. Such expenditures are counted as current-quarter consumption in the national income accounts, but to the consumer the purchase of a car or an appliance such as a personal computer or television set is a form of investment. Such purchases are often financed by borrowing, especially car' purchases. Higher interest rates raise the cost of such purchases and should lower this component of aggregate demand.

A final component of aggregate demand that may be affected by interest rates is a subcomponent of government spending. Government spending in the national income accounts includes state and local government spending for services, consumption goods, and investment goods. In the models constructed here, we take government spending to be exogenously fixed by the policymaker. The actual policymaker would be the federal government, and the appropriate policy variable is federal government expenditures. State and local government spending can more properly be considered with private consumption and investment spending. Much of state and local government investment spending is financed by borrowing through bond issues. High interest rates should, in theory, increase such borrowing costs and discourage this part of state and local government expenditures. There are, however, many determinants of the level and timing of such state and local government spending projects and the importance of interest rates in practice remains uncertain.

Within the simple model of Chapter 6, the effects on aggregate demand and equilibrium income as a result of a change in the interest rate are illustrated in Figure 7.1. Initially, we assume that the economy is in equilibrium at Y_0 with aggregate demand at E_0 equal to ($C + I_0 + G_0$), corresponding to an interest rate of r_0. A decline in the interest rate to r_1 shifts the aggregate demand curve up to E_1 equal to ($C + I_1 + G_0$). This shift represents the combined effects of the interest rate on business investment, residential construction investment, consumer expenditures on durable goods, and state and local government investment spending. Equilibrium income rises to Y_1

One important factor determining the change in equilibrium income ($Y_1 - Y_0$) that will occur for a given change in the interest rate is the size of the shift in aggregate

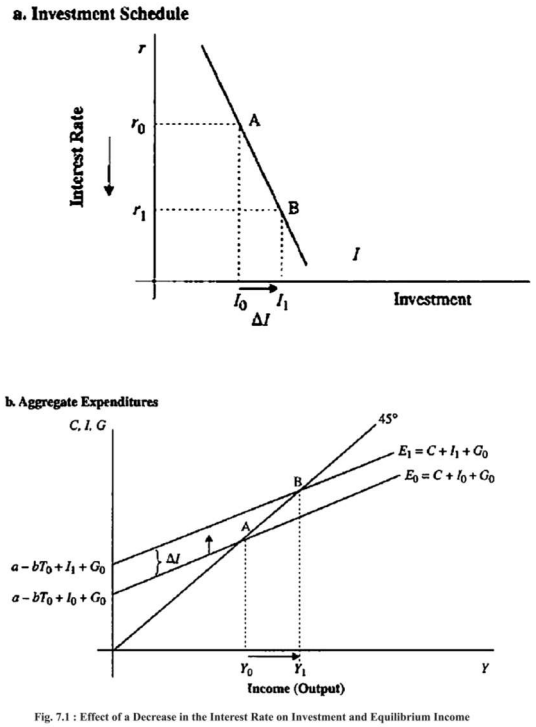


Fig. 7.1 : Effect of a Decrease in the Interest Rate on Investment and Equilibrium Income

Figure 7.1 Effect of a Decrease in the Interest Rate on Investment and Equilibrium Income

In part *a,* as the interest rate decreases from r_0 to r_1, investment increases from I_0 to l_1 In part *b,* this increase in investment, ΔI, shifts the aggregate expenditure schedule up since the intercept is larger, from $E_0 = C + I_0 + G_0$ to $E_1 = C + I_1 + G_0$. Output increases from Y_0 to Y_1.

demand caused by the change in the interest rate. The more sensitive the components of aggregate demand are to interest-rate changes, the larger will be the shift in the aggregate demand function in Figure 7.1 and the greater the effect on equilibrium income. The interest sensitivity of aggregate demand will therefore be important in determining how effective monetary policy will be in affecting equilibrium income.

Figure 7.1a illustrates the idea that investment is negatively related to the interest rate. At interest rate r_0, investment is I_0 at point A on the investment schedule. If the interest rate decreases to r_1 investment increases to I_1 at point B. Looking at figure 7.1b, since investment is a component of aggregate expenditures, the expenditure schedule shifts up, from equilibrium point A to equilibrium point B, and equilibrium income increases from Y_0 to Y_1

In our models, we represent the effect of interest rates on aggregate expenditures as simply an effect on *I,* the investment component of aggregate expenditures. The discussion in this section should, however, be kept in mind. To account fully for the effects of interest rates on aggregate expenditures, we must define investment broadly as including the other components of aggregate expenditure discussed here.

11.5 Let Us Sum Up

Keynes introduced a comprehensive theory of money demand based on three motives: transactions, precautionary, and speculative. While transactions and precautionary demands are positively related to income, speculative demand is strongly influenced by interest rate expectations. Together, these create a total demand for money that shifts with changes in income and interest rates. An increase in money supply lowers interest rates until money market equilibrium is re-established. At very low rates, the speculative motive can dominate, leading to a liquidity trap where monetary policy becomes ineffective.

11.6 Key words

- **Interest Rate (r)**: The cost of borrowing or the return on lending.
- **Liquidity Trap**: A situation where low interest rates render monetary policy ineffective.
- **Speculative Motive**: The desire to hold cash to avoid capital losses on bonds.
- **Transactions Motive**: The need for cash to facilitate daily spending.
- **Precautionary Motive**: The desire to hold cash for emergencies or unforeseen events.
- **Money Market**: The market where demand and supply of money determine interest rates.

11.7 Suggested Readings

1. Keynes, J. M. *The General Theory of Employment, Interest, and Money*.
2. Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
3. Mankiw, N. G. *Principles of Macroeconomics*.
4. Froyen, R. T. *Macroeconomics: Theories and Policies*.

11.8 Hints to Check Your Progress

- Can you explain each of the three motives for holding money?
- How does income affect the transactions and precautionary demand for money?
- What happens when the money supply increases at a constant level of income?
- Why is speculative demand inversely related to interest rate?
- What is the significance of the liquidity trap in Keynesian theory?

11.9 Examination Oriented Questions

1. Define speculative demand for money.
2. What is meant by the liquidity trap?
3. Explain the role of income in the Keynesian money demand function.
4. Discuss the three motives for holding money according to Keynes.
5. Analyze the impact of an increase in the money supply on interest rates and money market equilibrium.
6. Explain the speculative demand for money with the help of bond pricing and interest rate expectations.
7. How does Keynesian theory of money demand differ from classical views?

Lesson 12, Keynesian theory of interest rate

M.A. Eco. Sem 1I **Keynesian theory of interest rate** **Unit–II**

ECO- 202 **Lesson 12**

STRUCTURE

12.0 Objectives

The primary objectives of this lesson are to:

- Introduce Keynes's theory of interest rate determination.
- Explain how money and bonds are conceptualized in the Keynesian model.
- Understand the role of liquidity preference in determining interest rates.
- Illustrate the relationship between money demand, money supply, and equilibrium interest rates.

12.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Describe the Keynesian perspective on how interest rates are determined.
- Differentiate between money and bonds in the context of portfolio allocation.

- Analyze how changes in money supply or demand influence interest rates.
- Apply the equilibrium condition between money supply and money demand to interpret real-world monetary policy outcomes.

12.2 Introduction

In this lesson, we explore how interest rates are determined in the Keynesian framework, with a specific focus on the role of money. Unlike the classical approach, which links interest rates to savings and investment, Keynes emphasized the demand and supply of money as key determinants. This theory highlights how individuals allocate their wealth between money (a liquid, typically non-interest-bearing asset) and bonds (interest-earning financial instruments). The equilibrium interest rate, according to Keynes, arises when money demand equals money supply. This lesson lays the foundation for understanding monetary policy, financial decision-making, and liquidity preferences in the broader macroeconomic context.

12.3 Explanation- The Keynesian theory of the interest rate

The next relationship we consider is that between the quantity of money and the rate of interest. Keynes believed that the quantity of money played a key role in determining the rate of interest, and he structured his theory of interest-rate determination to highlight that role.

The Keynesian analysis begins with some simplifying assumptions. First, Keynes assumed that all financial assets can be divided into two groups: (1) money and (2) all nonmoney assets, which we term bonds.

Money can be thought of as the narrowly defined money supply that in the official U.S. monetary statistics is called Ml. Ml consists of currency plus bank accounts on which a person can write checks. The ”bond" category includes actual bonds plus other long-term financial assets, primarily corporate equities (stock). The *long-term* (bonds) versus *short-term* (money) distinction is the crucial one. In addition, for a long time bonds were the interest-earning asset, and money paid no interest. It is still true that part of the money supply, currency and some checkable accounts, pay no interest, but interest is paid on some components of Ml. We first explain the Keynesian theory of interest-rate determination *under the assumption that all money pays no interest. We* then explore the implications of having interest paid on some parts of the money stock.

Also, to keep things simple, we consider bonds in the model to be homogeneous in all respects. As in our discussion of the classical system, we assume that bonds are perpetuities, promises to

pay fixed amounts at fixed intervals in the future (e.g., one dollar per year), with no repayment of principal.

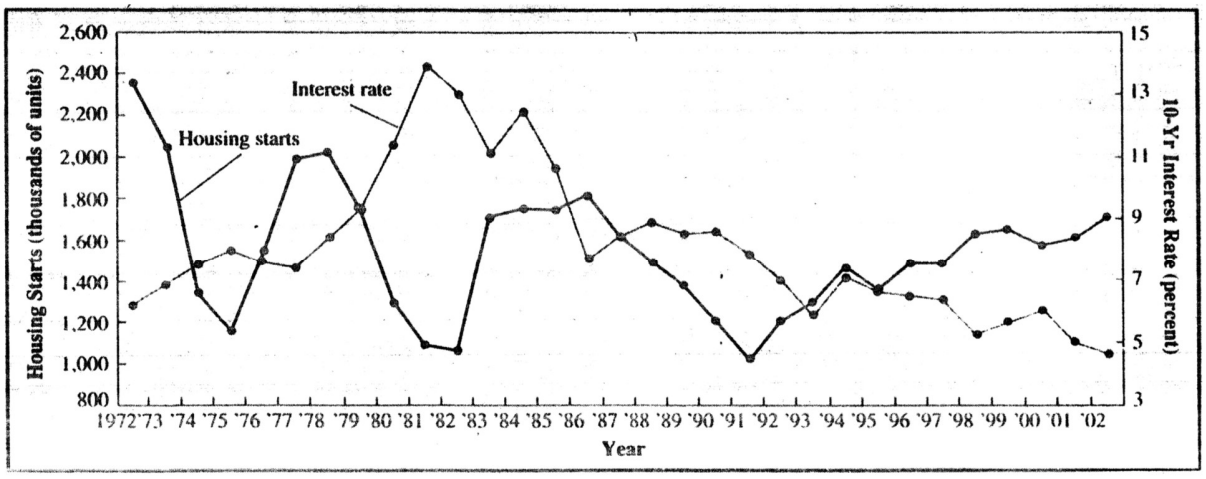


Fig. 7.2 : Housing Starts and the Interest Rate, 1972-2002

Within this simplified framework, Keynes considers the way in which individuals decide how to allocate their financial wealth between the two assets, money (M) and bonds (B). At a point in time, wealth (Wh) is fixed at some level, and because bonds and money are the only stores of wealth, we have

$$Wh = B + M \qquad (7.1)$$

The equilibrium interest rate on bonds is that rate at which the demand for bonds is equal to the existing stock of bonds. It might seem most natural to develop a theory of the equilibrium interest rate by studying the factors that directly determine the supply of and demand for bonds. Keynes did not proceed in this manner. Note that given equation (7.1), there is only one independent portfolio decision, the split between money and bonds. If, for an individual, wealth is equal to $50,000, the decision to hold $10,000 in the form of money implicitly determines that bond holdings will be the remainder, $40,000. In terms of equilibrium positions, this means that a person who is satisfied with the level of money holdings relative to total wealth is, by definition [equation (7.1)], satisfied with the bond holdings; this person is at the optimal split of wealth between the two stores of valued To say, for example, that the demand for money exceeds the supply is to say, in the aggregate, that the public is trying to increase the proportion of wealth held in the form of money. This is definitionally the same as saying that the supply of bonds exceeds the demand; the public is trying to reduce the proportion of wealth held as bonds.

Consequently, there are two equivalent ways to describe the equilibrium interest rate: as the rate that equates the supply of and demand for bonds or, alternatively, as the rate that equates the supply of money with the demand for money. Equilibrium in one market implies equilibrium in the other. Keynes chose the latter of these perspectives because he wished to emphasize the relationship between money and the interest rate.

This Keynesian view of interest rate determination is illustrated in Figure 7.3. The money supply is assumed to be fixed exogenously by the central bank at M^s_0. The equilibrium interest rate is r_Q, the rate at which money demand, given by the money demand schedule M^d in the graph, is just equal to the fixed money supply.

In a more fundamental sense, the equilibrium rate of interest is determined by factors affecting the supply of money and money demand. In the case of supply, the major factor will be the policies of the central bank. We turn now to the factors that Keynes believed determined money demand, the factors determining the position and slope of the M^d schedule in the figure.

12.4 Let Us Sum Up

Keynes introduced a comprehensive theory of money demand based on three motives: transactions, precautionary, and speculative. While transactions and precautionary demands are positively related to income, speculative demand is strongly influenced by interest rate expectations. Together, these create a total demand for money that shifts with changes in income and interest rates. An increase in money supply lowers interest rates until money market equilibrium is re-established. At very low rates, the speculative motive can dominate, leading to a liquidity trap where monetary policy becomes ineffective.

12.5 Key words

- **Interest Rate (r)**: The cost of borrowing or the return on lending.
- **Liquidity Trap**: A situation where low interest rates render monetary policy ineffective.
- **Speculative Motive**: The desire to hold cash to avoid capital losses on bonds.
- **Transactions Motive**: The need for cash to facilitate daily spending.
- **Precautionary Motive**: The desire to hold cash for emergencies or unforeseen events.
- **Money Market**: The market where demand and supply of money determine interest rates.

12.6 Suggested Readings

1. Keynes, J. M. *The General Theory of Employment, Interest, and Money*.
2. Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
3. Mankiw, N. G. *Principles of Macroeconomics*.
4. Froyen, R. T. *Macroeconomics: Theories and Policies*.

12.7 Hints to Check Your Progress

- Can you explain each of the three motives for holding money?
- How does income affect the transactions and precautionary demand for money?
- What happens when the money supply increases at a constant level of income?
- Why is speculative demand inversely related to interest rate?
- What is the significance of the liquidity trap in Keynesian theory?

12.8 Examination Oriented Questions

Short Answer Questions

1. Define speculative demand for money.
2. What is meant by the liquidity trap?
3. Explain the role of income in the Keynesian money demand function.

Long Answer Questions

1. Discuss the three motives for holding money according to Keynes.
2. Analyze the impact of an increase in the money supply on interest rates and money market equilibrium.
3. Explain the speculative demand for money with the help of bond pricing and interest rate expectations.
4. How does Keynesian theory of money demand differ from classical views?

Lesson 13: The Keynesian Theory of Money Demand – Total Demand for Money and the Effect of an Increase in Money Supply

M.A. Eco. Sem 1I	**Keynesian theory of Money Demand**	**Unit–II**
ECO- 202		**Lesson 13**

STRUCTURE

13.0 Objectives

- To explain the Keynesian theory of money demand.
- To distinguish between the transactions, precautionary, and speculative motives.
- To illustrate the relationship between money demand, income, and interest rates.
- To analyze the impact of a change in the money supply on market equilibrium.
- To understand the concept of the liquidity trap and its implications.

13.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Define and differentiate the three Keynesian motives for holding money.
- Understand the relationship between money demand, interest rate, and income.

- Interpret the Keynesian money demand function.
- Explain how changes in money supply influence interest rates and market equilibrium.
- Analyze graphical representations of money demand and equilibrium.

13.2 Introduction

The Keynesian theory of money demand is a cornerstone of modern macroeconomic thought. John Maynard Keynes offered a nuanced understanding of why individuals and firms hold money rather than investing in interest-bearing assets. According to Keynes, money is not merely a medium of exchange but also a store of value influenced by income and interest rate expectations. His theory introduces three fundamental motives for holding money: transactions, precautionary, and speculative. This lesson delves into each of these motives and examines how changes in the money supply affect equilibrium in the money market.

13.3 Explanation - The Keynesian Theory of Money Demand

Keynes considered three motives for holding money.

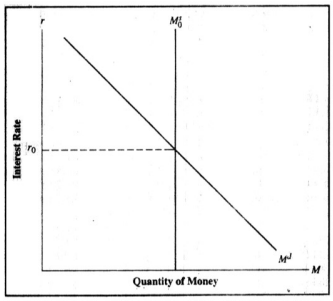
Transactions Demand

The first motive Keynes considered is the transactions motive. Money is a medium of exchange, and individuals hold money for use in transactions. Money bridges the gap between the receipt of income and eventual expenditures. The amount of money held for transactions would vary positively with the volume of transactions in which the individual engaged. Income is assumed to be a good measure of this volume of

Figure 7.3

Determination of the Equilibrium Interest Rate

In the Keynesian system, the equilibrium interest rate (r_0) is the interest rate that equates money supply and money demand transactions, and thus the



transactions demand for money is assumed to depend positively on the level of income.

Money received in one transaction can be used to buy bonds, which could then be sold to get money again when the time came for expenditure. The gain from doing so is the interest earned for the time the bonds were held. Brokerage fees involved in buying bonds and the inconveniences of a great number of such transactions would make it unprofitable to purchase bonds for small amounts to be held for short periods. Some money would be held for transactions. Still, there is room to *economize* on transaction balances by such bond purchases. Because the return to be gained is interest earnings on bonds, we would expect the incentive to economize on transaction balances to increase as the interest rate increases. Consequently, in addition to depending positively on income, the transactions demand for money would be expected to be negatively related to the rate of interest.

Keynes did not emphasize the interest rate when discussing the transactions motive for holding money, but it has proved to be important, especially for the business sector. Firms with a high volume of transactions can, by cash management practices, reduce considerably their average money holdings. The incentive to make the expenditures required for such cash management depends on the rate of interest.

Precautionary Demand

Keynes believed that, beyond money held for planned transactions, additional money balances were held in case of unexpected expenditures such as medical or repair bills. Keynes termed money held for this motive the precautionary demand for money. He believed that the amount held for this purpose depends positively on income. Again, the interest rate might be a factor if people tended to economize on the amount of money held for the precautionary motive as interest rates rose. Because the motives for holding precautionary balances are similar to those for transactions demand, we simplify our discussion here by subsuming the precautionary demand under the transactions demand category, transactions being expected or unexpected ones.

Speculative Demand

The final motive for holding money that Keynes considered was the speculative motive. This is the novel part of Keynes's analysis of money demand. Keynes began by asking why an individual would hold any money above that needed for the transactions and precautionary motives when bonds pay interest and money does not. Such an additional demand for money did exist, Keynes believed, because of the uncertainty about future interest rates and the relationship between changes in the interest rate and the price of bonds. If interest rates were expected to move in such a way as to cause capital losses on bonds, it was possible that these expected losses would outweigh the interest earnings on the bonds and cause an investor to hold money instead. Such money would be held by those "speculating" on future changes in the interest rate. To see how such speculation works, we analyze the relationship between the interest rate and bond prices.

Consider the case of a perpetuity, which is what we have been assuming the bonds in our model to be. Suppose that at some point in the past you paid the then prevailing market price of $1,000 to buy a government bond that entitles you to payment of $50 per year, termed the coupon payment. You bought a perpetual bond at a price of $1,000, at a market interest rate of 5 percent (50/1,000 = 0.05, or 5 percent). How much would this bond be worth if you tried to sell it today? The value of a financial asset that entitles the owner to a coupon payment of $50 per year depends on the *current* market rate of interest. First, suppose the current market rate of interest is 5 percent, the same as the interest rate that prevailed when you bought the bond. In this case, the bond would still sell for $1,000; at that price, it would yield the current interest rate of 5 percent.

Next, consider the case in which the market interest rate has risen to 10 percent over the time since you purchased the bond. The going price today for a bond with a coupon payment of $50 per year is $500 (50/500 = 0.10, or 10 percent). Your bond has no feature that will enable you to sell it for more. Even though you paid $1,000, given the rise in interest rates, you will be able to sell it only at a *capital loss* for $500, the price that makes it competitive at *current* market rates. *A rise in the market interest rate results in a capital loss on previously existing bonds.*

If, instead, from the time you purchased the bond, the market interest rate had fallen, then the value of your bond would have increased. If the interest rate had declined from 5 percent to 2 percent, the bond price would have increased from the $1,000 you paid to $2,500. At that price, your bond, which has a coupon of $50 per year, will pay 2 percent (50/2,500 = 0.02, or 2 percent). Thus, *a decline in interest rates results in a capital gain on previously existing bonds.* With this relationship between bond prices and interest-rate changes in mind, we return to the question of the relative desirability of money and bonds.

The expected returns on the two assets can be expressed as follows:

return on money	=	**0**	
expected return on bonds	=	interest earnings (= r)	(+) expected capital gain or (-) expected capital loss

The return on money is zero, because it earns no interest (our assumption so far) and because its value is not subject to capital gains or losses as the interest rate changes.[1] Money has a fixed price. The bond will pay an interest rate of r. The *expected* return on bonds will equal this interest return plus or minus any expected capital gain or loss. For reasons just discussed, an investor who expected interest rates to fall would expect a capital gain, and one who expected interest rates to rise would expect a capital loss. This uncertainty about the future course of interest rates is crucial to Keynes's analysis.

Suppose that an investor believes interest rates will fall. Bonds then have the higher expected return. They pay interest and are expected to yield a capital gain. If interest rates are expected to rise, however, it is possible that the expected capital loss on bonds will outweigh the interest

earnings. The expected return on, bonds would be negative in such a case, and money would be the preferred asset. Money held in anticipation of a fall in bond prices (a rise in interest rates) is Keynes's speculative demand for money.

To this point, we have a relationship between the amount of money demanded and expected future *changes* in interest rates. Keynes converts this to a relationship between money demand and the *level* of the interest rate by an assumption about how people form expectations about future interest-rate changes. He assumes that investors have a relatively fixed conception of the "normal" interest rate. When the actual interest rate is above the normal rate, investors expect the interest rate to fall. When the interest rate is below the normal rate, they expect it to rise. Given this assumption about how expectations about interest rates are formed, we can develop a relationship between the level of the speculative demand for money and the interest rate. We do so first for an individual investor and then consider the corresponding aggregate relationship.

For the individual investor, the demand curve for speculative balances is shown in Figure 7.4a. Here M_i^2 represents the speculative demand for money by the ith individual, and M_i^1 is the person's transactions demand. We have then

$$M_i^1 + M_i^2 = M_i$$

and

$$M_i + B_i = Wh_i$$

where M_i, B_i, and Wh_i are the individual's total money holdings, bond holdings, and wealth, respectively.

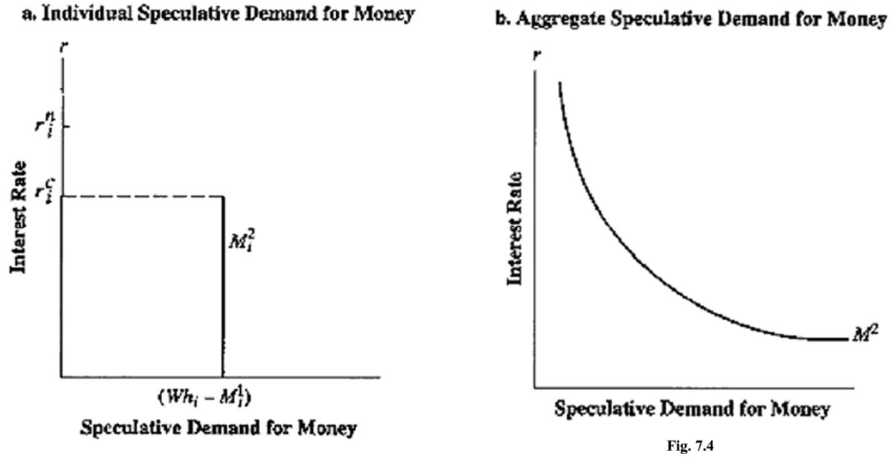


Fig. 7.4

Following Keynes's theory, the individual is assumed to have a preconceived view of the normal interest rate. This rate is shown as r_i^n in Figure 7.4a. Because at rates of interest above r_i^n, interest rates are expected to fall, at those rates bonds will be preferred to money as an asset. The speculative demand for money will be zero, and bond holdings will equal $(Wh_i - M_i^1)$.. The speculative demand for money will also be zero for interest rates over a certain range below r_i^n. If

the interest rate is not too far below r_i^n, the interest earnings on the bond will be greater than the small expected capital loss. The expected capital loss will be small because only a small rise in *r* will be expected as *r* returns to r_i^n.

There is a level of the interest rate below r_i^n, however, at which the expected capital loss on bonds, which increases as the interest rate declines below r_i^n, will come to just equal the interest earnings on the bond. We term this value of the interest rate the individual's critical interest rate *(* r_i^c *).* Below this rate, money will be preferred. The individual will sell bonds and hold speculative balances of (Wh_i- M_i^l), which means that all of this person's wealth will be held in money.

Keynes assumed that different individuals had different views as to what was a "normal" interest rate. As the interest rate fell, beginning, for example, at a very high rate where there was very little speculative demand, the rate would move successively below the critical rates of different investors. The lower the interest rate, the more investors would find that, given their view of the normal rate, money was the preferred asset. At a very low interest rate, almost all investors would come to expect the interest rate to rise substantially in the future ($r < r_i^c$), and money would be almost universally preferred as an asset. Proceeding in this manner, we construct the aggregate demand for speculative balances shown in Figure 7.*4b.*

The curve is smooth, reflecting the gradual increase in the speculative demand for money at successively lower interest rates. The curve flattens out at a very low rate of interest, reflecting that at this low rate, there is a general expectation of capital losses on bonds that outweigh interest earnings. At this rate, increments to wealth would be held in the form of money, with no further drop in the interest rate. Keynes termed this situation the liquidity trap. For the most part, however, we assume that we are on the downward-sloping portion of the speculative demand for money curve.

The Total Demand for Money

We have looked at the three motives for holding money in the Keynesian system and can now put these together to construct the total money demand function. The transactions demand and the precautionary demand vary positively with income and negatively with the interest rate. The speculative demand for money is negatively related to the interest rate. Taking those factors together, we can write total money demand as

$$M^d = L(Y, r) \quad (7.3)$$

where Y is income and *r* is the interest rate. A rise in income increases money demand; a rise in the interest rate decreases money demand. In the following analysis, we at times make the simplifying assumption that the money demand function is linear:

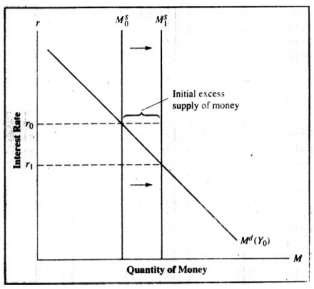
$$M^d = c_Q + c_1 Y - c_2 r \qquad c_1 > 0; \quad c_2 > 0 \quad (7.4)$$

Equation (7.4) assumes that we can plot the money demand function as a straight line on our graphs. The parameter c_1, is the increase in money demand per unit increase in income, and $c_2$gives the amount by which money demand declines per unit increase in the interest rate.

Figure 7.5

Equilibrium in the Money Market

An increase in the money stock from M_0^s to M_1^s causes an initial excess supply of money. The interest rate falls from r_0 to r_1 to restore equilibrium in the money market.



The Effects of an Increase in the Money Supply

In Figure 7.5, we plot this linear Keynesian money demand schedule [equation (7.4)] as a function of the interest rate and illustrate the effect of an increase in the money supply on the money market. The money demand function, M^d, is downward-sloping; a decline in the interest rate, for example, increases the demand for money. To fix the position of the money demand function, we must fix the level of income. The curve in Figure 7.5 is drawn for a level of income Y_0. An increase in income shifts the curve to the right, reflecting the fact that, for a given interest rate, money demand increases with income. The money supply is assumed to be an exogenously controlled policy variable set initially at M^s_0.

Now consider the effects of an increase in the money supply to the level shown by the Mf schedule in Figure 7.5. At the initial equilibrium interest rate r_0, after the money supply increases, there is an excess supply of money. At r_0 people are not content to hold the new money. They attempt to decrease their money holdings by buying bonds. The increase in the demand for bonds decreases the rate of interest suppliers of bonds (borrowers) offer to sell their bonds. The fall in the interest rate causes the demand for money to rise, and a new equilibrium is reached at interest rate r_1.

13.4 Let Us Sum Up

Keynes introduced a comprehensive theory of money demand based on three motives: transactions, precautionary, and speculative. While transactions and precautionary demands are positively related to income, speculative demand is strongly influenced by interest rate expectations. Together, these create a total demand for money that shifts with changes in income and interest rates. An increase in money supply lowers interest rates until money market equilibrium is re-established. At very low rates, the speculative motive can dominate, leading to a liquidity trap where monetary policy becomes ineffective.

13.5 Key words

- **Interest Rate (r)**: The cost of borrowing or the return on lending.
- **Liquidity Trap**: A situation where low interest rates render monetary policy ineffective.
- **Speculative Motive**: The desire to hold cash to avoid capital losses on bonds.
- **Transactions Motive**: The need for cash to facilitate daily spending.

- **Precautionary Motive**: The desire to hold cash for emergencies or unforeseen events.
- **Money Market**: The market where demand and supply of money determine interest rates.

13.6 Suggested Readings

1. Keynes, J. M. *The General Theory of Employment, Interest, and Money*.
2. Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
3. Mankiw, N. G. *Principles of Macroeconomics*.
4. Froyen, R. T. *Macroeconomics: Theories and Policies*.

13.7 Hints to Check Your Progress

- Can you explain each of the three motives for holding money?
- How does income affect the transactions and precautionary demand for money?
- What happens when the money supply increases at a constant level of income?
- Why is speculative demand inversely related to interest rate?
- What is the significance of the liquidity trap in Keynesian theory?

13.8 Examination Oriented Questions

Short Answer Questions

1. Define speculative demand for money.
2. What is meant by the liquidity trap?
3. Explain the role of income in the Keynesian money demand function.

Long Answer Questions

1. Discuss the three motives for holding money according to Keynes.
2. Analyze the impact of an increase in the money supply on interest rates and money market equilibrium.
3. Explain the speculative demand for money with the help of bond pricing and interest rate expectations.
4. How does Keynesian theory of money demand differ from classical views?

Unit-III

The Keynesian system versus classical

M.A. Eco. Sem 1I **The Keynesian Aggregate Demand Schedule** **Unit–III**

ECO- 202 **Lesson 14**

STRUCTURE

14.0 Objectives

- To understand the construction of the Keynesian Aggregate Demand curve.
- To analyze the interaction between the IS-LM framework and price level changes.
- To examine how shifts in aggregate demand impact equilibrium output.
- To contrast the Keynesian approach with the classical model.

14.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Illustrate how the aggregate demand curve is derived using the IS-LM model.
- Explain the influence of price level changes on real money supply and interest rates.
- Assess how monetary and fiscal policy shifts affect the AD curve.

- Differentiate between demand-determined and supply-determined output frameworks.

14.2 Introduction

In classical economics, output is primarily determined by supply-side factors under the assumptions of flexible prices and wages. However, Keynesian theory introduces a demand-driven perspective, especially under conditions of price and wage rigidity. This lesson explores how aggregate demand (AD) plays a central role in output determination, even when we relax the assumptions of fixed prices and wages. The analysis bridges the gap between the classical and Keynesian models, emphasizing the synthesis where both demand and supply interact to determine output and price levels.

14.3 Explanation

The Keynesian System and Aggregate Demand

The fixed price-fixed wage version of the Keynesian system highlights the role of aggregate demand. The demand-determined nature of output in this fixed price-fixed wage Keynesian model stands in sharp contrast to the supply-determined nature of output in the classical system.jln this chapter, we examine the Keynesian system when prices and wages are not held constant and see that demand factors as well as supply factors play a role in determining output in this sense the models considered in this chapter are a synthesis of the classical and Keynesian systems. We see, however, that the key feature in the Keynesian system continues to be the fact that aggregate demand is a factor determining aggregate output.

Earlier, we illustrate the demand-determined nature of output (income) in the Keynesian system. Here we construct a Keynesian aggregate demand curve. In earlier section, this Keynesian aggregate demand curve is put together with the classical supply side. It will be seen that as long as we retain the classical assumptions of perfect information in the labor market and perfect price and wage flexibility, the substitution of the Keynesian aggregate demand curve does not change the classical nature of the mode. As long as the supply curve remains vertical, as it does if the foregoing labor market assumptions are made, aggregate output will be determined independently of demand. For aggregate demand to play a role in output determination, the classical labor market assumptions must be modified.

Alternative Keynesian assumptions about the supply side of the economy are analyzed in sections 9.3 and 9.4. In these sections, we develop the Keynesian aggregate supply function. In section 9.5, we see how shifts in this aggregate supply function play a role in determining price and output in the Keynesian model.. The final section of the chapter compares the classical and Keynesian systems.

THE KEYNESIAN AGGREGATE DEMAND CURVE

The simple model of Chapter 6 presented Keynes's theory of the aggregate demand for output. The essential notion embodied in the simple Keynesian model was that for output to be at an equilibrium level, aggregate demand must equal output. The effect of the interest rate on investment, and hence on aggregate demand, was considered. It was shown that in order for an output (Y) and interest-rate (r) combination to be an equilibrium point, output must equal aggregate demand, and money demand must equal money supply.

What guarantees that this level of output will also be equal to aggregate supply—equal to the amount the business sector will choose to produce? No supply considerations were included in these versions of the Keynesian model. Our implicit assumption about the aggregate supply curve is depicted in Figure 9.1. We assumed that any level of output demanded would be forthcoming at the given price level. Supply was assumed to be no constraint on output.

Such an assumption could be plausible when the levels of output are far below the capacity of the economy. In these conditions – for example, during the Depression of the 1930s-increases in output might not put upward pressure on the level of the money wage, given the high level of unemployment. Also, the marginal product of

Figure 9.1

Aggregate Supply Curve in the Fixed-Price Keynesian Model

In previous chapters on the Keynesian model, where the price level was fixed and output was determined by aggregate demand, we were assuming that the aggregate supply . curve was horizontal. Supply was no constraint on output.

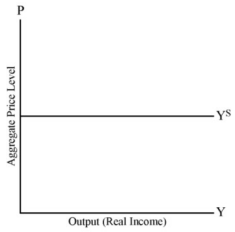


Fig. 9.1 : Aggregate Supply Curve in the Fixed-Price Keynesian Model

labor (MPN) might not fall as more labor is employed when we begin at a low level of employment (see Figure 3.1). As a consequence, the cost of producing additional units of output W/MPN might remain constant even with increases in output. In more normal conditions, an increase in output would put upward pressure on both the wage and price levels. We would expect the supply curve to be upward-sloping.

In this more general case of the upward-sloping aggregate supply curve, we cannot assume that price is given (supply is no constraint) and determine output simply by determining aggregate demand. Output and price will be jointly determined by supply and demand factors. The Keynesian aggregate supply curve is discussed in sections 9.3 and 9.4. First we construct the Keynesian aggregate demand curve, the relationship between aggregate demand and the price level in the Keynesian model. This aggregate demand curve will later be put together with the Keynesian aggregate supply curve to jointly determine price and output.

The factors that determine aggregate demand in the Keynesian system have been analyzed in detail. These factors determine the positions of the *IS* and LM curves and, therefore, the income-interest-rate combination that equilibrates the money market and causes output to equal aggregate demand. In constructing an aggregate demand schedule, we want to find output demanded for each price level. To do this, we examine how the position of the *IS* and LM schedules, and consequently the levels of the interest rate and output at which the curves intersect, are affected by price changes. The level of output at which the *IS* and LM schedules intersect for a given price level is a point on the Keynesian aggregate demand curve. Consider, first, how a change in the price level affects the position of the *IS* curve. The condition for equilibrium along the *IS* schedule is

$$I(r) + G = S(Y) + T \qquad \textbf{(9.1)}$$

where I = investment

G = government spending

S = saving

T = taxes

Y - output

To see how the price level influences the position of the *IS* schedule, consider how each variable in (9.1) is affected by price changes.

Two variables, government spending (G) and taxes (T), are assumed to be fixed by the government in *real terms;* that is, we have assumed and will continue to assume that their real levels are unaffected by price changes. The level of investment is also assumed to be determined in real terms; a given interest rate determines a level of real investment. Changes in the price level do not *directly* affect investment.

Similarly, *real* saving is assumed to depend on real income and is not directly affected by changes in the price level. None of the four terms in (9.1), the *IS* curve equilibrium condition, depends directly on the price level, so a change in the price level does not shift the *IS* curve.

What about the LM schedule? The equilibrium condition for the money market, the LM schedule equation, is

$$\frac{M}{p} = l(y, r) \qquad \textbf{(9.2)}$$

The condition equates the real supply of money (M/P) with the demand for money in real terms (demand for real money balances). The real money supply is equal to the exogenously fixed *nominal* money supply (M) divided by the price level (P).

The Keynesian theory of the demand for money considered in Chapter 7 related the demand for money in *real* terms to the level of *real* income and to the interest rate, although as long as prices were held constant, there was no need to distinguish between changes in real and nominal values. People wish to hold a certain amount of real money balances for a given volume of transactions measured in real (constant-dollar) terms, where real income is a proxy for the real volume of transactions. Consequently, equilibrium in the money market occurs when the demand for real

money balances is just equal to the real money supply. It is the nominal money supply—not the real money supply—that can be exogenously fixed by the monetary authority. Any change in the price level will affect the real money supply and consequently will shift the *LM* schedule.

Figure 9.2a illustrates the effect of changes in the price level on the real money supply and, therefore, on the position of the *LM* schedule. Holding the nominal money supply fixed at M_0, three price levels are considered, where $P_2 > P_1 > P_0$. Notice that as we consider the effect of a price increase from P_0 to P_1 then from P_1 to P_2, at the higher price level the *LM* schedule is shifted to the left. The effect of a higher price level reduces the real money supply,

$$\left(\frac{M_0}{P_2}\right) < \left(\frac{M_0}{P_1}\right) < \left(\frac{M_0}{P_0}\right).$$

Overall, the effect of a higher price level is the same as that of a fall in the nominal supply of money; both reduce the real money supply (M/P). The *LM* schedule shifts to the left, raising the interest rate and lowering investment and aggregate demand.

In Figure *9.2b,* we plot the level of the aggregate demand corresponding to each of the three price levels considered. This schedule, labeled Y^d, is the aggregate demand schedule. As can be seen from the construction of the curve, this level of output demanded is the equilibrium output level from the *1S-LM* curve model, the output level that for a given price level just equates output and aggregate demand while simultaneously clearing the money market.

The aggregate demand curve reflects monetary influences (factors that affect the *LM* schedule) as well as direct influences on aggregate demand (factors affecting the IS schedule). Factors that increase the level of equilibrium income in the *IS-LM* curve model (increase the level of output demanded at a given price level) will shift the aggregate demand curve to the right. Factors that cause equilibrium income to decline in the *IS-LM* curve framework will shift the aggregate demand schedule to the left.

Consider, for example, the effect of an increase in the money supply, from M_0 to M_1, as shown in Figure 9.3. From equilibrium point A,

$$\mathrm{LM}\left(\frac{M_0}{p_0}\right),$$

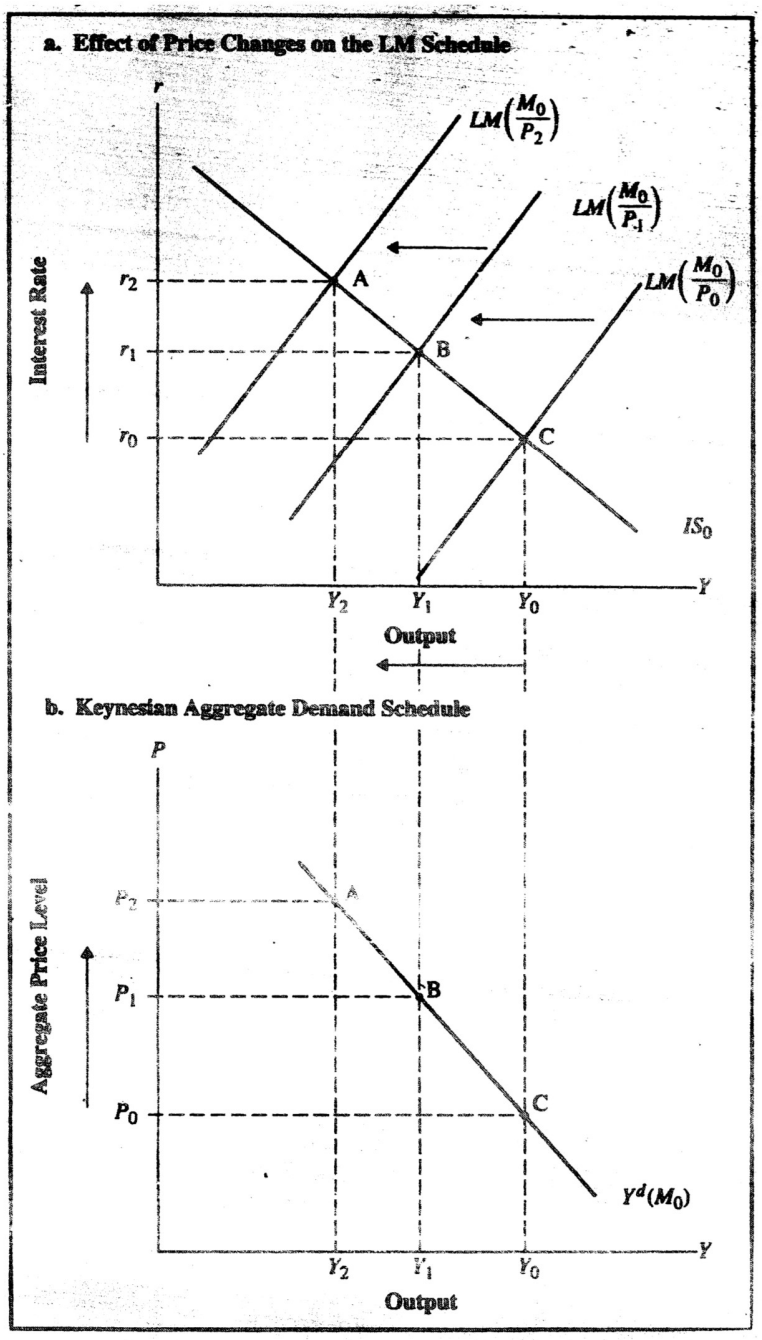


Figure 9.2 Construciton of the aggregate Demand Schedule

At Successively higher price levels, P_0, P_1, P_2, the LM schedule in part a is shifted farther to the left. This shift results in successively lower levels of aggregate demand Y_0, Y_1 , Y_2. These combinations of price and aggregate demand are plotted to give the negatively slopped aggregate demand schedule in part b.

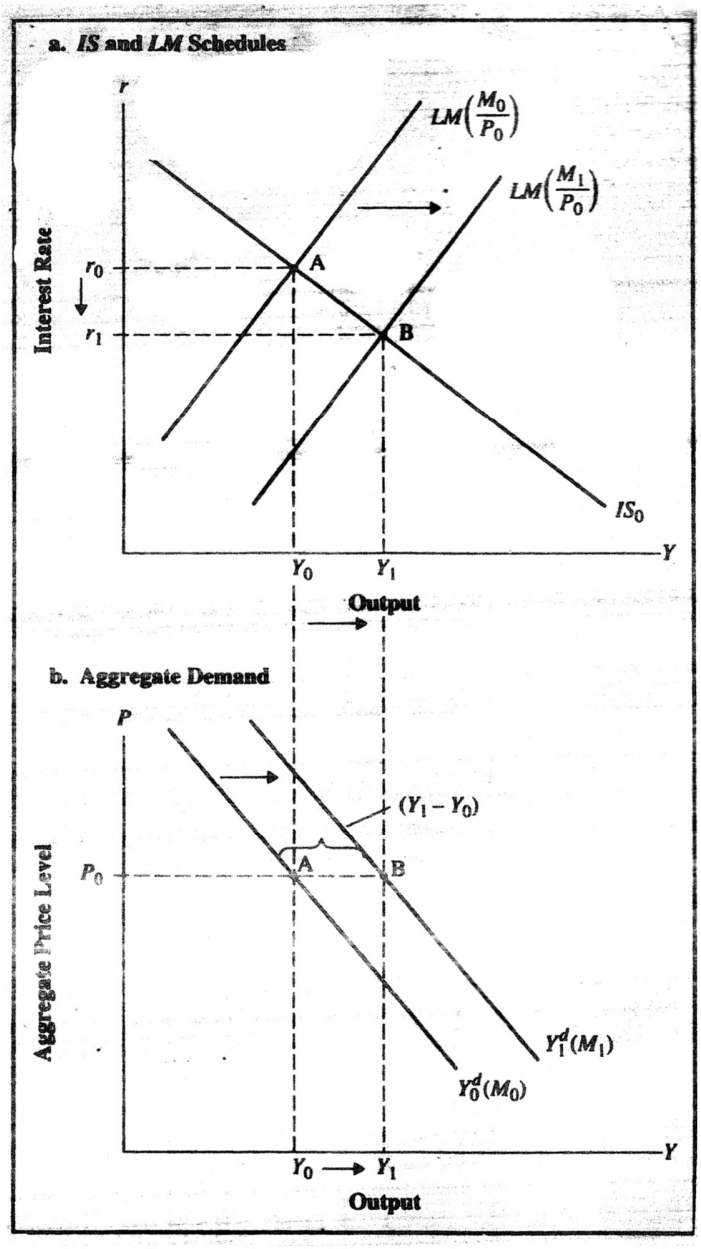


Figure 9.3 Effect on Aggregate Demand of an Increase in the Money Supply

the increase in the money supply shifts the LM schedule to

$$LM\left(\frac{M_1}{p_0}\right),$$

The new equilibrium point is at B, as shown in Figure 9.3a. Equilibrium income for a given price level P_0 in the figure increases from Y_0 to Y_1 The aggregate demand curve shown in Figure *9.3b* shifts to the right, from Y_0^d to Y_1^d. [1] Notice that the distance of horizontal shift in the aggregate demand curve is (Y_1 - Y_0), the amount of the increase in equilibrium income in the *IS-LM* curve model. This is the increase in income and aggregate demand that results *at a given price level.* Similarly, changes in government expenditures or taxes that shift the *IS* schedule shift the aggregate demand schedule such that the distance of the horizontal shift in the schedule equals the amount of the change in equilibrium income from the *IS-LM.* curve model—the amount of the change in aggregate demand for a given price level.

14.4 Let Us Sum Up

This lesson explored the Keynesian Aggregate Demand schedule in a framework where prices and wages are flexible. Unlike the classical model, where output is supply-determined, the Keynesian model incorporates demand-side dynamics through the IS-LM framework. The aggregate demand curve, constructed through the interaction of interest rates, real balances, and investment, exhibits a downward slope. Shifts in monetary and fiscal policies directly influence the position of this curve.

14.5 Key words

- **Aggregate Demand (AD)**: Total demand for goods and services at various price levels.
- **IS Curve**: Shows combinations of interest rates and output where the goods market is in equilibrium.
- **LM Curve**: Shows combinations where the money market is in equilibrium.
- **Real Money Supply (M/P)**: Nominal money supply adjusted for the price level.
- **Equilibrium Output**: The level of output where aggregate demand equals aggregate supply.

14.6 Suggested Readings

- Mankiw, N. G. (2021). *Macroeconomics* (11th Edition). Worth Publishers.
- Dornbusch, R., Fischer, S., & Startz, R. (2018). *Macroeconomics*.
- Blanchard, O. (2017). *Macroeconomics* (7th Edition). Pearson Education.
- Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*.
- Froyen, T. Richard. *Macroeconomics*

14.7 Hints to Check Your Progress

- Recall how price level affects the real money supply and the LM curve.
- Remember that the IS curve is not directly influenced by price changes.
- Understand the mechanism through which changes in the LM curve shift the AD curve.
- Identify the conditions under which the Keynesian model reduces to the classical model.

14.8 Examination-Oriented Questions

Short Answer Type:

1. What is the shape of the Keynesian aggregate demand curve? Why?
2. How does a change in the price level affect the LM curve?
3. Why doesn't the IS curve shift with changes in the price level?

Long Answer Type:

1. Explain the derivation of the Keynesian aggregate demand curve using the IS-LM framework.
2. Discuss how monetary and fiscal policy can shift the aggregate demand schedule.
3. Compare and contrast the classical and Keynesian views of output determination.
4. Examine the impact of a fall in the price level on investment, interest rates, and aggregate demand.

Lesson 15. The Keynesian aggregate demand schedule combined with the classical theory of aggregate supply

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M.A. Eco. Sem 1I The Keynesian Aggregate Demand Schedule Unit–III
Combined with the Classical theory of aggregate supply
ECO- 202 Lesson 15

STRUCTURE

15.0 Objectives

- To analyze the implications of combining Keynesian demand with classical supply assumptions.
- To understand how aggregate supply shape affects the output response to demand shocks.
- To explore how classical labour market assumptions lead to a vertical supply curve.
- To evaluate the compatibility between Keynesian and classical economic systems.

15.1 Learning Outcomes

After completing this lesson, students will be able to:

- Explain how policy measures like increased government spending impact output under various supply curve assumptions.
- Differentiate between horizontal, upward-sloping, and vertical AS curves.
- Interpret classical assumptions about labor markets and their role in determining output.
- Evaluate the fundamental conflicts between classical and Keynesian models.

15.2 Introduction

In Keynesian macroeconomic analysis, aggregate demand plays a vital role in determining the level of output and employment. However, when we drop the assumption of fixed wages and prices, understanding demand alone is insufficient for determining income. In such cases, the effect of economic policies (like increased government spending) depends significantly on the nature of the aggregate supply (AS) curve. This lesson explores how the Keynesian theory of aggregate demand interacts with different assumptions about the supply side, particularly focusing on classical supply theory, which postulates a vertical AS curve due to flexible wages and price mechanisms. We examine how these combined frameworks affect equilibrium output, price levels, and employment.

15.3 Explanation

The Keynesian Aggregate Demand Schedule Combined with the Classical Theory of Aggregate Supply

When prices and wages are not assumed constant, knowing the effects of policy actions on demand is not enough to determine their effects on income. The effect on income will depend on the assumptions we make about aggregate supply. This concept is illustrated in Figure 9.4, where the effect of an increase in government spending is compared for three different assumptions about the aggregate supply schedule.

In each case, the increase in government expenditures shifts the aggregate demand schedule to the right, from Y_0^d to Y_1^d. If the supply schedule is given by Y_2^s, a horizontal schedule, then output increases by the full amount of the horizontal shift in the aggregate demand schedule. Recall from section 9.1 that this is the increase in equilibrium income from the *IS-LM* curve model, which

implicitly assumed that the supply schedule was horizontal. If the supply schedule is upward-sloping (Y_1^s), prices will rise and the increase in income will be less, $Y_1 - Y_0$ compared with $Y_2 - Y_0$ in Figure 9.4. If the supply schedule were vertical (Y_0^S in Figure 9.4), there would be no increase in income even though aggregate demand increased. Clearly, then, the effects of policy changes on income depend on the assumption made concerning aggregate supply. In this section, we consider the implications of making the "classical" assumptions about supply while maintaining the Keynesian apparatus behind the aggregate demand schedule.

'For simplicity, the Keynesian aggregate demand curve here and in later graphs is drawn as a straight line. The exact curvature of the aggregate demand curve is not important for our analysis.

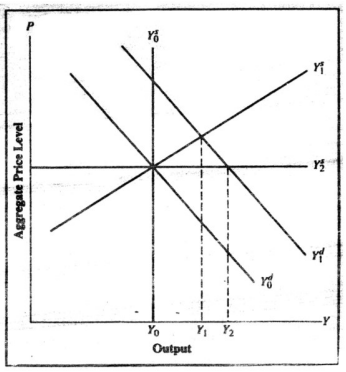


Figure 9.4
Role of Aggregate Supply in Determining the Output Response to a Policy Shock
An increase in government spending shifts the aggregate demand schedule from Y_0^d to Y_1^d. If the aggregate supply schedule is horizontal (Y_2^s), output increases from Y_0 to Y_2. If the aggregate supply schedule slopes upward (Y_1^s), output increases only to Y_1. If the supply schedule is vertical (Y_0^s), output is unchanged at Y_0.

Figure 9.4

Role of Aggregate Supply in Determining the Output Response to a Policy Shock An increase in government spending shifts the aggregate demand schedule from Y_0^d to Y_1^d. If the aggregate supply schedule is horizontal (Y_2^s), output increases from Y_0 to Y_2. If the aggregate supply schedule slopes upward (Y_1^s), output increases only to Y_1 If the supply schedule is vertical (Y_0^s), output is unchanged at Y_0.

The classical analysis of aggregate supply was explained in Chapter 3. The central elements of this analysis are illustrated in Figure 9.5. In the labor market, both supply and demand depend solely on the real wage (W/P), which is assumed to be known to all. Further, the labor market is assumed always to be in equilibrium with the perfectly flexible money wage, adjusting to equate supply and demand. The labor market has the characteristics of an "auction" market. The equilibrium in the labor market is graphed in Figure 9.5a. As shown in Figure 9.5b, for a given level of employment,

output will be determined along the production function, the relationship giving the output produced by each amount of labor, given the fixed capital stock.

As explained in Chapter 3, the classical assumptions result in a vertical aggregate supply curve (see section 3.5). With the classical assumptions concerning the supply side, the aggregate supply curve would be given Y_0^s by in Figure 9.4; output would be completely supply-determined. Factors such as changes in government spending, taxes, and the money supply, which shift the demand schedule, would not affect the equilibrium output.[2]

This analysis shows that *the classical theory of aggregate supply based on the classical auction market characterization of the labor market is fundamentally incompatible with the*

[2] Some fiscal policy changes, such as a change in the marginal tax rate, have supply-side effects in the classical system, as explained in section 4.3. These are being ignored here.

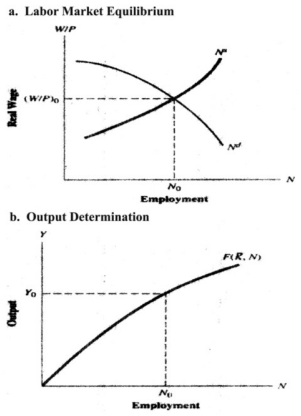


Fig. 9.5 : Classical Supply Assumptions

Figure 9.5

Classical Supply Assumptions

In the classical model, employment (N_0) is determined at the point where labor supply and demand, both as functions of the real wage, are equated (part a). Equilibrium output (Y_0) is then determined using the production function (part b).

Keynesian system. The central feature of Keynesian analysis is the theory of aggregate demand and the influence of aggregate demand on output and employment. With the classical assumptions about aggregate supply, leading to the vertical supply schedule, there is *no* role for aggregate demand in determining output and employment. It was therefore necessary for Keynes and his followers to attack the classical supply assumptions and to develop a Keynesian theory of the supply side.

15.4 Let Us Sum Up

In this lesson, we examined how the Keynesian aggregate demand schedule interacts with different forms of the aggregate supply curve, particularly within the classical theoretical framework. While Keynesian analysis supports a demand-driven economy, classical theory emphasizes supply-determined output. A flexible wage and price system, as assumed by classical economists, results in a vertical AS curve, rendering demand-side policies ineffective in altering output or employment. This fundamental contradiction explains why Keynesians developed an alternative supply theory that accommodates wage rigidity and unemployment.

15.5 Key words

- **Aggregate Supply (AS)**: The total quantity of goods and services producers are willing to supply at different price levels.
- **Aggregate Demand (AD)**: The total demand for goods and services in the economy at a given overall price level.
- **Vertical AS Curve**: A supply curve that implies output is fixed at full employment, regardless of price level.
- **Horizontal AS Curve**: Reflects price rigidity and unused capacity; output can increase without price changes.
- **Real Wage (W/P)**: The purchasing power of wages; ratio of nominal wages to the price level.
- **Production Function**: A relationship that shows how output is produced from varying levels of labor input with fixed capital.

15.6 Suggested Readings

- Mankiw, N. G. (2021). *Macroeconomics* (11th Edition). Worth Publishers.

- Dornbusch, R., Fischer, S., & Startz, R. (2018). *Macroeconomics*.
- Blanchard, O. (2017). *Macroeconomics* (7th Edition). Pearson Education.
- Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*.
- Froyen, T. Richard. *Macroeconomics*

15.7 Hints to Check Your Progress

- Review the differences in output effects between horizontal, upward-sloping, and vertical AS curves.
- Recall how flexible wages and prices affect labor market equilibrium in classical theory.
- Think about why Keynesian economists objected to the classical supply assumptions.
- Try diagramming the interaction between AD shifts and various AS shapes to visualize outcomes.

15.8 Examination-Oriented Questions

Short Answer Questions:

1. What is the shape of the aggregate supply curve under classical assumptions?
2. Why does an increase in aggregate demand not affect output in the classical model?
3. How does the labor market operate in the classical model?

Long Answer Questions:

1. Explain the effects of a government spending increase under horizontal, upward-sloping, and vertical aggregate supply conditions.
2. Discuss the classical labor market assumptions and their implications for output and employment.
3. Why are the classical supply assumptions incompatible with Keynesian aggregate demand theory?
4. Illustrate and explain how the interaction between AD and AS curves determines output under different supply scenarios.

Lesson 16. A contractual view of the labour market- sources of wage rigidity, flexible price-fixed money wage model

STRUCTURE

16.0 Objectives

By the end of this lesson, learners will be able to:

- Understand Keynes's critique of the classical labor market model.
- Identify the key reasons behind money wage rigidity.
- Explore the institutional and behavioral aspects of wage-setting.
- Analyze the implications of fixed money wages in macroeconomic models.
- Understand the flexible price-fixed wage model in Keynesian theory.

16.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Describe the main sources of wage rigidity in modern labor markets.
- Explain the Keynesian contractual view and its departure from classical assumptions.
- Evaluate how wage stickiness affects employment and output.
- Interpret graphical models demonstrating aggregate supply under fixed wages.

Assess the effects of monetary and fiscal policy in a fixed-wage environment

16.2 Introduction

In contrast to the classical assumption of perfectly flexible wages, Keynesian economics presents a more realistic view of labor markets, emphasizing the rigidity of money wages in the short run. This rigidity, particularly in downward adjustments, can lead to persistent unemployment even when labor is in excess supply. This lesson explores the Keynesian "contractual" perspective of the labor market, highlighting the reasons for wage stickiness and the implications for employment and output in the context of a flexible price but fixed money wage model.

16.3 Explanation of Key Themes

Keynes believed that the money wage would not adjust sufficiently in the short run to keep the economy at full employment. In the classical system, both labor supply and demand are functions of the real wage, and the intersection of the labor supply and demand curves determines an equilibrium real wage and level of employment. Wage bargains are, however, set in terms of money wages, and one assumption crucial to the classical model is that the money wage is perfectly flexible. Adjustments in the money wage are required to keep the economy at full employment.

Sources of Wage Rigidity

The Keynesian theory offers a number of reasons why the money wage will *not* quickly adjust, especially in the downward direction, to maintain equilibrium in the labor market. The most important of these explanations for the *rigidity* of money wages are as follows.

1. Keynes argued that workers are interested in their relative as well as their absolute wage. There exists in any labor market a set of wage differentials between workers with different trades and skills. Much of the work of wage bargaining is to arrive at a relative wage structure that is acceptable to both labor and management.

Wage differentials can be measured by relative money wages, because price-level changes affect all wages symmetrically.

Keynes believed that workers would resist money wage cuts even as the demand for labor fell. They would see the wage cuts as "unfair" changes in the structure of relative wages. Workers in one firm or industry would have no assurance that if they accepted a cut in money wages, workers in other sectors of the labor market would do the same. A decline in the real wage as a result of a rise in prices would not be seen by labor as affecting the structure of relative wages. For this reason, Keynes believed that declines in real wages caused by price-level increases would meet much less resistance from labor than an equivalent fall in the real wage from a money wage cut.

2. The next factor leading to stickiness in the money wage level is an institutional one. In the unionized sector of the labor market, wages are set by labor contracts, most often of two or three years' duration. Such contracts typically fix money wage levels for the life of the contract. The money wage will not respond to events, such as a decline in labor demand, over the life of the contract. Indexation of the money wage set in the contract (i.e., provisions that tie changes in the money wage to changes in the price level) provides some flexibility in the money wage over the length of the contract. In the United States, however, when any indexation of labor contracts exists, it is generally incomplete. Thus fixed-money-wage contracts impart stickiness to the money wage.

Once such a labor contract is signed, the decision of how much labor to hire is left to the employer. A labor supply curve such as the classical labor supply function in Figure 9.5 no longer plays any role in determining employment. The firm hires the profit-maximizing amount of labor at the fixed money wage.

3. Even in segments of the labor market in which no explicit contract fixes the money wage, there is often an implicit agreement between employer and employee that fixes the money wage over some time period. In particular, such implicit contracts keep employers from cutting money wages in the face of a fall in the demand for their products and consequent decline in labor demand. The incentive for employers to refrain from attempting to achieve such wage cuts, or alternatively from hiring workers from among the pool of the unemployed who might be willing to work for a lower wage, is their desire to maintain a reputation as a "good employer." Firms might achieve a temporary gain by forcing a money wage cut to reduce labor costs, but this gain could be more than counterbalanced by the effect of poor labor relations with existing employees and difficulties in recruiting new employees. Keynesians believe that the "conventions" of labor markets are such

that firms find it in their interest to cut the length of the work week or to have layoffs in response to falls in demand rather than to seek money wage cuts.

Keynesians believe that contractual arrangements are central to understanding how modern labor markets function. The *contractual* view of the labor market stands in sharp contrast to the frictionless *auction* market view of the classical economists. In the Keynesian view, as expressed by Arthur Okun,

Wages are not set to clear markets in the short run, but rather are strongly conditioned by longer-term considerations involving ... employer worker relations. These factors insulate wages ... to a significant degree from the impact of shifts in demand so that the adjustment must be made in employment and output.[3]

A Flexible Price-Fixed Money Wage Mode

To model this contractual view of the labor market, we assume that, although prices are free to vary, the money wage is *fixed}* A fixed money wage is an extreme version of a sticky wage, and Keynesian economists certainly do not believe that the money wage is completely rigid. Still, if the response of the money wage to labor market conditions is slow to materialize, as the contractual approach to the labor market suggests, results based on the assumption of a fixed money wage will be approximately correct for the short run.

Finally, before we analyze this flexible price-fixed money wage model, we should point out that Keynes's concern was with the downward rigidity of the money wage—the failure of the money wage to fall sufficiently to restore full employment. The main situations to which we would want to apply the fixed-wage model are those in which there is an excess supply of labor.

With the money wage fixed and labor supply greater than labor demand, actual employment will be determined by demand. Firms will be able to hire the amount of labor they demand at the going wage. Keynes did not object to the classical theory of ' labor demand. According to this theory, as explained in Chapter 3, the profit-maximizing firm demands labor up to the point at which the real wage (W/P) is equal to the marginal productivity of labor (MPN) or, equivalently, to the point at which

$$W=MPN-P \qquad \textbf{(9.3)}$$

The money wage paid to labor is equal to the money value of the marginal product (the marginal revenue product) of labor. Because, with an excess supply of labor and

Figure 9.6

Employment with a Fixed Money Wage With the money wage fixed at *W,* employment will be at N_0, the amount of labor demanded.

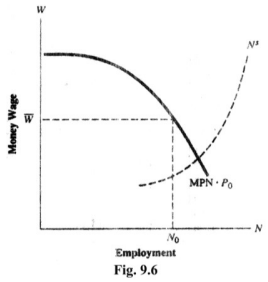


Fig. 9.6

a fixed money wage, employment depends only on labor demand, the determination of employment is as depicted in Figure 9.6. At a fixed money wage $\overline{W}$, labor demand, and therefore employment, will be N_0.

The labor supply schedule is shown in Figure 9.6, as a dashed line. Notice that at the fixed money wage ($\overline{W}$), the labor supply curve is to the right of N_0, indicating an excess supply of labor. Demand, not supply, is the factor constraining employment. The labor supply curve plays *no* role and is not shown in the subsequent figures in this section. The properties of the Keynesian labor supply function are explained in the next section, where we analyze a Keynesian model in which the money wage is allowed to vary.

The position of the labor demand schedule, the schedule giving the money value of the marginal product of labor corresponding to each level of employment (the MPN • P_0 schedule in Figure 9.6), depends on the price level. The number of workers firms will hire, and as a consequence the amount of output they will supply, depends on the price level. This relationship between output supplied and the price level is developed in Figure 9.7.

Figure 9.7a shows the level of employment that will result at three successively, higher price levels, P_0, P_1, and P_2, with the money wage fixed at $\overline{W}$. An increase in the price level (from P_0 to

P_1 then from $P1$ to P_2) will increase the money value of the marginal product of labor corresponding to any level of employment and therefore will increase labor demand for a given money wage. The labor demand (MPN • P) schedule shifts to the right, and employment increases. As employment increases, output is shown to rise in Figure *9.7b,* where we have plotted the aggregate production function giving the level of output for each level of employment.

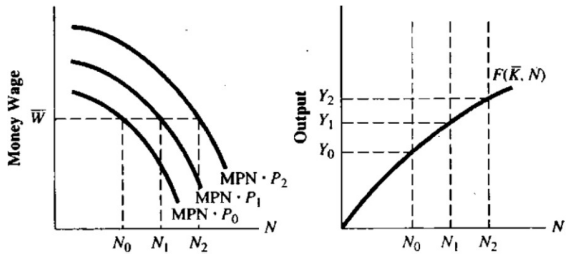


Figure 9.7c combines the information from Figures 9.7a and *9.7b* to show output supplied for each price level. Higher prices result in higher supply; the aggregate supply function is upward-sloping. At some level of output *(Y_f* in Figure 9.7c), full employment would be reached and further increases in price would have no effect on output. The aggregate supply curve becomes vertical at this level.

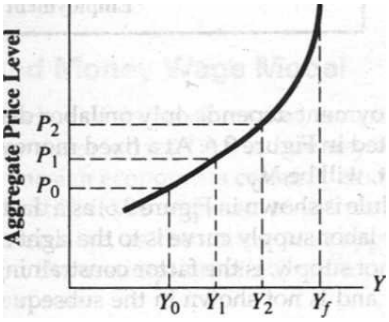


Figure 9.7 The Keynesian Aggregate Supply Curve When the Money Wage Is Fixed

Money Wage Is Fixed Part *a* shows the levels of employment N_0, N_v N_2 for three successively higher price levels, PQ, P_v P_2- Part *b* shows the levels of output, Yg, Y_v Y_2 that will be produced at these three levels of employment. In part c, we put together the information in *a* and *b* to show output supplied at each of the three price levels. Notice that at higher price levels, employment, and hence output supplied, increase; *the aggregate supply curve* (Y^5) *is upward-sloping.*

Below full employment, the supply curve will not be vertical; shifts in the aggregate demand curve will change the level of output. The effects of an increase in the money supply and the effects of an increase in government spending are illustrated in Figures 9.8 and 9.9, respectively.

In Figure 9.8a, an increase in the money supply shifts the LM schedule from *LM(M_0/P_0)* to LM(M_1/P_0). This shift in the LM curve is a direct result of the change in the money supply. The increase in the money supply shifts the aggregate demand schedule to the right in Figure *9.8b,* from V'(M_n) to *Y^d(M^).* At the initial price level *P_0,* output would increase to *Y{* as shown in Figure 9.8. But for output to increase, the price level must rise and the new equilibrium is reached not at *Y{* but at Yj, where the price level has risen to *P_v* The rise in price shifts the *LM* schedule in Figure 9.8a to LMCM^P,).

Thus we find the same type of Keynesian results from an increase in the money supply as we did for the fixed-price *IS-LM* curve model in Chapter 8. Output and employment will rise, and the interest rate will fall, from r_0 to r_1 in Figure 9.8a. When the price level is allowed to vary, the increase in output will be less than when the price level is fixed. Output rises to *Y_x* instead of to *Y{.* The reason is that the increase) in the price level reduces the real money supply (M/*P),* and this reduction *partially* offsets the effects of the increase in the nominal money supply. The interest rate falls only to *r_v* not to *r[.* As a consequence, this expansionary monetary policy action has a smaller effect on investment and, hence, on output.

The situation is much the same with fiscal policy. The results are Keynesian in that fiscal policy does affect output, but again the effect of a given policy action is smaller in magnitude when the price level is variable than when the price level is fixed. The effects of an increase in government spending are illustrated in Figure 9.9.

An increase in government spending shifts the *IS* curve from JS(G_0) to fS(G]) in Figure 9.9a. The increase in government spending has no direct effect on the *LM* schedule, which is initially given by *LM(M_0/P_0).* The increase in aggregate demand as the *IS* curve shifts right is reflected in Figure *9.9b* in the shift of the aggregate demand curve from *Y^d(G_0)* to Yd(G_1). Output increases to *Y_v* and the price level rises to *P_v* The increase in the price level decreases the real money supply *(M/P),* causing the *LM* schedule to shift from *LM(M_0/P_0)* to *LM(M_0/PJ* in Figure 9.9a. Output rises only to *Y_v* not to *Y{,* the increase in output that would have occurred had the price

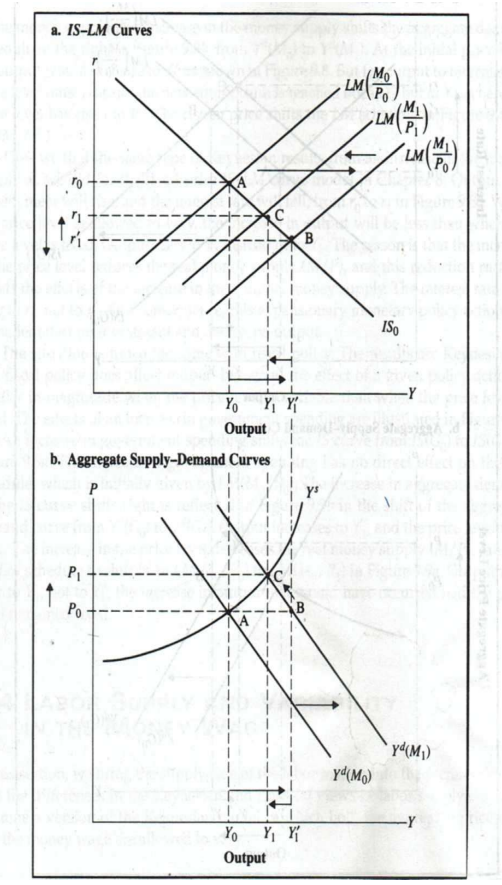
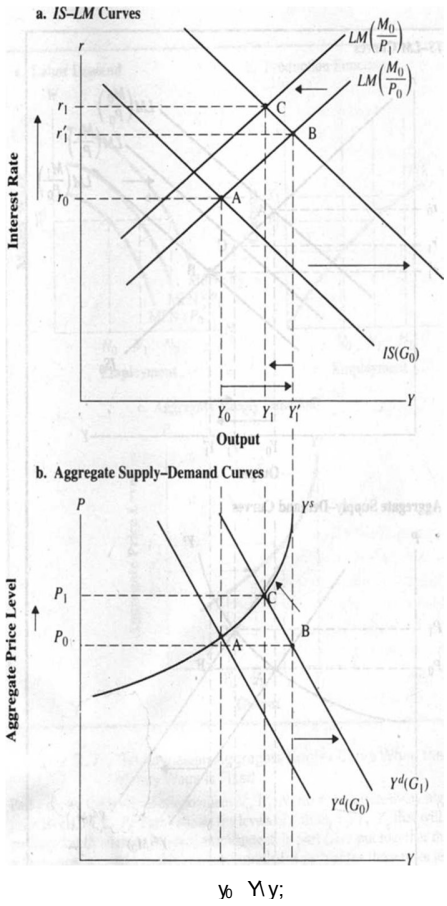


Figure 9.8 Effects of an Increase in the Money Supply When the Price Level Is Flexible



y_0 Y\ y;

An increase in government spending shifts the *IS* curve from JS(G_0) to fS(G]) in Figure 9.9a. The increase in government spending has no direct effect on the *LM* schedule, which is initially given by *LM(M_0/P_0).* The increase in aggregate demand as the *IS* curve shifts right is reflected in Figure *9.9b* in the shift of the aggregate demand curve from $Y^d(G_0)$ to Yd(G_1). Output increases to Y_v and the price level rises to P_v The increase in the price level decreases the real money supply *(M/P),* causing the *LM* schedule to shift from *LM(M_0/P_0)* to *LM(M_0/PJ* in Figure 9.9a. Output rises only to Y_v not to $Y\{$, the increase in output that would have occurred had the price level remained fixed.Figure 9.9 Effects of an increase in Government Spending When the Price Level is Flexible. (An increase in government spending shifts the *IS* curve from IS(G_0) to IS(G_1) (part a) and shifts the aggregate demand curve from $Y^d(G_0)$ to $Y^d(G_l)$ (part *b).* The increase in aggregate demand causes output to rise from Y_0 to Y, and the price level to rise from P_0 to P_l. The increase in the price level shifts the *LM* schedule from LM(M_0/P_0) to LM(M_0/P_1)).

16.4 Let Us Sum Up

- Keynes's theory departs from classical economics by emphasizing money wage rigidity.
- Workers resist nominal wage cuts due to concerns over fairness and relative wage structure.
- Contracts—both explicit and implicit—contribute significantly to wage stickiness.
- With fixed money wages, employment is determined by labor demand, not supply.
- In such a scenario, an increase in the price level reduces real wages, increases labor demand, and raises output.
- Monetary and fiscal policies are still effective but have diminished impact when prices are flexible.

16.5 Key words

Term	Definition
Wage Rigidity	Resistance of nominal wages to change despite economic conditions.
Marginal Product of Labor (MPN)	The additional output generated by employing one more unit of labor.
Aggregate Supply Curve	A curve showing total output firms will produce at various price levels.
IS Curve	Represents equilibrium in the goods market.
LM Curve	Represents equilibrium in the money market.
Real Wage (W/P)	The purchasing power of wages, calculated as nominal wage divided by price level.

16.6 Suggested Readings

1. Keynes, J. M. *The General Theory of Employment, Interest and Money.*
2. Blanchard, O., & Johnson, D. R. (2012). *Macroeconomics*.
3. Mankiw, N. G. (2021). *Macroeconomics*.
4. Okun, A. M. *Prices and Quantities: A Macroeconomic Analysis*.
5. Froyen, T. Richard. *Macroeconomics*

16.7 Hints to Check Your Progress

- What are the main reasons behind wage rigidity in the Keynesian model?
- How do fixed wages influence employment in the short run?
- What role does the price level play in adjusting output when wages are fixed?
- How does the effectiveness of monetary policy change in a flexible price-fixed wage model?

16.8 Examination-Oriented Questions

Short Answer Type:

1. Define wage rigidity and explain its causes.
2. What is meant by the contractual view of the labor market?
3. Explain the relationship between price level and employment when wages are fixed.

Long Answer Type:

1. Critically analyze the Keynesian view of wage rigidity with real-world examples.
2. Explain the working of the flexible price-fixed money wage model using appropriate diagrams.
3. Discuss the effectiveness of monetary and fiscal policy under a fixed wage and flexible price framework.

Lesson 17. Classical and Keynesian theories of labour supply, The Keynesian aggregate supply schedule with a variable money wage, Policy effects in the variable- wage Keynesian model

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M.A. Eco. Sem 1I **Classical and Keynesian theories of labour supply** **Unit–III**

ECO- 202 **Lesson 17**

STRUCTURE

17.0 Objectives

After completing this lesson, learners will be able to:

- Understand and differentiate between classical and Keynesian views of labor supply.
- Explain the role of real and money wages in influencing labor supply.
- Analyze the Keynesian labor supply function in relation to price expectations.
- Construct the Keynesian aggregate supply curve under conditions of variable money wage.
- Evaluate the effects of policy changes on output and employment when wages are flexible.

17.1 Learning Outcomes

Upon successful completion of this lesson, students should be able to:

- Describe how classical theory links real wages to labor supply.
- Explain how Keynesian theory incorporates imperfect information and expectations into labor market behavior.
- Illustrate how changes in the expected price level affect labor supply.
- Distinguish between the implications of fixed versus flexible money wages on aggregate supply.
- Assess the role of aggregate demand in determining output in Keynesian models with flexible wages.

17.2 Introduction

This lesson integrates the supply side of the labor market into macroeconomic analysis. It contrasts classical and Keynesian theories of labor supply, with a special focus on how wages and prices interact to influence employment and output. Particular attention is given to how changes in money wages and expectations of the price level affect labor decisions and the shape of the aggregate supply curve.

17.3 Key Concepts

- **Real Wage:** The purchasing power of wages, defined as the money wage divided by the price level (W/P).
- **Money Wage (W):** The nominal wage agreed upon in labor contracts.
- **Expected Price Level (Pe):** Workers' anticipated future price level, based on past price trends.
- **Labour Supply Function:** The relationship between labor supply and real/money wages.
- **Aggregate Supply Curve:** The relationship between the price level and the total output firms are willing to produce.
- **Price Stickiness:** The resistance of prices (especially wages) to adjust quickly to changes in market conditions.

17.4 Explanation

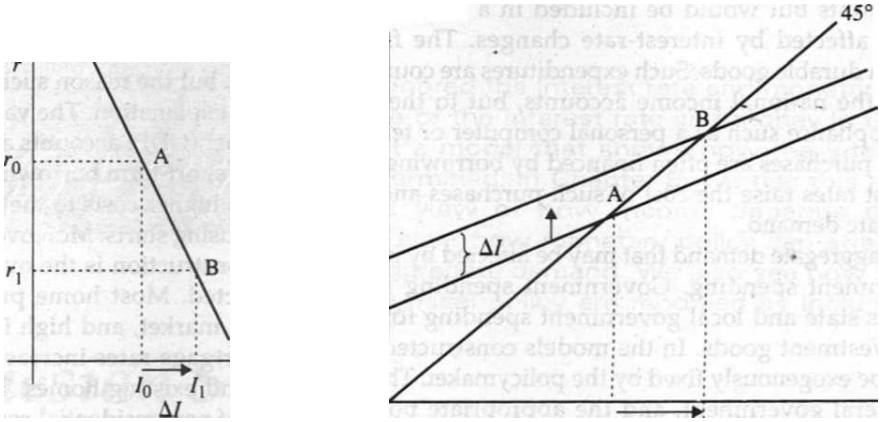
Labour supply and variability in the money wage-

In this section, we bring the supply side of the labor market into the picture. We discuss the differences in the Keynesian and classical views of labor supply and then examine a version of the Keynesian model in which both the aggregate price level and the money wage are allowed to vary.

Classical and Keynesian Theories of Labor Supply

Classical economists believed that the supply of labor depended positively on the real wage,

$$N^s = g\left(\frac{W}{P}\right) \qquad (9.4)$$



In part *a,* as the interest rate decreases from r_0 to r_x, investment increases from I_0 to l_v In part *b,* this increase in investment, Ai, shifts the aggregate expenditure schedule up since the intercept is larger, from $E_0 = C + I_Q + G_0$ to Ej = C + 7, + G_0. Output increases from Y_0 to Y_v demand caused by the change in the interest rate. The more sensitive the components of aggregate demand are to interest-rate changes, the larger will be the shift in the aggregate demand functiofTin Figure 7.1 and the greater the effect oh equilibrium income. The interest sensitivity of aggregate demand will therefore be important in determining how effective monetary policy will be in affecting equilibrium income.

Figure 7.1a illustrates the idea that investment is negatively related to the interest rate. At interest rate r_0, investment is I_Q at point A on the investment schedule. If the interest rate decreases to r_v investment increases to Jj at point B. Looking at

The reasoning behind this formulation is that individuals maximize utility, which depends positively on real income and leisure. A rise in the real wage increases the income that can be gained from an hour's labor or, looked at in reverse, increases the opportunity cost of taking one hour of leisure. Consequently, an increase in the real wage increases labor supply.

The Keynesian theory of labor supply begins with the observation that the wage bargain is struck in terms of the *money* wage, not the real wage. The classical theory assumes that suppliers of labor (workers) know the price level (P) and money wage (W), and therefore know the real wage (W/P). Keynesians argue that, because the labor bargain is in terms of the money wage, we can assume that workers know the money wage but not the price level. As explained previously, through implicit or explicit contracts, workers agree to provide labor services over some period, let us say for a year, *they* have no way of knowing the value that the aggregate price level will take on oveFtne~c6ming year. It is this aggregate price level that will determine the purchasing power of any money wage they agree to in a current wage bargain. As a consequence, the Keynesians believe that decisions about labor supply depend on the current money wage and the *expectation pi* the aggregate price level. Further, the Keynesian view has been that workers' expectations about the price level depend for the most part on the past behavior of prices.

To see the implications of the Keynesian view of workers' bargaining for a known money wage with, only imperfect information about prices, we construct a Keynesian labor supply curve, which we compare with the classical labor supply curve [equation (9.4)]. We then consider a model in which the money wage is perfectly flexible but labor supply is given by the Keynesian labor supply function. In this analysis, we neglect the factors enumerated previously, which Keynesians believe cause the money wage to be sticky. One purpose of this analysis is to show that *even if the money wage were perfectly flexible,* with the Keynesian labor supply curve, the aggregate supply curve would not be vertical. Output and employment would not be completely supply-determined; aggregate demand would also play a role. In reality, the Keynesians believe that the money wage is sticky in the downward direction and that much of unemployment is the result of the failure of the money wage to clear the labor market. Imperfect information about prices is, however, an additional factor that the Keynesians believe explains fluctuations in output and employment.

The Keynesian labor supply function can be written as

$$N^s = t\left(\frac{W}{P^e}\right) \qquad (9.5)$$

An increase in the money wage (W) for a given value of the expected price level (P^e) would increase labor supply, because it would be viewed by workers as an increase in the real wage. An increase in the expected price level would cause labor supply to decline. Fundamentally, workers are interested in the real wage, not the money wage, and they reduce their supply of labor when they perceive that the real wage has declined. The difference between the Keynesian and classical labor supply functions is that in the Keynesian version workers must form an expectation of the price level. Labor supply therefore depends on the *expected* real wage. In the classical system, workers know the real wage; labor supply depends on the *actual* real wage.

The Keynesian theory of labor supply is incomplete without an assumption about how workers form an expectation of the price level *(P^e)*. The Keynesian assumption is that such price expectations are based primarily on the past behavior of the price level. Thus

$$P^e = a_1P_{-1} + a_2P_{-2} + a_3P_{-3} + \ldots\ldots a_nP_{-n} \qquad (9.6)$$

where P_{-1} *(i = 1, 2,* 3,...) is the price level from *i* periods back and $a_1\ a_2,\ldots\ ,a_n$ are the weights given to a number of past observations on the price level in forming the expectation of the current price level. Clearly, there is additional information that might prove useful in accurately predicting the behavior of prices. The Keynesian assumption is that the cost of gathering and processing such additional information is high enough that the price expectations of labor suppliers are reasonably accurately represented by a simple formulation such as equation (9.6). As we will see later, this assumption has not gone unchallenged.

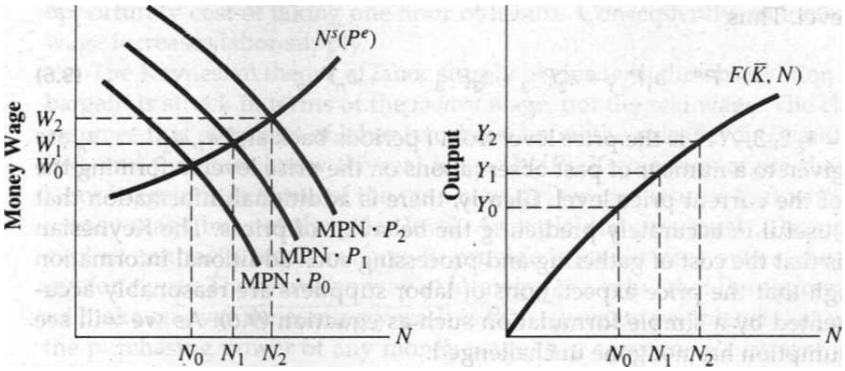
According to equation (9.6), price expectations are essentially *backward-looking,* adjusting to the past behavior of the price level. Moreover, in the Keynesian view there is considerable inertia in this adjustment process; price expectations adjust only *slowly* to the past behavior of the price level. If this is the case, then price expectations do not change as a result of current economic conditions. In analyzing the effects of various policy changes, for example, we can take P^e as constant. In the longer run (after many short periods have passed), we need to take account of how stabilization policies affect P^e, because such policies will have affected price levels from past periods.

The Keynesian Aggregate Supply Curve with a Variable Money Wage

Figure 9.10 illustrates the construction of the aggregate supply curve, where labor supply is given by equation (9.5) and the money wage is assumed to adjust to equate labor supply and labor demand. In Figure 9.10a, labor supply (N^s) and labor demand are plotted as functions of the money wage. As in the previous analysis, labor demand depends on the real wage; firms are assumed to know the price level at which they will be able to sell their products. The labor demand curve will shift to the right with an increase in the price level. Figure 9.10a shows labor demand curves for three successively higher price levels, P_0, P_1, and P_2, respectively.

The labor supply curve is drawn for a given value of the *expected* aggregate price level. As just explained, this expected price level is assumed to be fixed in the short run. With the fixed labor supply curve, increases in the price level shift the labor demand curve along the supply curve, so that for a higher price level the equilibrium levels of employment and the money wage are increased. The process at work here is as follows. The increase in price (from P_0 to P_1, for example) causes an excess demand for labor at the old money wage (W_0). The money wage is bid up, and for a given value of P^e, an increase in the money wage causes more workers to accept jobs (or to increase hours worked in existing jobs); employment rises.

At the higher levels of employment $N_1$and N_2, corresponding to the higher price levels P_1 and P_2, output is higher at the levels shown by Y_1 and Y_2 in Figure 9.10b.



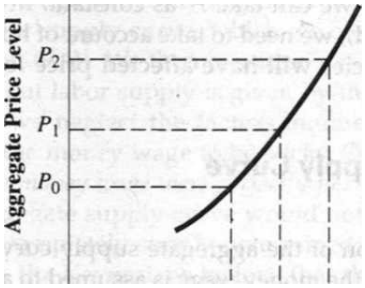


Figure 9.10 The Keynesian Aggregate Supply Curve When the Money Wage Is Variable'

Part *a* shows equilibrium levels of employment N_0, N_1, N_2, corresponding to successively higher values of the price level, P_0, P_1, P_2. Part *b* gives the level of output, Y_0, Y_1 Y_2 that will be produced at each of these employment levels. Part c combines the information in parts *a* and *b* to show the relationship between the price level and output supplied. At higher values of the price level, output supplied increases; as in the fixed-wage case, *the aggregate supply curve* (Y^s) is *upward-sloping.*

Thus, a higher price level corresponds to a higher level of output supplied. This information is reflected in the upward-sloping aggregate supply curve in Figure 9.10c, plotting output supplied for each price level (points such as P_0, Y_0; P_1, Y_1, and P_2, Y_2).

Policy Effects in the Variable-Wage Keynesian Model

Because the variable-wage Keynesian aggregate supply curve is still upward-sloping (nonvertical), changes in aggregate demand that shift the aggregate demand curve will affect the level of output. Increases in the money supply or level of government expenditures will shift the aggregate demand curve to the right, increasing both output and the aggregate price level. Graphical illustrations of such policy shifts are *qualitatively* the same as Figures 9.8 and 9.9.

Suppose that we compare the effects on price and output from a given change in aggregate demand when the money wage is variable with the effects for the case in which the money wage is fixed. Is there a predictable *quantitative* difference? The answer is yes. When the money wage is variable, a given increase in aggregate demand will cause output to increase by less than when the money wage is fixed. When the money wage is variable, an increase in aggregate demand will cause the price level to rise by more than when the money wage is fixed. The reason for these results is that

the aggregate supply curve when the money wage varies is steeper than when the money wage is fixed. As the aggregate demand curve is shifted to the right along the steeper aggregate supply curve, the increased demand results less in increased output and more in increased price.

The reason the aggregate supply curve is steeper in the variable-money-wage case is illustrated in Figure 9.11. In Figure 9.11a, the labor market response to an increase in the price level is illustrated for the fixed- and variable-money-wage cases. If the money wage is fixed at $\overline{W} = W_0$, an increase in the price level from P_0 to P_1 shifts the labor demand curve from MPN . P_0 to MPN. P_1 ,and employment rises from N_0 to N_1 Recall from the previous section that in the fixed-money-wage case, we assume there is an excess supply of labor. The labor supply curve in this case, N^s ($W = \overline{W}$), is to the right of N_0 at $\overline{W}$ (as in Figure 9.6). Labor supply is no constraint on employment, which is determined solely by labor demand. For this case of $W = \overline{W}$, output supplied can be seen from Figure 9.11b to rise from Y_0 to Y_1 . The aggregate supply curve is given by Y^s($W = \overline{W}$) in Figure 9.11c.

With a variable money wage, when the labor demand curve shifts from MPN. P_0 to MPN. P_1, as a result of the increase in price, employment rises only to $N`_1$. Here we are assuming that there is no initial excess supply of labor. At W_0, labor demand just equals supply along the labor supply curve N^s (W variable). The money wage must rise from W_0 to W_1 to get workers to increase labor supply. This increase in the money wage dampens the effect of the increase in labor demand. Because employment increases by less than in the fixed-wage case, output supplied also increases by less, rising only to $Y`_1$, as shown in Figure 9.11b. The increase in the price level leads to a smaller rise in output supplied, and this relationship is reflected in the steeper aggregate supply curve for the variable-money-wage case, as shown in Figure 9.11c, the Y^s *(W* variable) curve.

At this point it is useful to draw some conclusions from the preceding two sections concerning how allowing price and wage flexibility affects the policy implications of the Keynesian system. In section 9.3, we saw that when the price level was assumed to vary (the money wage still fixed), policy multipliers were reduced relative to their values in the simple *IS-LM* curve model of Chapter 8, where both the price level and the money wage had been fixed. In that simple *IS-LM* curve model, the assumption was that the aggregate supply curve was horizontal. Supply was no barrier to an increase in output. In the model in section 9.3, we were taking account of the fact that in normal circumstances, as output increases, the marginal product of labor declines. Because the

unit cost of producing additional units of output is the money wage divided by the marginal product of labor, firms will supply a greater output only at a higher price—even if the money wage is fixed. The aggregate supply curve was upward-sloping, and increases in aggregate demand consequently had smaller output effects than with the horizontal aggregate supply curve.

When the money wage is also assumed to be variable, the implied aggregate supply curve becomes steeper. Now as output is increased, not only does the marginal product of labor decline, causing an increase in unit costs (W/MPN), but the rise in the money wage required to induce workers to supply more labor will also push up unit cost. As a result, any increase in output supplied requires a larger increase in price; the aggregate supply curve is steeper. Aggregate demand changes have still smaller output effects.

In the classical system, the aggregate supply curve was vertical; output was completely supply-determined. The price and wage were perfectly flexible. In the simple IS-LM curve model, output was completely demand-determined. Prices and wages were completely rigid. The models in these two sections, by introducing price and wage flexibility in the Keynesian system, have brought the Keynesian results closer to those of the classical model. Still, the models in these sections remain

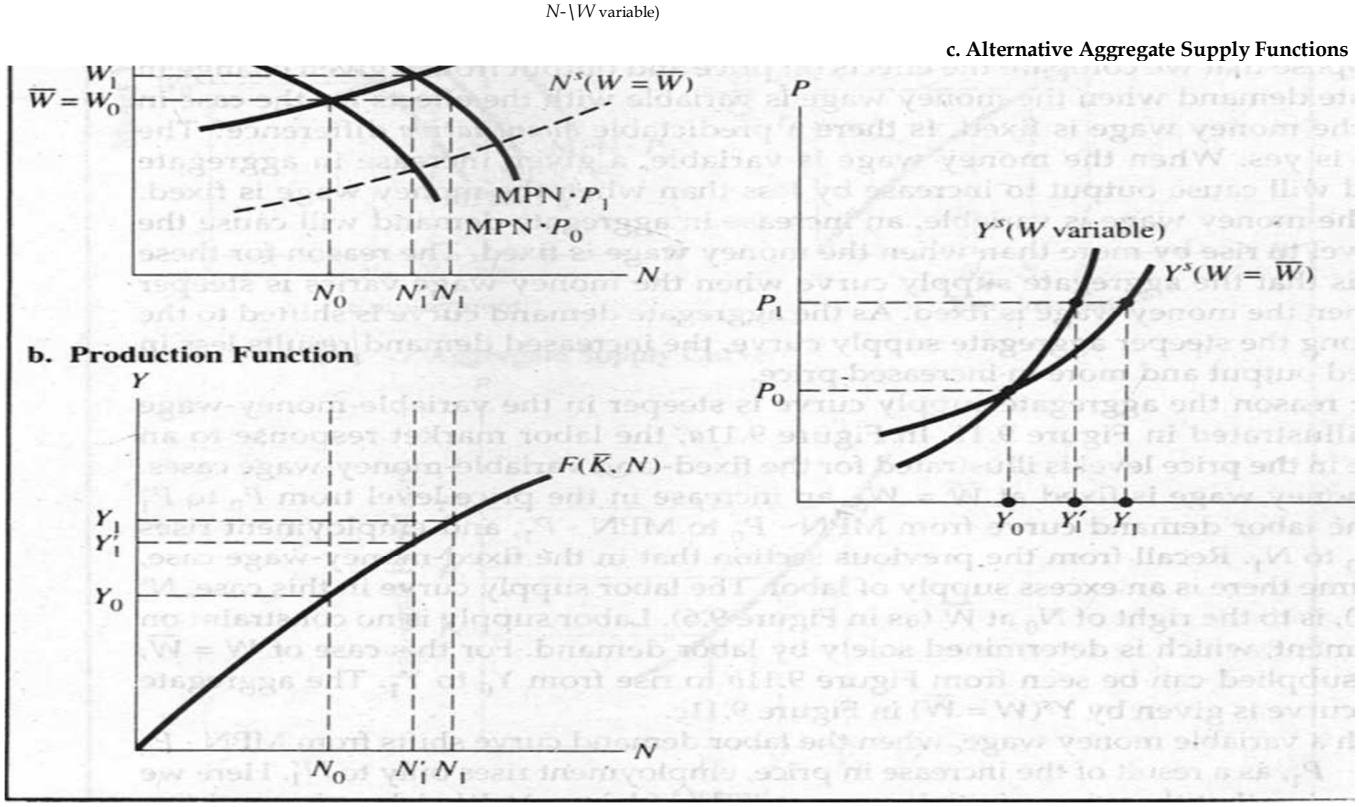


Figure 9.1 1 Keynesian Aggregate Supply Curves for the Fixed- and Variable-Money-Wage Cases

The aggregate supply schedule in part c for the case when the money wage is variable [Y"(W variable)) is steeper than when the money wage is fixed |Y^S(W = IV)] because the increase in employment (part *a)* with a rise in price and therefore the increase in output (part *b)* are smaller when the money wage is variable than when it is fixed. In essence, this outcome follows because the rise in the money wage in the variable-wage case dampens the effect on employment and output from an increase in the price level.

"Keynesian" in that aggregate demand continues to play a role in determining output.

17.5 Let Us Sum Up

- Classical theory emphasizes perfect information and real wages in labor decisions.
- Keynesian theory incorporates money wage contracts and imperfect price expectations.
- The Keynesian labor supply depends on perceived real wages, influenced by money wages and expected price levels.

- The aggregate supply curve becomes steeper when wages are flexible, reducing the impact of demand-side policies on output.
- Policy effectiveness is diminished under wage flexibility due to rising costs.

17.6 Key words

- **Real Wage:** Adjusted wage reflecting purchasing power.
- **Money Wage:** Nominal wage stated in contracts.
- **Expected Price Level (Pe):** Forecast of future prices based on past data.
- **Labour Demand Curve:** Relationship between real wages and quantity of labor demanded by firms.
- **Aggregate Supply (AS) Curve:** Shows total output supplied at various price levels.

17.7 Suggested Readings

1. Mankiw, N. Gregory. *Macroeconomics*. Worth Publishers.
2. Dornbusch, Rudiger, and Fischer, Stanley. *Macroeconomics*. McGraw-Hill.
3. Blanchard, Olivier. *Macroeconomics*. Pearson Education.
4. Keynes, John Maynard. *The General Theory of Employment, Interest and Money*.
5. Froyen, T. Richard. *Macroeconomics*

17.8 Hints to Check Your Progress

- Understand how changes in real and money wages influence labor supply.
- Differentiate clearly between expected and actual price levels.
- Review graphical illustrations of labor market equilibrium under various assumptions.
- Practice deriving aggregate supply curves under both fixed and variable wage conditions.

17.9 Examination-Oriented Questions

1. Explain the classical theory of labor supply. How is it different from the Keynesian view?
2. How do workers form expectations about the price level in the Keynesian model?
3. Derive the Keynesian labor supply function and explain its significance.
4. How does the variability in money wages affect the shape of the aggregate supply curve?
5. Compare and contrast policy effects under fixed and variable money wage scenarios.

6. “Aggregate supply in the Keynesian model is upward-sloping.” Justify this statement using appropriate diagrams.
7. How does the steepness of the aggregate supply curve influence the effectiveness of monetary policy?

LESSON- 18 THE EFFECTS OF SHIFTS IN THE AGGREGATE SUPPLY SCHEDULE, FACTOR THAT SHIFT THE AGGREGATE SUPPLY SCHEDULED,

STRUCTURE

18.0 Objectives

- To understand how changes in aggregate supply influence macroeconomic variables like price, output, and employment.
- To explore the causes and consequences of supply-side shifts.
- To identify the role of cost-push factors, especially energy prices and labor expectations, in shifting the aggregate supply schedule.
- To analyze real-world events, such as oil shocks and economic transitions, through the Keynesian lens.

18.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Differentiate between the effects of aggregate demand and aggregate supply shifts.
- Analyze historical macroeconomic events using Keynesian tools.
- Identify factors that cause supply-side disruptions.
- Explain how changes in labor expectations and input costs influence macroeconomic equilibrium.

18.2 Introduction

In Keynesian economics, both demand and supply factors influence output and employment. While the initial Keynesian framework emphasized aggregate demand, subsequent developments acknowledged that shifts in aggregate supply also significantly impact price levels, employment, and production. These shifts became essential to explaining historical economic episodes, particularly the stagflation of the 1970s.

18.3 Explanation

The Effects of Shifts in the Aggregate Supply Schedule

So far in our development of the Keynesian theory of aggregate supply we have focused on how taking account of supply factors changes the role of aggregate demand in determining output. The output and employment effects of changes in aggregate demand—shifts in the aggregate demand schedule—depend on the slope of the aggregate supply schedule. In addition, supply factors have an independent role in determining output and employment. Shifts can occur in the aggregate supply schedule, and such shifts will affect output, employment, and the price level.

Shifts in the aggregate supply schedule have at times played an important part in the Keynesian explanation of movements in price, output, and employment. In fact, if shifts in the aggregate supply schedule are not taken into account, the behavior of price, output, and unemployment over the decade of the 1970s cannot be explained within a* Keynesian framework. To see why, consider the data in Table 9.2. Notice that while the GNP deflator increased substantially in each year between 1973 and 1981, real output fell in three of those years. In fact, output fell in three of the four most inflationary years.

Table 9.2

Percentage Growth Rates in Real GNP and the GNP Price Deflator, 1973-81

Year	Growth in\ Real gnp	Increase in GNP Deflator

1973	5.8	5.8
1974	- 0.6	8.8
1975	-1.2	9.3
1976	5.4	5.2
1977	5.5	5.8
1978	5.0	7.4
1979	2.8	8.6
1980	0.3	9.2
1981	2.5	9.6

This pattern of price and output changes is inconsistent with the Keynesian model unless shifts in the aggregate supply schedule are taken into account. Consider Figure 9.12. In part *a,* movements in output and price are caused by shifts in the aggregate demand schedule (from Y_0^d to Y_1^d, then to Y_2^d). In this case, increases in price (from $P_0$to P_1then to P_2) would be accompanied by increases in output (from Y_0 to Y_1 , then to Y_2). The demand schedule shifts to the right along the fixed upward-sloping supply schedule, increasing both price and output. Shifts to the left in the aggregate demand schedule cause *both* output and price to fall. Therefore, shifts in the aggregate demand schedule do not explain the behavior of price and output in years such as 1974, 1975, and 1980, when output fell but price rose.

In Figure 9.12b, we can see that shifts to the left in the aggregate supply schedule (from Y_0^s to Y_1^s, then to Y_2^s) would result in price increases (from P_0 to P_1 , then to P_2) associated with declines in output (from Y_0 to Y_1then to Y_2). Such "supply shocks" could explain the U.S. economy's inflationary recessions over the 1970s—periods when output declined and prices increased.

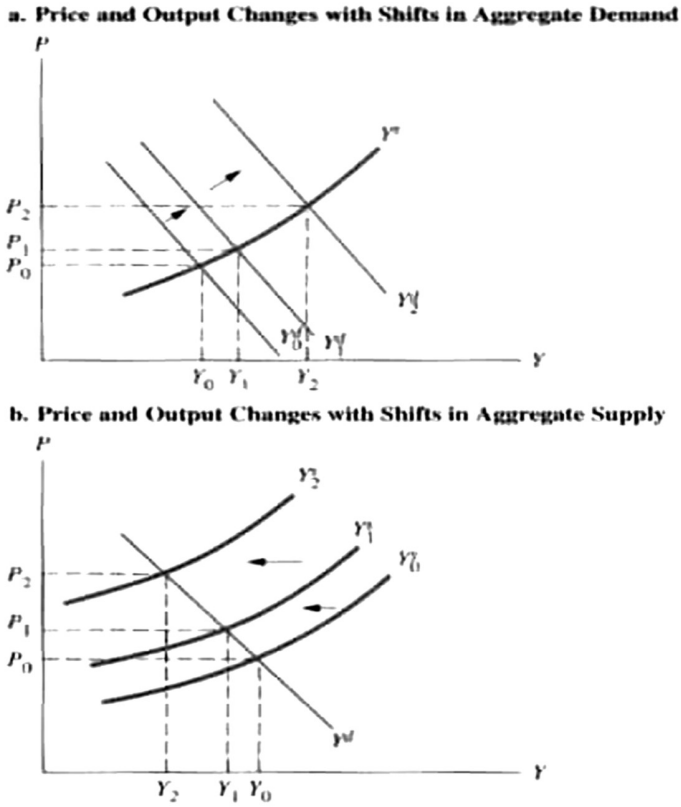


Figure 9.12, Price and Output Variations with Shifts in Aggregate Demand and Supply

Factors That Shift the Aggregate Supply Schedule

The question remains of the causes of shifts in the aggregate supply schedule—the, nature of supply shocks. Recall that points on the aggregate supply schedule give the^{N} desired output of the firms for each aggregate price level. Each firm, and therefore firms in the aggregate, will choose the level of output that maximizes profits. This implies, as discussed in Chapter 3, that firms produce up to the point where P is equal to marginal cost (MC):

P=MC **(9.7)**

Marginal cost is the addition to total cost as a result of increasing the use of variable factors of production to increase output. In our previous analysis, we assumed that labor was the only variable factor of production. In this case, the marginal cost of producing an additional unit of output was the money wage (W), the amount paid for an additional unit of labor, divided by the marginal product of labor (MPN). Marginal cost (W/MPN) increased as output increased because as more labor was hired, the marginal product of labor (MPN) declined. In addition, in the variable-wage model of the preceding section, in order for workers to supply additional labor, the money wage had to be increased, a further factor causing marginal cost to rise as output increased These two factors, the declining marginal product of labor and increasing upward pressure on money

wages as output and employment increase, explain why the aggregate supply schedule is upward-sloping.

A shift in the aggregate supply schedule—for example, a shift upward to the left, as in Figure 9.12b—means that after the shift, firms will produce less for a given price or, put differently, firms will find it optimal to continue to produce the same output, only at a higher price. From condition (9.7) it can be seen that any factor that causes marginal cost to increase *for a given output level* will cause such a shift upward and to the left in the aggregate supply schedule. If marginal cost increases for a given output, then to continue to meet condition (9.7) *at a given price,* the firm must decrease output. As output declines, marginal cost will decline (MPN will rise and IV will fall) and equality (9.7) can be restored. Alternatively, price would have to rise by the amount of the increase in marginal cost for the firm to find it optimal to continue to produce the same level of output.

This is only half the story; the next task is to determine the factors that will change marginal cost for a given output level. Such factors are often termed *cost push factors* because they affect price independently of the level of demand, acting by shifting the supply curve. One set of cost push factors affects the money wage demands on the part of labor at a given level of employment; these are factors that shift the labor supply curve as drawn, for example, in Figure 9.10. So far we have considered one factor that shifts the labor supply schedule, a change in workers' expectation about the aggregate level of price (P^e).

In the preceding section, we assumed that workers' expected price level depended on the past behavior of prices and, hence, was given in the short run. Over time, however, as new information is received, workers will adjust their price expectation. Figure 9.13 shows the effect on labor supply and on the aggregate supply curve of an increase in workers' expectations concerning the aggregate price level.

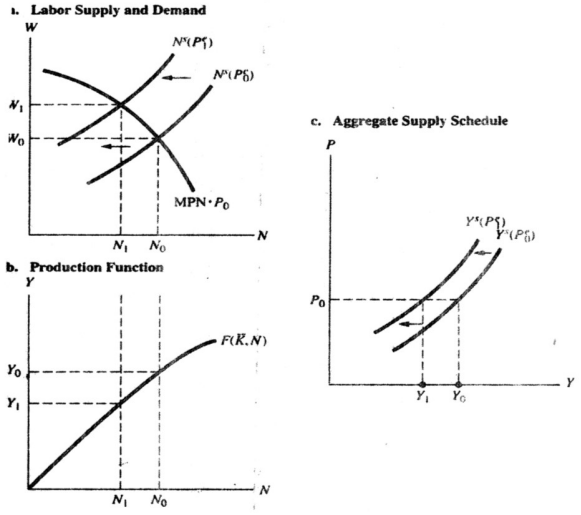


Figure 9.13, Shift in the Aggregate Supply Schedule with an increase in the Expected Price Level.

Suppose that as a result of observed past increases in the aggregate price level, workers' expectation of the current price level rose from P_0^e P_1^e. The labor supply schedule would then shift to the left in Figure *9.13a,* from $N^s(P_0^e)$ to $N^s(P_1^e)$. Less labor would be supplied at each money wage because with the higher expectation about the aggregate price level, a given money wage would correspond to a lower real wage. At the initial price level P_0, the shift in the labor supply schedule would reduce employment (from $N_0$to N_1). Consequently, output at price level P_0 would fall (from Y_0 to Y_1), as can be seen in Figure 9.13b. The aggregate supply schedule would shift to the left in Figure.9.13c [from $Y^s(P_0^e)$ to $Y^s(P_1^e)$].

Thus, any factor that shifts the labor supply curve upward to the left, lowering labor supply for a given money wage or, what amounts to the same thing, increasing the money wage at which a given amount of labor will be supplied, shifts the aggregate supply schedule to the left. Such shifts in the labor supply function play an important part in our analysis of the longer-run adjustment of output and employment to policy changes.

If we broaden our analysis to allow for variable factors of production other than labor, it follows that an autonomous increase in the price of *any* variable factor of production will increase marginal cost for a given output level and shift the aggregate supply schedule to the left.

In particular, autonomous increases in the price of raw materials have this type of cost push effect. Keynesians believe that increases during the 1970s in the world price of raw materials for production, primarily energy inputs, caused large increases in production cost for a given level of output and resulted in significant shifts to the left in the aggregate supply schedule, increasing the domestic aggregate price level and reducing real output.

In addition to the direct effects that increases in raw material prices have on the aggregate supply schedule, such supply shocks have indirect effects that come through an effect on labor supply. Increases in raw material prices—for example, the price of imported oil and other energy products—push up the domestic price level. As domestic prices rise and enough time passes for these price increases to be perceived by the suppliers of labor, the workers' expectation about the aggregate price level *(P^e)* will increase. As was just explained, such an increase in the expected price level will cause a shift to the left in the aggregate supply curve, further increasing the price level and causing an additional decline in real output.

The Keynesian explanation of the large price increases and output declines in the 1973-75 period and again in 1979-80 relies on such direct and indirect effects of supply shocks. The key supply shock in each case was a massive increase in the price of crude oil on the world market. Figure 9.14 shows the price of crude oil for the period 1965-2003. The spikes in the series in 1974 and 1979-80 are evident. (The later spikes in 1990 and 2000 are discussed in the next subsection.) In 1974-75, there was a fourfold increase in the price of oil caused by the firming up of the OPEC (Organization of Petroleum Exporting Countries) pricing cartel. The 1979 disruption of the world

oil market following the Iranian revolution again precipitated a huge increase in crude oil prices. The Keynesian view of the effects of such supply shocks is represented graphically in Figure 9.15. The initial increase in oil prices and the increase in the price of other energy sources (coal, natural gas, etc.), which results from the attempt of energy users to substitute other fuels for the higher-priced oil, cause a shift in the aggregate supply schedule from $Y_0^s(P_0^e)$ to $Y_1^s(P_0^e)$. Output declines from Y_0 to Y_1 and price rises from P_0 to P_1 This is the direct effect of the supply shock. As prices of energy-related products and of all products that use such energy in the production process—a virtually all-inclusive category—rise, labor suppliers in time perceive the increase in price; the expected price level rises (from (P_0^e) P to (P_1^e). There is a further shift to the left in the aggregate supply schedule, from $Y_1^s(P_0^e)$ $Y_1^s(P_1^e)$. Price increases further to P_2, and output declines to Y_2.

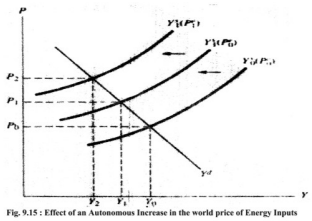


Fig. 9.15 : Effect of an Autonomous Increase in the world price of Energy Inputs

Figure 9.15 : Effects of an Autonomous increase in the world price of Energy inputs

More Recent Supply Shocks

Figure 9.14 shows that the price of oil remained volatile during the post-1980 period. Oil prices fell sharply in the years from 1981 to 1986 as new sources became available and the OPEC cartel weakened. This was in effect a favorable supply shock. By simply reversing the graphical analysis in Figure 9.15, we can see that such a favorable shock would, in the absence of other changes, reduce the aggregate price level and increase output. In fact, during the first half of this period, there was a severe recession, which in the Keynesian view was caused by demand-side factors. The decline in the price of oil did contribute to the dramatic fall in the inflation rate during these years.

The next large change in oil prices came in August 1990, following Iraq's invasion of Kuwait. The price of oil shot up as Kuwaiti oil production was halted and the United Nations placed an embargo on Iraqi oil exports. The price of oil declined as rapidly as it had risen once a swift victory of U.N. forces was evident in early 1991. The effects of both the rise and fall of oil prices can be seen in the behavior of the producer price index. The index rose by more than 15 percent (at an annual rate) between August and October 1990 and then fell by 5 percent (again at an annual rate) between December 1990 and March 1991.

The price of oil fell sharply in the latter part of the 1990s, bottoming out at $10 per barrel in 1999. This fall contributed to the benign inflation performance in Europe and the United States during these years. Then, in 2000, the price of oil tripled to $30 per barrel in what has been called

the “fourth oil price shock.” The price of oil remained above $25 per barrel through the period of the U.S. invasion of Iraq. This latest spike in the price of oil has had only modest effects on the industrialized economies. One reason is that these economies have reduced their dependence on oil. Oil input per dollar of GDP in industrialized countries has fallen by approximately 50 percent over the years since 1972. In addition, even at $30 per barrel, the real (inflation-adjusted) oil price is still only back up to the level of the mid-1970s.

18.4 Let Us Sum Up

The Keynesian perspective on supply shifts underscores that aggregate supply is not static. External shocks, particularly those affecting input costs and wage expectations, can significantly alter the output-price relationship. These supply-side factors explain episodes of stagflation and help us interpret complex economic scenarios better than demand-side analysis alone.

18.5 Key words

- **Aggregate Supply Schedule**: Relationship between the overall price level and the quantity of output producers are willing to supply.
- **Marginal Cost (MC)**: The additional cost incurred from producing one more unit of output.
- **Stagflation**: A condition where high inflation and unemployment occur simultaneously.
- **Cost-Push Inflation**: Price rises caused by increased production costs.
- **Price Expectations (Pe)**: Anticipated future price levels that influence wage bargaining and production decisions.

18.6 Suggested Readings

- Blanchard, O. (2021). *Macroeconomics*. Pearson Education.
- Mankiw, N.G. (2019). *Principles of Economics*. Cengage Learning.
- Dornbusch, R., Fischer, S., & Startz, R. (2014). *Macroeconomics*. McGraw-Hill Education.
- Keynes, J.M. (1936). *The General Theory of Employment, Interest and Money*.
- Richard T. Froyen-Macroeconomics-Theories and Policies

18.7 Hints to Check Your Progress

- Can you explain how a leftward shift in the AS curve affects price and output?
- What are cost-push factors? Provide examples.
- How do worker expectations about future prices impact supply?
- What was the role of oil prices in the economic crisis of the 1970s?

STRUCTURE

19.0 Objectives

After completing this unit, learners will be able to:

- Identify the foundational differences between Keynesian and Classical models.
- Explain the role of aggregate demand and aggregate supply in each framework.
- Understand how monetary and fiscal variables influence demand in both models.
- Analyze policy responses recommended by each school of thought.
- Examine the implications of wage flexibility and employment assumptions.

19.1 Learning Outcomes

On successfully studying this lesson, you should be able to:

- Differentiate the Keynesian and Classical approaches to aggregate demand and supply.

- Illustrate the economic behavior using AD-AS diagrams in both models.
- Explain the assumptions behind wage adjustments and employment levels.
- Evaluate the need for policy interventions under both systems.
- Discuss the short-run versus long-run implications of each theory.

19.2 Introduction

This unit explores the contrasting perspectives of Keynesian and Classical economic theories, focusing particularly on their interpretations of aggregate demand and supply. While earlier discussions centered on the Keynesian framework, this lesson draws comparisons with the classical model that Keynes critiqued. By analyzing the differences in aggregate demand and supply mechanisms, we gain a deeper understanding of how these schools of thought interpret economic stability, employment, and policy interventions.

19.3 Explanation of the Keynesian versus Classical theories of Aggregate Demand and Supply.

Earlier chapters have analyzed the Keynesian view of macroeconomics. What are the major differences between the Keynesian view and the classical macroeconomic theory that Keynes attacked? In this chapter, we have seen how the Keynesian system can be summarized by the aggregate supply and aggregate demand relationships. The classical model was expressed in the same manner in Chapter 4. A convenient way to summarize the differences between the Keynesian and classical theories is to examine the differences between the respective aggregate demand and aggregate supply relationship in the two models.

Keynesian Versus Classical Theories of Aggregate Demand

The classical model did not contain an explicit theory of aggregate demand. The *quantity theory of money* provided an implicit classical theory of aggregate demand. Using the quantity theory relationship with the assumption that V is constant, we can determine PY for a given value of M. This relationship gives the rectangular hyperbola $Y^d(M_0)$ plotted in Figure 9.16a for M equals M_0. This was the classical aggregate demand curve.

$$M \quad V \quad = \quad P \quad Y \quad \textbf{(9.8)}$$

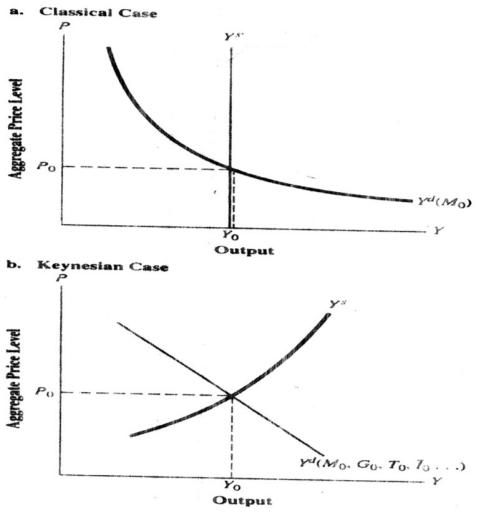


Figure 9.16, *Classical and Keynesian Aggregate Supply and Demand Curves*

The logic behind this relationship was clearest for the Cambridge form of the quantity theory:

$$M = M^d = kPY \qquad \textbf{(9.9)}$$

Because *k* is equal to 1/ *V,* (9.8) and (9.9) are equivalent. From (9.9) it can be seen that an increase in M will, for a given value of *PY* and an assumed constant *k,* cause an excess supply of money. The classical theory assumed that this excess money would be reflected in an excess demand for goods.

Increases in demand by one sector of the economy—government demand or autonomous investment demand, for example—would not affect aggregate demand in the classical system. Changes in sectoral demands would cause adjustments in the interest rate. The interest rate played a stabilizing role in the classical system and ensured that such changes in sectoral demands could not change aggregate demand. For example, in the classical model an increase in government spending financed by selling bonds to the public would cause the interest rate torise until private spending had declined by just the amount of the increase in government spending. Aggregate demand would be unchanged. *Only monetary factors shift the classical aggregate demand curve.*

The Keynesian aggregate demand curve is shown in Figure 9.16b. Although both the classical and Keynesian aggregate demand curves are downward-sloping, there is an important difference between them. Whereas the classical aggregate demand schedule shifts only when the supply of money changes, the position of the Keynesian aggregate demand schedule depends on variables such as the level of government spending (G_0), the level of tax collections (T_0), and the level of autonomous investment expenditures ($\bar{I}_0$) in addition to the quantity of money (M_0). As we have seen, the Keynesian aggregate demand schedule will shift when any of these other factors vary.

The interest rate does not completely insulate aggregate demand from changes in sectoral demands in the Keynesian system. This difference in the determinants of aggregate demand in the Keynesian and classical models produces important differences in their respective explanations of instability in the economy.

Keynes believed that the instability of investment demand was the major cause of cyclical fluctuations in income. Autonomous changes in investment demand caused by changes in expectations cause shifts in the aggregate demand schedule and consequently instability in price and output.

Keynesian Versus Classical Theories of Aggregate Supply

The key difference between the classical and Keynesian aggregate supply schedules is their slope. The classical aggregate supply schedule, shown in Figure 9.1*6a,* is vertical, resulting from the classical assumptions about the labor market. Labor supply and demand are assumed to depend only on the real wage, which is known to all. The money wage is assumed to be perfectly flexible, adjusting quickly to equate supply and demand. Because the aggregate supply schedule is vertical, output and employment are completely supply-determined. Aggregate demand plays no systematic role in determining output.

In the short run the Keynesian aggregate supply schedule slopes upward to the right. We would expect the curve to be quite flat at levels of output well below full capacity and to become steeper as full-capacity output's approached. The Keynesian view of aggregate supply (sections 9.3 and 9.4) emphasizes the stickiness of the money wage and the failure of market participants to perceive the real wage correctly. As a consequence, the labor market will not be in continual equilibrium at full employment. Actual output and employment will not be completely determined by the supply factors that determine *full employment* output. Shifts in the aggregate demand function will move the economy along the upward-sloping supply schedule, causing output to change. In the Keynesian system, the level of aggregate demand is important in determining the level of output and employment.

The Keynesian aggregate supply schedule in Figure 9.16b was termed a short-run supply schedule, to emphasize that it pertained to a short period of time, not to a long-run equilibrium situation. Factors such as explicit long-term labor contracts, implicit contracts, and resistance to wage cuts seen as cuts in the relative wage would slow but not permanently prevent the necessary wage adjustment to return the economy to a full-employment level. Imperfect information about the real wage on the part of labor suppliers would also be a short-run phenomenon. Eventually, expectations would approach the actual value of the price level and, hence, of the real wage. The Keynesians do not deny that eventually the economy would approach full employment. But to the Keynesians such long-run "classical" properties of the economy are unimportant. They agree with Keynes that "this *long run* is a misleading guide to current affairs. *In the long run* we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons.they can only tell us that when the storm is long past the ocean is flat again."[5]

Keynesian Versus Classical Policy Conclusions

Classical economists stressed the self-adjusting tendencies of the economy. If left free from destabilizing government policies, the economy would achieve full employment. Classical economists were noninterventionist in that they did not favor active monetary and fiscal policies to stabilize the economy. Such policies, to affect aggregate demand, would have no effects on output or employment given the supply-determined nature of those variables in the classical system.

Keynesians view the economy as unstable as a result of the instability of aggregate demand, primarily its private-investment component. Aggregate demand does affect output and employment in the Keynesian view. Consequently, swings in aggregate demand will cause undesirable fluctuations in output and employment in the short run. These fluctuations can be prevented by using monetary and fiscal policies to offset undesirable changes in aggregate demand. Keynesians are interventionists, favoring active policies to manage aggregate demand.

19.4 Let Us Sum Up

This unit examined the fundamental differences between Keynesian and Classical views of aggregate demand and supply. The Classical model relies on automatic market adjustments and supply-side dominance, while the Keynesian model emphasizes demand-side influences and wage-stickiness in the short run. Policy-wise, Classical economists prefer laissez-faire approaches, whereas Keynesians support active intervention to stabilize the economy.

19.5 Key words

- **Aggregate Demand (AD):** Total demand for goods and services in an economy.
- **Aggregate Supply (AS):** Total supply of goods and services at various price levels.
- **Quantity Theory of Money:** Economic theory linking money supply with price levels and output.
- **Wage Rigidity:** Resistance of wages to adjust downward despite unemployment.
- **Autonomous Investment:** Investment not influenced by current income levels.
- **Full Employment Output:** The maximum sustainable output level when resources are fully utilized.

19.6 Suggested Readings

- Mankiw, N. Gregory. *Macroeconomics*, Worth Publishers.

- Dornbusch, R., Fischer, S., and Startz, R. *Macroeconomics*.
- Blanchard, O. *Macroeconomics*.
- Keynes, J.M. *The General Theory of Employment, Interest and Money*.
- Froyen, T. Richard. *Macroeconomics*

19.7 Hints to Check Your Progress

- Explain how the Classical model defines aggregate demand.
- Identify why investment instability is important in the Keynesian framework.
- Compare the shape and implications of the AS curve in both models.
- Discuss why Keynesians support government intervention while Classical economists do not.

19.8 Examination Oriented Questions

1. Distinguish between the Classical and Keynesian views of aggregate demand.
2. Explain the role of wage flexibility in the Classical model of aggregate supply.
3. Describe how investment expectations affect the Keynesian aggregate demand curve.
4. Why do Keynesians support interventionist policies while Classical economists prefer laissez-faire?
5. Compare the policy recommendations of Keynesian and Classical economists in times of recession.

UNIT - IV

OUTPUT, INFLATION AND UNEMPLOYMENT: ALTERNATIVE VIEWS

M.A. Eco. Sem 1I ECO- 202	**The Phillips Curve**	Unit–IV Lesson 20

STRUCTURE

20.0 Objectives

After studying this lesson, learners will be able to:

- Understand the concept and significance of the Phillips Curve.
- Explain the short-run trade-off between inflation and unemployment.
- Explore the idea of wage rigidity and its implications.
- Understand how monetary and aggregate demand changes influence employment and wages.
- Analyze the dynamic relationship between employment levels and wage adjustments.

20.1 Learning Outcomes

Upon successful completion of this lesson, learners should be able to:

- Interpret the Phillips Curve and its representation of inflation-unemployment trade-offs.
- Explain how wage inflation and unemployment are interrelated.

- Analyze how aggregate demand changes affect employment and wage dynamics.
- Understand wage stickiness and how it challenges classical economic assumptions.
- Illustrate the dynamic nature of wage adjustments in response to employment shifts.

20.2 Introduction

This unit introduces the Phillips Curve, a fundamental concept in macroeconomics that illustrates the inverse relationship between unemployment and wage inflation. Proposed by A.W. Phillips, this theory suggests that when unemployment is low, wage rates tend to rise, and when unemployment is high, wage growth slows down. This unit explores both the short-run and long-run implications of this trade-off and delves into the concept of wage stickiness and its role in labor market dynamics.

20.3 Explanation of Phillips curve

The Phillips curve given by A.W. Phillips shows that there exist an inverse relationship between the rate of unemployment and the rate of increase in nominal wages. A lower rate of unemployment is associated with higher wage rate or inflation, and vice versa. In other words, there is a trade off between wage inflation and unemployment.

Thus, decrease in unemployment leads to increase in the wage (Fig. 13.6). But when wage increases, the firms cost of production increases which leads to increase in price. Therefore it is also called wage inflation, that is, decrease in unemployment leads to wage inflation.

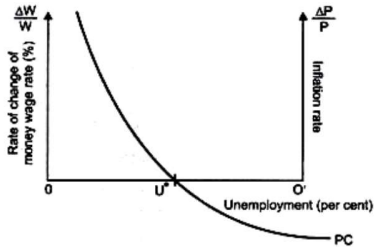


FIG. 13.6

To explain the trade off between growth rate of wages and unemployment:

Let $W_t \rightarrow$ Wage in the last period

$W_{t+1} \rightarrow$ Wage in this current period

Then growth rate of wage inflation (g_w) will be:

$$g_w = \frac{W_{t+1} - W_t}{W_t} \quad ...(1)$$

Phillips curve relationship

With U* representing NRU, the equation of Phillips curve, can be written as:

$$g_w = -\epsilon (U - U^*) \quad ...(1a)$$

$\epsilon \rightarrow$ Response of wage change to Unemployment rate

$U - U^* \rightarrow$ Unemployment gap
$U \rightarrow$ Actual unemployment
$U^* \rightarrow$ NRU

or $W_{t+1} = W_t [1 - \epsilon (U - U^*]^2 \ldots (2)$

– (*For proof refer to 13.1*

Equation (1*a*) shows:
if $U > U^*$ wages are falling because g_w is negative ($g_w < 0$)
$U < U^*$ wages are rising because g_w is positive ($g_w > 0$)

This show that there exists inverse relationship between the rate of unemployment and growth rate of money wages. The Phillips Curve shows that wages and prices adjust slowly to changes in AD due to imperfections in the labour market. Initially, the economy is in equilibrium with stable prices and unemployment at NRU (U*)

If Money supply increases by 10%, with price level constant, real money supply (M/P) will increase. This will lead to decrease in interest rate and thus increase in AD which in turn will lead to an increase in both wages and prices by 10% so that the economy reaches back to the full employment equilibrium level (U*) i.e. at NRU.

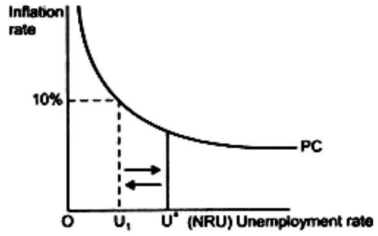


FIG. 13.7

Thus, Phillips curve shows that when wage increases by 10%, unemployment rate will fall from U* to U1. This will cause the wage rate to increase, but when wage increases, prices will also increase and eventually the economy will return back to the full-employment level of output and unemployment.

Rewriting equation 1 which shows Relation between wage inflation to unemployment

$$W_{t+1} = w_t [1 - \epsilon(U - U^*)] \quad ...(2)$$

Equation shows that wages will increase only if $U < U^*$

Since Phillips curve shows a tradeoff between inflation and unemployment rate, any attempt to solve the problem of inflation will lead to an increase in the unemployment. Similarly, any attempt to decrease unemployment will aggravate inflation. Thus, the negative sloped Phillips Curve suggested that the policy makers in the short run could choose different combinations of unemployment and inflation rates.

20.4 Let Us Sum Up

- The Phillips Curve highlights a short-run inverse relationship between wage inflation and unemployment.

- As unemployment decreases, wages rise, contributing to higher price levels (inflation).
- At the natural rate of unemployment, the economy achieves price stability.
- Expansionary policies may reduce unemployment temporarily but risk higher inflation.
- The trade-off between inflation and unemployment offers critical policy insights for managing macroeconomic stability.

20.4 Key words

- **Phillips Curve**: A graphical representation of the inverse relationship between unemployment and wage inflation.
- **Wage Inflation**: The rate at which nominal wages increase over time.
- **Unemployment Rate**: The percentage of the labor force that is jobless and actively seeking employment.
- **Natural Rate of Unemployment (U*)**: The level of unemployment where inflation is stable.
- **Aggregate Demand (AD)**: Total demand for goods and services within an economy.
- **Real Money Supply (M/P)**: Money supply adjusted for the price level.

20.5 Suggested Readings

- Mankiw, N. Gregory. *Macroeconomics*.
- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
- A.W. Phillips (1958), "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861–1957", *Economica*.
- Richard T. Froyen-Macroeconomics-Theories and Policies

20.6 Hints to Check Your Progress

- What happens to wage inflation when unemployment decreases?
- How does an increase in money supply affect employment and price levels?
- What is the significance of U* in the Phillips Curve?
- Explain the short-run trade-off between unemployment and inflation.

20.7 Examination Oriented Questions

1. Discuss the main features and implications of the Phillips Curve.

2. How does the Phillips Curve explain the trade-off between inflation and unemployment?
3. Explain how monetary policy affects the Phillips Curve in the short run.
4. What happens when unemployment is pushed below the natural rate?

STRUCTURE

21.0 Objectives

- To introduce the concept of the natural rate of unemployment and output.
- To explore how monetary policy affects real and nominal variables in the short and long run.
- To differentiate between short-run deviations and long-run equilibrium in output and employment.
- To understand the monetarist view on labor market dynamics and expectations.

21.1 Learning Outcomes

By the end of this lesson, learners will be able to:

- Explain the core tenets of the Natural Rate Theory.
- Distinguish between short-run and long-run effects of monetary policy.
- Understand how real wages and expectations influence employment decisions.
- Calculate the natural rate of unemployment and output using labor and production functions.

21.2 Introduction

The Natural Rate Theory, primarily associated with Milton Friedman, builds upon monetarist ideas, particularly regarding the limits of monetary policy's impact on real economic variables such as output and employment. While short-run changes in the money supply can influence economic activity, this theory asserts that in the long run, only nominal factors like the price level are affected, not real variables. The concept emphasizes that the economy gravitates toward a natural rate of output and unemployment, determined by real factors like technology, institutions, and resource availability.

21.3 Explanation- The Natural Rate Theory

In Chapter 10, we analyzed the monetarist proposition that short-run changes in the money supply are the primary determinant of fluctuations in output and employment. However, the monetarists place a limitation on the real effects of changes in the money supply, as expressed in the second of the monetarist propositions given in Chapter 10.

> In the long run the influence of money is primarily on the price level and other nominal magnitudes. In the long run, real variables, such as real output and employment, are determined by real, not monetary, factors.

The basis of this proposition is the theory of the natural rates of unemployment and output developed by Milton Friedman. [1]

According to the natural rate theory, there exists an equilibrium level of output and an accompanying rate of unemployment determined by the supply of factors of production, technology, and institutions of the economy (i.e., determined by real factors). This is Friedman's natural rate. Changes in aggregate demand, which Friedman believes are dominated by changes in the supply of money, cause temporary movements of the economy away from the natural rate. Expansionary monetary policies, for example, move output above the natural rate and move the unemployment rate below the natural rate for a time. The increased demand resulting from such an expansionary policy would also cause prices to rise. In the short run, the price adjustment would not be complete, as in the classical theory, where increases in demand cause prices to rise but do not affect output. The monetarists do not agree with the classical position that output is completely supply-determined even in the short run.

Friedman does believe that equilibrating forces cause output and employment to return to their natural rate over a longer period. It is not possible, in Friedman's view, for the government to use monetary policy to maintain the economy permanently at a level of output that holds the unemployment rate below the natural rate. At least it is not possible for the policymakers to do so unless they are willing to accept an ever- accelerating rate of inflation- The natural rate of unemployment is defined by Friedman as the rate "which has the property that it is consistent with

equilibrium in ; the structure of real wage rates." Thus the natural rate of unemployment, or the corresponding natural rate of employment, will be such that labor demand equals labor supply at an equilibrium real wage, as depicted in Figure 11.1a.

The labor demand schedule in part a of the figure is the familiar marginal product of labor schedule (MPN). At N*, the natural rate of employment, labor demand is equated with labor supply, where in drawing the labor supply schedule, N^s [W/(P^e = P)], we stipulate that the price level expected by labor suppliers is equal to the actual price level (P^e = P). Only at this level of employment is there no tendency for the real wage to change. Labor demand and supply are equated. Moreover, labor suppliers have a correct expectation of the price level. If such were not the case, labor supply would tend to change as workers perceived that their expectations were in error.

The natural rate of unemployment can be found simply by subtracting those employed from the total labor force to find the number unemployed and then expressing this number as a percentage of the total labor force. Using the production function in Figure 11.lb, we can find the level of output that will result from an employment level N*. This is the natural level of output, Y*.

Figure 11.1 shows that the natural rates of output and employment depend on the supply of factors of production and the technology of the economy—supply-side

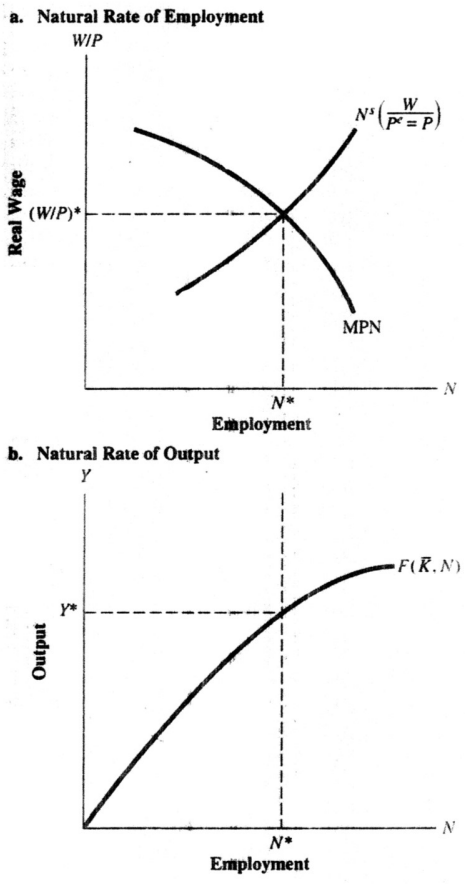


Figure 11.1

Natural Rates of Employment and Output

In part a, the natural rate of employment (N*) is determined at the point where labor supply is equated with labor demand and with labor suppliers' correct evaluation of the price level (P^e, = P). The natural rate of output (Y*) is determined in part b along the production function.

factors. The natural rates of output and employment do not depend on aggregate demand. All this is much the same as in the classical system; the difference between the monetarists and the classical economists is that the monetarists do not assume that the economy is necessarily at these natural levels of employment and output in the short run.

As do the Keynesians, the monetarists assume that labor suppliers do not have perfect information about the real wage. They must base their labor supply decisions on the expected real wage (W/Pc). Therefore, in the short run, labor supply may not be given by the supply schedule in Figure 11.1a; Pc may not equal P. In this case, employment and hence output will not be at their natural rates.

21.4 Let Us Sum Up

- The Natural Rate Theory posits that long-term output and employment are shaped by real economic factors, not monetary changes.
- In the short run, monetary policy can influence output and unemployment, but this effect fades as price and wage expectations adjust.
- Full employment and natural output levels occur when labor supply equals labor demand at the correct real wage.
- Efforts to push unemployment below its natural rate lead to inflationary pressures.
- Expectations play a critical role in determining short-run deviations from long-run equilibrium.

21.5 Key words

- **Natural Rate of Unemployment (U*)**: The level of unemployment consistent with stable inflation and equilibrium real wages.
- **Natural Rate of Output (Y*)**: The level of output achieved when employment is at its natural rate.
- **Real Wage**: Wage adjusted for the price level (W/P), representing the purchasing power of income.
- **Expected Price Level (Pe)**: The price level workers and firms anticipate, influencing their behavior.
- **Labor Demand and Supply**: Represent the willingness of firms to hire and individuals to work at various wage levels.

21.6 Suggested Readings

- Friedman, Milton. "The Role of Monetary Policy," *American Economic Review*, 1968.
- Mankiw, N. Gregory. *Macroeconomics*.
- Dornbusch, R., Fischer, S., and Startz, R. *Macroeconomics*.
- Branson, William H. *Macroeconomic Theory and Policy*.
- Richard T. Froyen-Macroeconomics-Theories and Policies

21.7 Hints to Check Your Progress

- What determines the natural rate of unemployment according to Friedman?
- How do real and expected price levels influence labor supply decisions?
- Why can’t unemployment be kept below the natural rate permanently?
- How do labor market expectations affect employment in the short run?

21.8 Examination Oriented Questions

1. Define and explain the Natural Rate Theory as given by Milton Friedman.
2. What is the role of expectations in determining employment levels in the short run?
3. Distinguish between the classical and monetarist views on output determination.
4. How do labor market dynamics determine the natural rate of employment?
5. Explain with diagram how the natural level of output and employment is established

STRUCTURE

22.0 Objectives

- To understand the monetarist view of monetary policy in the short run and long run.
- To explain how output and employment respond to changes in the money supply.
- To examine the concept of the natural rate of unemployment.
- To analyze the evolution of the Phillips Curve under changing inflation expectations.
- To discuss policy implications of Friedman's theory in historical and theoretical contexts.

22.1 Learning Outcomes

After studying this lesson , learners will be able to:

- Describe how monetary expansion affects employment and inflation in the short run.
- Explain the return of employment to its natural rate in the long run.
- Illustrate the shifting Phillips Curve and the role of expectations.
- Evaluate the limitations of sustained interventionist policies in managing unemployment.
- Understand the implications of monetary policy for inflation control.

22.2 Introduction

This unit explores Milton Friedman's monetarist perspective on the short-run and long-run impact of monetary policy on output, employment, and inflation. It addresses how temporary deviations from natural output and employment levels are corrected over time, and how expectations play a crucial role in these adjustments.

22.3 Explanation

To see why Friedman and other monetarists believe that output and employment diverge from their natural rates temporarily, but will eventually be drawn to these rates, we examine Friedman's analysis of the short-run and long-run consequences of an increase in the rate of growth in the money supply.

Monetary Policy in the Short Run

Let us begin with a situation in which the economy is in equilibrium at the natural rate of unemployment and output. Also suppose that the money supply (and hence nominal income) has been growing at a rate equal to the rate of growth of real output. Thus the price level is assumed to have been stable for some time. Suppose now that the rate of growth in the money supply is increased above the rate consistent with price stability. For concreteness, assume that the rate of growth in the money supply rises from 3 percent to 5 percent:

The increase in the growth rate of the money supply will stimulate aggregate demand and, as a consequence, nominal income. The short-run consequences of this increase in aggregate demand are described by Friedman as follows:

To begin with, much or most of the rise in income will take the form of an increase in output and employment rather than in prices. People have been expecting prices to be stable, and prices and wages have been set for some time in the future on that basis. It takes time for people to adjust to a new state of demand. Producers will tend to react to the initial expansion in aggregate demand by increasing output, employees by working longer hours, and the unemployed by taking jobs now offered at former nominal wages. This much is pretty standard doctrine[3].

The standard doctrine to which Friedman refers is the Phillips curve. The Phillips curve (PC) is a negative relationship between the unemployment rate (U) and the inflation rate (P), such as that plotted in Figure 11.2. High rates of growth in aggregate demand stimulate output and hence lower the unemployment rate. Such high rates of growth in demand also cause an increase in the rate at which prices rise (i.e., raise the inflation rate). Thus the Phillips curve postulates a trade-off between inflation and unemployment; lower rates of unemployment can be achieved, but only at

the cost of higher inflation rates. Friedman is agreeing with this notion of a trade-off between inflation and unemployment in the short run.

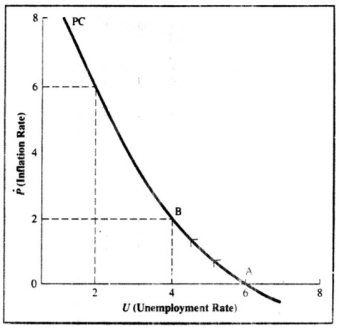


Figure 11.2
The Phillips Curve
In the short run, an increase in the rate of growth in the money supply moves the economy from point A to point B along the short-run Phillips curve (PC). Unemployment declines, and inflation rises.

Monetary Policy in the Long Run

The distinctive element in Friedman's analysis is his view of the long-run effects of monetary policy. Here the notion of the natural rate of unemployment comes into play. We have just considered the short-run effects of an increase in the rate of growth of the money supply from 3 percent to 5 percent. In terms of Figure 11.2, the original equilibrium was with stable prices (P = 0) and unemployment equal to the natural rate assumed to be 6 percent (point A in Figure 11.2). We assume that, as a result of the increase in the rate of growth in the money supply, the economy moves to a new short-run equilibrium, with unemployment reduced to 4 percent and an inflation rate at 2 percent (point B in Figure 11.2). The expansionary aggregate demand policy lowers the unemployment rate below the natural rate. Friedman accepts this outcome:

> But it describes only the initial effects. Because selling prices of products typically respond to an unanticipated rise in nominal demand faster than prices of factors of production, real wages received have gone down—though real wages anticipated by employees went up, since employees implicitly evaluated the wages offered at the earlier price level; Indeed, the simultaneous fall ex post in real wages to employers and rise ex ante to employees is what enabled employment to increase. But the decline ex post in real wages will soon come to affect anticipations. Employees will start to reckon on rising prices of the things they buy and to demand higher nominal wages for the future. "Market" unemployment is below the natural level. There is an excess demand for labor so real wages will tend to rise toward their initial level. [5]

Consider this explanation. Friedman points out that in the short run, product prices increase faster than factor prices, the crucial factor price being the money wage. Thus the real wage (W/P) falls. This is necessary for output to increase, because firms must be on the labor demand curve shown in Figure 11.1. Firms expand employment and output only with a decline in the real wage.

Friedman does not argue that workers are always on the labor supply curve shown in Figure 11.1. That curve expresses labor supply as a function of the actual real wage, and Friedman does not assume that workers know the real wage. In the short run, after a period of stable prices,

workers are assumed to evaluate nominal wage offers "at the earlier price level." Prices have risen, but workers have not yet seen this rise, and they will increase labor supply if offered a higher money wage even if this increase in the money wage is less than the increase in the price level, even if the real wage is lower. In the short run, labor supply increases because the ex ante (or expected) real wage is higher as a result of the higher nominal wage and unchanged view about the behavior of prices. Labor demand increases because of the fall in the ex post (actual) real wage paid by the employer. Consequently, unemployment can be pushed below the natural rate.

This situation is temporary, for workers eventually observe the higher price level and demand higher money wages. In terms of Figure 11.1, the real wage has been pushed below (W/P)*, the wage that clears the labor market once labor suppliers correctly perceive the price level and, hence, the real wage. At a lower real wage, an excess demand for labor pushes the real wage back up to its equilibrium level, and this rise in the real wage causes employment to return to the natural rate shown in Figure 11.1.

The implications for the Phillips curve of this long-run adjustment back to the natural rate are illustrated in Figure 11.3. The schedule labeled PC($P^e = 0$) is the short-run Phillips curve from Figure 11.2. Here the curve is explicitly drawn for a given expected rate of inflation on the part of the suppliers of labor, in this case stable prices ($P^e = 0$, where Pe is the expected rate of inflation). We have already analyzed the process whereby an increased rate of growth of the money supply from 3 percent to 5 percent moves the economy in the short run from point A to point B.

As suppliers of labor anticipate that prices are rising, the Phillips curve will shift upward to the right. Suppliers of labor will demand a higher rate of increase in money wages and, as a consequence, a higher rate of inflation will now correspond to any given unemployment rate. If money growth is continued at 5 percent, the economy will return to the natural 6 percent rate of unemployment, but now with an inflation rate of 2 percent instead of the initial stable price level. In terms of Figure 11.3, this longer-run adjustment moves the economy from point B to point C.

A policymaker who is not content with this return to 6 percent unemployment (the natural rate) may still pursue a target unemployment rate below the natural rate by again increasing the rate of growth in the money supply. Let us suppose that this time the policymaker increases money supply growth from 5 percent to 7 percent. The

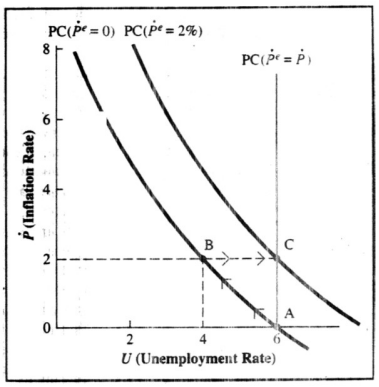


Figure 11.3

Short-Run and Long-Run Phillips Curves

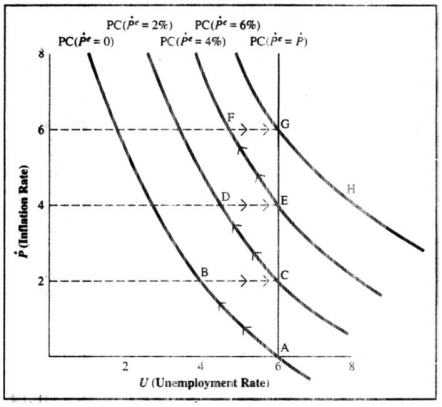
As labor suppliers come to anticipate the higher inflation rate, the short-run Phillips curve shifts from PC (/"' = 0) to PC(Pf = 2%). The unemployment rate returns to the natural rate of 6 percent; the inflation rate remains higher at 2 percent (we move from point B to point C).

effects of this further expansion of aggregate demand are illustrated in Figure 11.4. Until the suppliers of labor come to anticipate the further increase in the inflation rate, employment will expand. The economy will move to a point, such as D in Figure 11.4, with unemployment below the natural rate of unemployment.

Suppliers of labor, after a time, will come to anticipate the higher inflation that corresponds to a 7 percent growth in the money supply. The short-run Phillips curve will shift to the schedule labeled PC(P^e - 4%), and the economy will return to the natural rate of unemployment, with the inflation rate increased to 4 percent (7 percent money growth minus 3 percent growth in real income). In terms of Figure 11.4, we move from point D to point E. If the policymaker persists in attempting to "peg" the unemployment rate, money supply growth will again increase, for example, to 9 percent. This increase will move the economy in the short run to point F, but in the long run to point G, with a still higher rate of inflation.

Eventually, the policymaker will conclude that inflation has become a more serious problem than unemployment (or will be replaced by a policymaker who has this view), and the acceleration of inflation will stop. Notice, however, that when inflation has persisted for a long time, inflationary expectations become built into the system. At a point such as point G in Figure 11.4, expansionary aggregate demand policies have increased the expected (and actual) inflation rate to 6 percent (9 percent money growth minus 3 percent growth in real income). An attempt to lower inflation by slowing the rate of growth in the money supply, let us suppose all the way back to the initial noninflationary 3 percent, will not immediately move the economy back to a point such as the initial point A. In the short run, we would move along the short-run Phillips curve that corresponds to an expected inflation rate of 6 percent, to a point such as H in Figure 11.4, with high inflation and unemployment above the natural rate. Just as it took time for suppliers of labor to recognize that the rate of inflation had increased and, hence, to demand a faster rate of growth

in money wages, it will take time for them to recognize that the inflation rate has slowed and to modify their money wage demands to a level compatible with price stability. In the meantime, in the monetarist view, the economy must suffer from high inflation and high unemployment.



Monetarists believe that expansionary monetary policy can only temporarily move the unemployment rate below the natural rate. There is a trade-off between unemployment and inflation only in the short run. In terms of Figures 11.3 and 11.4, the downward-sloping short-run Phillips curves that are drawn for given expected inflation rates illustrate the short-run trade-off between unemployment and inflation. The long-run Phillips curve showing the relationship between inflation and unemployment when expected inflation has time to adjust to the actual inflation rate ($P = P^e$)—when inflation is fully anticipated—is vertical, as shown in Figures 11.3 and 11.4.

Friedman's theory of the natural rate of unemployment and output is the theoretical foundation for the monetarist belief that in the long run the influence of the money supply is primarily on the price level and other nominal variables. Real variables such as output and employment have time to adjust to their natural rates in the long run. Those natural rates of output and employment depend on real variables such as factor supplies (labor and capital) and technology.

Policy Implications

The theory of the natural rate of unemployment implies that the policymaker cannot peg the unemployment rate at some arbitrarily determined target rate. Attempts to lower the unemployment rate below the natural level by increasing the growth in aggregate demand will be successful only in the short run. The unemployment rate will gradually return to the natural rate, and the lasting effect of the expansionary policy will be a higher inflation rate.

Monetarists believe that the natural rate theory strengthens the case for non-interventionist policies. They believe that the record of the U.S. economy in the post-World War II years provides evidence that interventionist policies to affect unemployment resulted in only short-run gains and were responsible for increased inflation rates. Consider, for example, the behavior of unemployment, inflation, and money growth rates for the United States for the years 1961 to 1971, a time-period where Keynesian influence on policy was at a highpoint, as shown in Table 11.1.

According to the monetarist interpretation, expansionary policies in the mid-1960s temporarily lowered unemployment from an average rate of 5.8 percent for 1961-64 to an average rate of 3.8 percent for the 1965-69 period. In the monetarist view, this decline in unemployment resulted from the increased rate of growth in the money supply beginning in 1964, which is evident in the table. The natural rate theory suggests that at first the increased money growth would stimulate output and employment the effect on prices coming with a longer lag. Consequently, the theory would have predicted the higher inflation rates observed in the table for the later 1960s. The natural rate theory would also have predicted the reversal of the downward movement in the unemployment rate, the average unemployment rate for 1970-71 being 5.4 percent, even though the inflation rate remained high relative to the early 1960s.6

Unemployment, Inflation, and Money Growth Rates for the United States, 1961-71

YEAR	UNEMPLOYMENT RATE[a]	INFLATION RATE[b]	MONEY GROWTH RATE[c]
1961	6.7		2.1
1962	5.5	12	2.2
1963	5.7	1.6	2.9
1964	5.2	1.2	4.0
1965	4.5.	1.9	4.2
1966	3.8	3.4	4.7
1967	3.8	3.0	3.9
1968	3.6	4.7	7.2
1969	3.5	6.1	6.1
1970	4.9	5.5	3.8
1971	5.9	3.4	6.7

[a]Civilian unemployment rate (percent).

[b]Annual percentage rate of change in the consumer price index.

[c]Annual percentage rate of growth in Ml (currency held by the public plus checkable deposits).

Friedman's analysis of the Phillips curve can also be used to explain the simultaneously high inflation and high unemployment later in the 1970s. Excessive monetary growth had eventually resulted in entrenched expectations of high inflation. These raised the average inflation rate corresponding to a given unemployment rate; the Phillips curve was shifted upward. When the Federal Reserve sometimes shifted toward a more anti-inflationary policy, the economy operated at points like H in Figure 11.4, with high inflation and unemployment.

In the 1980s, the monetarists saw the high unemployment early in the decade as again the result of previous excessive monetary growth that had created high inflationary expectations. As the Federal Reserve shifted to a more prolonged restrictive policy, at first we moved along a very unfavorable short-run Phillips curve. Only after the actual inflation rate fell did the expected inflation rate gradually fall, causing the short-run Phillips curve to shift downward. In the

monetarist view, this eventual downward shift enabled unemployment to decline i:i the late 1980s and in the 1990s as the inflation rate remained low.

22.4 Let Us Sum Up

Friedman's monetarist theory suggests that monetary policy can influence real variables like output and employment only in the short run. Over time, expectations adjust, real wages return to equilibrium, and the economy reverts to its natural rates of output and employment. Persistent efforts to lower unemployment using expansionary policy result in higher inflation without sustainable employment benefits.

22.5 Key words

- **Natural Rate of Unemployment**: The rate at which the labor market is in equilibrium without accelerating inflation.
- **Real Wage**: Wage adjusted for inflation (W/P).
- **Phillips Curve**: Shows the inverse relationship between inflation and unemployment in the short run.
- **Inflationary Expectations**: Anticipations of future inflation that influence wage and price-setting behavior.
- **Aggregate Demand**: Total demand for goods and services in the economy.
- **Money Supply Growth**: The rate at which the quantity of money in circulation increases.

22.6 Suggested Readings

- Friedman, M. (1968). *The Role of Monetary Policy*. American Economic Review.
- Dornbusch, R., Fischer, S., & Startz, R. *Macroeconomics*.
- Mishkin, F. (2020). *The Economics of Money, Banking and Financial Markets*.
- Blanchard, O. (2017). *Macroeconomics*.
- Richard T. Froyen-Macroeconomics-Theories and Policies

22.7 Hints to Check Your Progress

- Why does real output initially rise after a monetary expansion?
- How do inflationary expectations affect wage demands over time?
- What happens to the Phillips Curve when inflation becomes expected?

- Why can unemployment not be kept permanently below the natural rate?

22.8 Examination Oriented Questions

1. Explain Friedman's monetarist view of the short-run and long-run effects of monetary policy.
2. Discuss the role of inflation expectations in shifting the Phillips Curve.
3. What is the natural rate of unemployment, and why does it matter in the long run?
4. Evaluate the policy implications of monetarism with examples from the post-war U.S. economy.
5. How does monetary expansion lead to higher inflation without reducing unemployment in the long run?

STRUCTURE

23.0 Objectives

- To explore the Keynesian interpretation of the Phillips Curve.
- To distinguish between short-run and long-run trade-offs between inflation and unemployment.
- To evaluate the role of expectations in shaping labour supply and output.
- To understand Keynesian justification for stabilization policies despite long-run neutrality.

23.1 Learning Outcomes

After completing this lesson, learners will be able to:

- Explain the Keynesian model of inflation-output-unemployment relationships.
- Differentiate between short-run and long-run Phillips Curves.
- Analyze the influence of expected price levels on labour and aggregate supply.
- Justify short-run policy interventions from a Keynesian standpoint.

23.2 Introduction

This unit delves into the Keynesian perspective on the trade-off between inflation and unemployment in both short and long run contexts. It examines how Keynesian models interpret the Phillips Curve, the rationale behind activist economic policies, and how these contrast with the monetarist or natural rate theories. The unit also addresses the significance of stabilization policies in managing output and employment fluctuations.

23.3 Explanation- Keynesian view of the output-inflation trade off in the short and long run, stabilization policies for output and employment

Friedman's theory of the natural rate of unemployment explains both the short-run and long-run relationship between inflation and unemployment. What is the Keynesian view of the Phillips curve, and how does it differ from the natural rate view? How can Keynesians defend activist policies to affect output and employment if the natural rate theory is correct and such policies have only a temporary effect on output and employment? These questions are considered in this section. To anticipate our conclusions, we find the following:

1. Traditional Keynesian models, such as those considered in Chapter 9, also imply that once the economy has fully adjusted to a change in inflation (caused, for example, by a change in money supply growth), output and employment will be unaffected. These Keynesian models also imply a vertical long-run Phillips curve.
2. Keynesians, however, draw different policy conclusions from this absence of a long-run trade-off between inflation and unemployment.

The inflation rate did fall from 5.5 percent in 1970 to 3.4 percent in 1971, but this drop was in part because of mandatory price and wage controls instituted on August 15,1971. The inflation rate before controls were imposed was still in excess of 5 percent.

The Phillips Curve: A Keynesian Interpretation

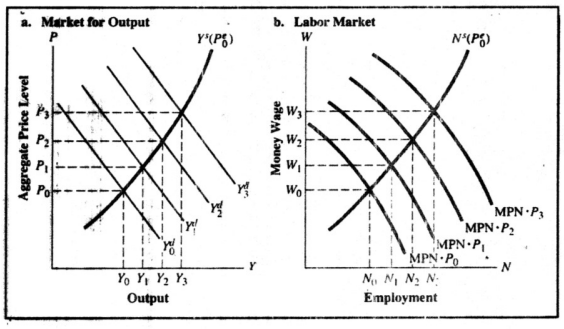
Keynesians' view of the relationship between the rate of inflation and the levels of employment and output follows directly from their theory of how price and output are determined. Here we relate that theory to the Phillips curve.

The Short-Run Phillips Curve

Figure 11.5 shows the effect on price, output, and employment of a sequence of expansionary policy actions increasing aggregate demand. The version of the Keynesian model here is the same as in section 9.4. The money wage is flexible, and labor supply is assumed to depend on the expected real wage (W/P^e), the money wage divided by the expected price level.

In the Keynesian system, an expansionary aggregate demand policy might be a monetary policy action, such as the increase in the rate of growth in the money supply analyzed in the preceding section, or it might be a fiscal policy action, such as a series of increases in government spending. In either case, policy will produce a series of shifts in the aggregate demand schedule, as shown in Figure 115a. As can be seen, the effects of these increases in aggregate demand will be to increase output (from Y_0 to Y_1 to Y_2, then to Y_3) and employment (from N_0 to N_1 to N_2, then to N_3), as well as the price level (from P_0 to P_1 to P_2, then to P_3). As employment increases, the unemployment rate will decline. The level of the money wage will increase.

Figure 11.5 Short-Run Effects of Increases in Aggregate Demand in the Keynesian Model



An expansionary aggregate demand policy, such as an increase in the rate of growth in the money supply will cause a series of shifts to the right in the aggregate demand schedule (from Y_0^d to Y_1^d to Y_2^d, to Y_3^d*). In the short run, output, the price level, and employment all rise.*

These results can be interpreted in terms of a Phillips curve relationship. The more quickly aggregate demand grows, the larger will be the rightward shifts in the aggregate demand schedule, and, other things being equal, the faster will be the rate of growth in output and employment. For a given growth in the labor force, this means that the unemployment rate will be lower the faster the rate of growth in aggregate demand. As can also be seen from the example in Figure 11.5a, increases in aggregate demand cause the price level to rise, so again, other things being equal, the faster the growth of aggregate demand is, the higher the rate of inflation will be.

The Keynesian model, then, implies a trade-off between inflation and unemployment. High rates of growth in demand correspond to low levels of unemployment and high rates of inflation. Slower growth in aggregate demand means a lower inflation rate but a higher rate of unemployment. The Phillips curve implied by the Keynesian model is downward-sloping.

But is this a short-run or a long-run relationship? Notice that so far we are holding the expected price level constant. We are considering the effects of increases in demand in the short run. As explained in Chapter 9, Keynesians view the expected price level as depending primarily on the past behavior of prices. Thus, as successive periods go by with increases in the actual price level, the expected price level will rise. In the long run, we must take account of the effects of such

increases in the expected price level. Because we did not do so in Figure 11.5, our results there, and the Phillips curve relationship derived from them, pertain to the short run. To emphasize their short-run relevance, we have labeled the labor supply curve $N^s(P^0_c)$ and the aggregate supply curve $Y^s(P^e_0)$ to indicate that these curves are drawn for the initial value of the expected price level. In Figure 11.6, we

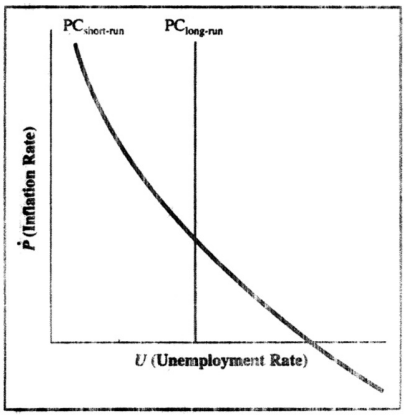


Figure 11.6

The Phillips Curve: The Keynesian Perspective

In the short run, the Phillips curve implied by the Keynesian model is downward-sloping. In the long run in the Keynesian model, as in Friedman's analysis, the Phillips curve is vertical.

Label the Phillips curve implied by the example in Figure 11.5 as the short-run Phillips curve, $PC_{short\text{-}run.}$[7]

The Long-Run Phillips Curve

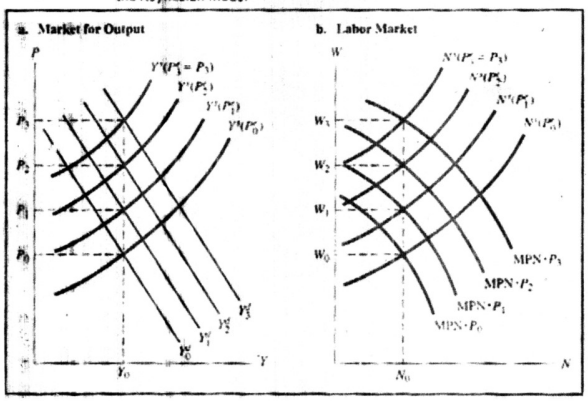
In the long run, the expected price adjusts to the actual price. Suppliers of labor perceive the inflation that has resulted from the expansionary aggregate demand policy.

The longer-run adjustment of output and employment following an increase in aggregate demand is illustrated in Figure 11.7. Recall that, in the Keynesian system, labor supply depends on the expected real wage:

$$N^s = t\left(\frac{W}{P^e}\right) \qquad (11.1)$$

where the effect of the money wage on labor supply is positive and the effect of an increase in expected price is negative. As the expected price rises, the labor supply curve in Figure 11.5b shifts to the left. Less labor will be supplied at any money wage (W) because a given money wage corresponds to a lower expected real wage (W/P^e) after an increase in the expected price level. This shift in the labor supply curve is shown in Figure 11.7b. As the expected price level rises to P^e_1, to P^e_2 and then to P^e_3, the labor supply curve shifts to $N^s(P^e_1)$, to $N^s(P^e_2)$, then to $N^s(P^e_3 = P_3)$.

Fig. 11.7 : Long-Run Effects of Increases in Aggregate Demand in the Keynesian Model



As the labor supply curve shifts to the left, the level of employment for any given price level declines. We move back up on a given labor demand curve (which is drawn for a given price level). The increase in expected price lowers employment for any price level and, therefore, lowers output supplied at any price level. The aggregate supply curve also shifts upward to the left with each increase in expected price, reflecting this decline in output supplied at a given price level. These shifts in the supply curve are illustrated in Figure 11.7a.

The labor supply and aggregate supply curves continue to shift to the left until expected price and actual price are equal. The long-run equilibrium position is shown in Figure 11.7, where the labor supply curve is $N^s(P_3^e = P_3)$ and the aggregate supply curve is $Y^S(P_3^e = P_3)$ Notice that at this point income and employment have returned to their initial levels Y_0 and N_0. This must be the case, because output and employment can be maintained above Y_0 and N_0 only as long as the expected price is below the actual price—that is, only as long as labor suppliers underestimate inflation. Once the suppliers of labor correctly perceive the increases in the price level, they will demand increases in the money wage proportionate to the increase in the price level. At this point, the real wage will have returned to its initial level ($W_3/P_3 = W_0/P_0$). Both labor supply and labor demand will have returned to their initial levels. Consequently, employment and output will be at their initial levels of N_0 and Y_0.[8] An increase in aggregate demand increases output and employment and, as a consequence, lowers the unemployment rate only in the short run. As shown in Figure 11.6, the long-run Phillips curve is vertical in the Keynesian as well as the monetarist view.

Stabilization Policies for Output and Employment: The Keynesian View

Why does the absence of a long-run effect of aggregate demand on output and employment no lead the Keynesians to accept the monetarist noninterventionist policy position? The reason is that in the Keynesian view, aggregate demand policies are aimed at stabilizing output and employment in the short run.

The goal of such stabilization policies is to keep the economy at its equilibrium level in the face of shocks to aggregate demand or supply. In other words, the aim of stabilization policies is, as the name implies, to offset what would otherwise be

[8]*In this discussion, we are ignoring elements of the Keynesian theory of labor supply that explain why the money wage is sticky in the short run (see section 9.3). We are not, for example, allowing for the effects of implicit or explicit labor contracts that prevent the money wage from adjusting to changes in demand conditions. Such factors are important in explaining the short-run behavior of the labor market. They are, however, factors that can slow but not ultimately prevent adjustment to the long-run equilibrium position.*

destabilizing influences on output and employment. The focus of such policies is on the short run.

The monetarist noninterventionist policy conclusion is based, to a large extent, on the propositions discussed in Chapter 10. The private sector is basically stable if left to itself. Thus we would not expect large destabilizing shocks to private-sector demand for output. Even if such shifts in private-sector demand (undesired shifts in the IS schedule) occurred, they would have little effect on output if the money supply were held constant, because of the steepness of the LM schedule (see Figure 10.6). Small shocks may cause output and employment to deviate somewhat from the natural rate, but Friedman and other monetarists do not believe that our knowledge of the economy allows us to predict such shocks and design policies with sufficient precision to offset them.

We could still argue that, left to itself, the private sector produces equilibrium levels of output and employment that are "undesirable." Unemployment might be "too high." It could then be proposed that the role of monetary policy would be to ensure that unemployment and output were at "desirable" levels. The theory of the natural rate of unemployment shows that monetary policy cannot fulfil this role and indicates that attempts to achieve such arbitrary unemployment targets will have destabilizing effects on the price level in the long run.

If we do not accept the other propositions of the monetarists—and Keynesians do not—there is a short-run role for stabilization policies, whether monetary or fiscal. Keynesians believe that private-sector aggregate demand is unstable, primarily because of the instability of investment demand. Keynesians believe that even for a given money supply, such changes in private-sector aggregate demand can cause large and prolonged fluctuations in income. Consequently, they believe that monetary and fiscal policies should be used to offset such undesirable changes in aggregate demand and to stabilize income.

23.4 Let Us Sum Up

Keynesian theory supports a short-run inverse relationship between inflation and unemployment, which disappears in the long run as expectations adjust. While both Keynesians and monetarists agree on the long-run neutrality, Keynesians justify short-term intervention through stabilization policies to counteract economic instability, especially in the face of fluctuating private-sector demand.

23.5 Key words

- **Phillips Curve**: A graphical representation of the inverse relationship between inflation and unemployment.
- **Natural Rate of Unemployment**: The level of unemployment consistent with stable inflation.
- **Expected Price Level (Pe)**: The price level anticipated by economic agents based on past inflation.
- **Stabilization Policies**: Government measures aimed at reducing economic volatility.
- **Aggregate Demand (AD)**: Total demand for goods and services in an economy.
- **Aggregate Supply (AS)**: Total output an economy's firms are willing to produce at different price levels.

23.6 Suggested Readings

- Blanchard, O. (2021). *Macroeconomics*. Pearson Education.
- Mankiw, N.G. (2020). *Principles of Macroeconomics*. Cengage Learning.
- Dornbusch, R., Fischer, S., & Startz, R. (2018). *Macroeconomics*. McGraw-Hill Education.
- Richard T. Froyen-Macroeconomics-Theories and Policies

23.7 Hints to Check Your Progress

- Can you explain why the Phillips Curve is downward-sloping in the short run?
- What happens when expected price levels catch up with actual price levels?
- How do Keynesians justify the use of fiscal and monetary policy in the short run?
- What are the implications of a vertical long-run Phillips Curve?

23.8 Examination Oriented Questions

1. Discuss the Keynesian interpretation of the Phillips Curve.
2. Explain the difference between short-run and long-run Phillips Curves under Keynesian theory.
3. Evaluate the effectiveness of stabilization policies according to Keynesian economics.

4. Why do Keynesians reject the monetarist view of non-interventionism despite long-run neutrality?

STRUCTURE

24.0 Objectives

24.0 Objectives

- To explain the origin and purpose of the natural rate of unemployment.
- To identify key factors influencing the natural rate.
- To understand how the natural rate varies over time and across countries.
- To explore implications of this concept for economic policymaking.

24.1 Learning Outcomes

By the end of this lesson students will be able to:

- Describe the theoretical foundation of the natural rate of unemployment.
- Identify structural and market-based determinants of the natural rate.
- Analyze the role of information and mobility in affecting unemployment levels.
- Assess how and why the natural rate may change over time.

24.2 Introduction

The concept of the *natural rate of unemployment* was introduced by Milton Friedman to show the limitations of monetary policy in achieving permanent reductions in unemployment. He argued that trying to keep unemployment below this natural level would lead to continuous increases in inflation. Over the years, economists have focused increasingly on identifying the value of this rate and understanding the structural factors that determine it in different economies. The concept

remains vital to modern macroeconomic policy, especially in evaluating safe limits for unemployment without triggering inflation.

24.3 Explanation - Evolution of the Natural Rate concept- determination of the Natural Rate of unemployment

Milton Friedman's purpose in advancing the concept of natural rates of output and unemployment was to illustrate a limitation on monetary policy. Monetary policy could not permanently lower unemployment below the natural rate, not without causing an ever-accelerating inflation rate. Over the three decades since Friedman introduced the concept, however, much attention has also been focused on what determines the natural rate and what that value is for different countries.[9] If, for example, it is important for policymakers to avoid driving the unemployment rate below the natural rate and thereby setting off inflationary pressures, how do they know how much they can safely reduce the unemployment rate by? In the late 1990s this became a crucial question in the United States as the unemployment rate fell to a 30-year low.

> [9]*In this subsequent literature, the term nonaccelerating inflation rate of unemployment (NAIRU) is often used in place of natural rate of unemployment.*

Determinants of the Natural Rate of Unemployment

Friedman did address the question of what determines the natural rate of unemployment. As we have seen, the natural rate that is consistent with an equilibrium real wage. Within our model of the labor market, this is simply an equilibrium between Tabor supply and demand subject to the condition that labor suppliers correctly estimate the price level. Friedman argued that, in the real world, the natural rate would be the rate "ground out" by an equilibrating process that would also be affected by "the actual structural characteristics of labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the cost of mobility and so on. These additional characteristics are ones we think of as deter-mining the levels of frictional and structural unemployment. Low labor mobility in a country, for example, might be expected to lead to a higher natural rate of unemployment because, as demand shifted from one region of the country to another, workers would not be quick to follow. Poor information about job vacancies might also lead to a higher natural rate of unemployment, as workers take longer to find initial jobs or to move between jobs. In Friedman's view, then, the natural rate in each country will be determined by the structural characteristics of that country's commodity and labor markets.

Time-Varying Natural Rates of Unemployment

One observer commented that "when Milton Friedman first proposed the natural rate hypothesis ... in 1968, it sounded like a royal edict had established the natural rate as another one of the universe's invariant constants." If, as Friedman argued, the natural rate of unemployment depends on the structural characteristics of a country's commodity and labor markets, there is no reason why it need be constant over time, though we would expect changes to be gradual rather than abrupt. In fact, the behavior of unemployment over the past three decades indicates that if the natural rate of unemployment is a useful concept, it must be time-varying.

To see why, consider the unemployment figures for selected European countries in Table 11.2. Shown are average unemployment rates in eight countries for five periods ranging in length from 6 to 10 years. Averages over periods of this length should give reasonable approximations of the natural rate. If there is a tendency for unemployment to move to one rate, as suggested by the natural rate hypothesis, then actual unemployment should fluctuate around that rate—sometimes above it, sometimes below it. If averaging the unemployment rate over these periods does provide an estimate of the natural rate, then the natural rate of unemployment in the countries in the table has been rising over the past three decades. Almost all reached extremely high levels in the 1990s.

24.4 Let Us Sum Up

Milton Friedman's concept of the natural rate of unemployment emphasized that monetary policy has limitations in the long run. Structural aspects such as mobility, information flow, and market imperfections determine the natural rate, making it vary across countries and time. It serves as a guidepost for policymakers to avoid inflationary risks while planning employment strategies.

24.5 Key words

- **Natural Rate of Unemployment**: The unemployment level at which inflation remains stable.
- **NAIRU**: A term used interchangeably with the natural rate, highlighting its role in inflation control.
- **Structural Unemployment**: Long-term unemployment due to mismatches in skills or locations.
- **Frictional Unemployment**: Short-term joblessness during job transitions.
- **Labour Market Imperfections**: Factors like poor mobility or lack of information that hinder market efficiency.

24.6 Suggested Readings

- Friedman, M. (1968). "The Role of Monetary Policy." *American Economic Review.*
- Mankiw, N.G. (2020). *Principles of Macroeconomics*. Cengage.
- Blanchard, O., & Johnson, D. (2013). *Macroeconomics*. Pearson.
- Dornbusch, R., Fischer, S., & Startz, R. (2018). *Macroeconomics*. McGraw-Hill Education.
- Richard T. Froyen-Macroeconomics-Theories and Policies

24.7 Hints to Check Your Progress

- What was the primary reason Friedman introduced the natural rate concept?
- List some structural factors that influence the natural rate of unemployment.
- Why is the natural rate not considered constant over time?
- How do informational inefficiencies affect unemployment levels?

24.8 Examination Oriented Questions

1. Discuss the evolution of the natural rate of unemployment and its policy relevance.
2. What are the key determinants of the natural rate of unemployment according to Milton Friedman?
3. Explain how structural characteristics of labour markets influence the natural rate.
4. Why is the natural rate of unemployment considered time-varying? Illustrate with examples.
5. Differentiate between frictional and structural unemployment and their effect on the natural rate.

STRUCTURE

25.0 Objectives

- To explain the origins and motivations behind the new classical economic approach.
- To contrast new classical economics with Keynesian and monetarist theories.
- To understand the policy ineffectiveness proposition.
- To explore the role of rational expectations in economic modelling.
- To examine the implications of market-clearing and optimizing behavior assumptions.

25.1 Learning Outcomes

After studying this lesson, students will be able to:

- Describe the main features of new classical economics.
- Differentiate between Keynesian, monetarist, and new classical policy conclusions.
- Explain the rational expectations hypothesis and its implications.
- Analyze why new classical models reject traditional short-run policy effectiveness.
- Evaluate the role of unanticipated versus anticipated policy changes in economic fluctuations.

25.2 Introduction

The emergence of **New Classical Economics** in the 1970s was a response to rising inflation and unemployment, coupled with disillusionment with Keynesian economic policies. Spearheaded by Robert Lucas, this school of thought shares the classical foundation with monetarism but introduces a more profound critique of Keynesian theory. New classical economists argue that policy efforts to manage demand have no real effect on output or employment, even in the short run, especially when expectations are rational.

25.3 Explanation - New Classical Economics

The next theoretical system we consider, the new classical economics, developed against the background of the high inflation and unemployment of the 1970s and the accompanying dissatisfaction with the prevailing Keynesian orthodoxy. Both monetarism and the new classical economics have their origins in aspects of classical economics, and the two schools of economists reach similar noninterventionist policy conclusions. Robert Lucas, the central figure in the development of the new classical economics, basically agrees with Milton Friedman's proposal for noninterventionist policy rules. Much in the spirit of Friedman, Lucas says, "As an advice giving profession we are in way over our heads." In fact, new classical economists are even more skeptical than monetarists about the usefulness of activist stabilization policies.

The new classical economics, however, is a more fundamental attack on the Keynesian theoretical system than is monetarism. Monetarists and Keynesians reach different policy conclusions and differ on a number of empirical questions, but in Chapters 10 and 11 we presented no distinct monetarist theoretical model. New classical economists have attacked the Keynesian theoretical structure as "fundamentally flawed."

This chapter first presents the new classical economists' critique of Keynesian macroeconomics, focusing especially on the differences in the policy conclusions of the two groups (section 12.1). Next, we take a broader look at the new classical economics (section 12.2). We then consider the Keynesian response to the new classical economics (section 12.3). The final section (12.4) contains concluding comments on the current state of ^the controversy between Keynesian and new classical economists.

The New Classical Position

We have already quoted Franco Modigliani's Keynesian view that a private-enterprise economy needs to be, can be, and should be stabilized by active government aggregate demand management. The central policy tenet of the new classical economics is that stabilization of real variables, such as output and employment, cannot be achieved by aggregate demand management. The values of such variables in both the short run and the long run are insensitive to systematic

aggregate demand management policies.(In other words, in the new classical view, systematic monetary and fiscal policy actions that change aggregate, demand will not affect output and employment, even in the short run. This has been termed the new classical policy ineffectiveness proposition.

Although monetarists question the necessity and desirability of activist policies to affect output and employment as well as the effectiveness of fiscal policy actions, they believe that systematic monetary policy actions have real effects in the short run. The new classical objection to activist stabilization policies is thus more far-reaching than that of monetarists.

A Review of the Keynesian Position

To see the basis for this new classical policy position, we first consider the new classical economists' critique of Keynesian macroeconomics. A good starting place is a review of the Keynesian analysis of the relationships among output, employment, and aggregate demand, as discussed in section 11.3. Consider the effects in the Keynesian model of an expansionary policy action—for example, an increase in the money supply. In the short run, such a policy action would increase aggregate demand. The aggregate demand curve would shift to the right along the upward-sloping aggregate supply schedule (as illustrated, for example, in Figure 11.5a). The price level and level of output would rise. Parallel to the increase in output is a rise in employment as labor demand increases, with the rise in prices shifting the labor demand schedule to the right along the upward-sloping (drawn against the money wage) labor supply schedule (as illustrated, for example, in Figure 11.5b).

Crucial to these results is the fact that the positions of both the aggregate supply schedule and labor supply schedule are fixed in the short run. The position of both these schedules depends on the value of the expected price level (PO, which is assumed to depend primarily on past prices and not to change with current policy actions.

In the long run, the expected price level converges to the actual price level, and both the aggregate supply schedule and the labor supply schedule shift to the left The initial levels of employment and output are restored, with only the price level and the money wage left permanently higher as a result of the increase in the money supply (see Figure 11.7). Output and employment remain above their long-run equilibrium levels only for as long as it takes labor suppliers to perceive correctly the change in the price level that results from the expansionary policy action. As long as our attention is confined to monetary policy actions, monetarists would agree with the foregoing analysis of an increase in aggregate demand.

The Rational Expectations Concept and Its Implications

The new classical economists do not agree. In particular, they do not accept the difference between the short-run and long-run results in the Keynesian or monetarist analysis of the effects of aggregate demand on output and employment. The focal point of their criticism is the Keynesian

(and monetarist) assumption concerning price expectations. This formulation assumes that labor suppliers form an expectation of the current aggregate price level (or inflation rate) on the basis of the past behavior of prices. In practice, Keynesians and monetarists have assumed that such price expectations adjust slowly and can be fixed for the analysis of policy effects over short periods.

New classical economists criticize such formulations of expectations as "naive in the extreme." Why, they ask, would rational economic agents forming an expectation of the price level rely only on past values of the price level? Why especially would they do so when in general such behavior results in their being systematically wrong when aggregate demand shifts? We have been assuming that after changes in aggregate demand—for example, the increase in the money supply considered in the preceding subsection—labor suppliers fail to perceive that the demand shift will affect price. New classical economists argue that economic agents will not persist in making such systematic errors.

New classical economists propose that economic agents will form rational expectations, rational in that they will not make systematic errors. According to the hypothesis of rational expectations, expectations are formed on the basis of all available relevant information concerning the vari- able being predicted. Furthermore, the hypothesis maintains that individuals use available information intelligently; that is, they understand the way in which the variables they are trying to predict. Thus, according to the rational expectations hypothesis expectations are, as the originator of the concept, John Muth, suggested, "essentially the same as the predictions of the relevant economic theory,"[4] based on available information.

If expectations are rational, then in forming a prediction of the value of the aggregate price level for the current period, labor suppliers will use all relevant past information, not just information about the past behavior of prices. In addition, they will use any information they have about the current values of variables that play a role in the price level. Most important from the standpoint of aggregate demand management policy, labor suppliers will take account of any anticipated (expected) policy actions. Further, they are assumed to understand the relationship between such policies and the price level.

A useful contrast can be made between the backward-looking nature of expectations in the Keynesian model and the forward-looking nature of rational expectations. In the Keynesian model, expectations are backward-looking. The expectation of a variable such as the price level adjusts (slowly) to the past behavior of the variable. According to the rational expectations hypothesis, economic agents instead use all

''John Muth, "Rational Expectations and the Theory of Price Movements," Econometrica, 29 (Julv 1961), p. 316.

New classical economists argue that fruitful macroeconomic models should rectify the failures of Keynesian economics by consistently adhering to the following assumptions:

1. Agents optimize; that is, they act in their own self-interest.

2. Markets clear.

Why, then, did Keynes dispense with those assumptions? Keynesian economics was a response to the failure of classical economics to explain the problem of unemployment and the relationship between unemployment and aggregate demand. Recall that the classical aggregate supply schedule was vertical. With such a vertical supply schedule, aggregate output was totally dependent on supply factors. The classical model was abandoned by Keynes because it did not explain prolonged deviations of output and employment from full-employment levels.

New classical economists argue that a model in the classical tradition can explain the deviations from full employment if the assumption of rational expectations is incorporated into the classical system. Recall that the classical theory of the labor market, which was the basis for the classical vertical aggregate supply function, assumed that labor suppliers knew the real wage, implying that labor suppliers had *perfect information* about the value that the aggregate price level would take on over the short run. New classical economists substitute the assumption that labor suppliers make a rational forecast of the aggregate price level. In this case, as we have seen, systematic, and hence anticipated, changes in aggregate demand will not affect output and employment, but unanticipated changes in aggregate demand will. Such unanticipated changes in aggregate demand can explain deviations from full employment.

This substitution of the assumption of rational expectations for the classical assumption of perfect information does not require substantive changes in the non-interventionist classical policy conclusions, for as we saw earlier in this chapter, meaningful aggregate demand management policies involve *systematic* variations in aggregate demand, and these have no effect on output and employment in the new classical view.

25.4 Let Us Sum Up

New classical economics represents a rigorous challenge to Keynesian theory, emphasizing rational expectations, market clearing, and policy ineffectiveness. It rejects the view that governments can stabilize real variables through systematic demand management. Instead, it posits that only unexpected policy interventions can cause short-term changes in output and employment, leaving price levels permanently altered.

25.5 Key words

- **New Classical Economics**: A school of thought that relies on rational expectations and market-clearing to explain macroeconomic outcomes.
- **Policy Ineffectiveness Proposition**: The idea that systematic aggregate demand policies have no real effect on output or employment.
- **Rational Expectations**: Expectations formed using all relevant information, not just past trends.
- **Market Clearing**: The assumption that prices and wages adjust to ensure markets are in equilibrium.
- **Optimizing Agents**: Economic actors who make decisions to maximize utility or profits.

25.6 Suggested Readings

- Lucas, R. E. (1972). "Expectations and the Neutrality of Money." *Journal of Economic Theory*.
- Muth, J. F. (1961). "Rational Expectations and the Theory of Price Movements." *Econometrica*.
- Mankiw, N.G. (2020). *Macroeconomics*.
- Snowdon, B. & Vane, H.R. (2005). *Modern Macroeconomics: Its Origins, Development and Current State*.

25.7 Hints to Check Your Progress

- What differentiates new classical economics from monetarism?
- Define rational expectations and explain their relevance to macroeconomic modelling.
- Why do new classical economists believe policy interventions are ineffective?
- How does the assumption of market clearing alter Keynesian conclusions?

25.8 Examination Oriented Questions

1. Discuss the theoretical foundations of the new classical position in macroeconomics.
2. How does the rational expectations hypothesis challenge Keynesian analysis?
3. Explain the policy ineffectiveness proposition with suitable illustrations.

4. Compare and contrast the Keynesian and new classical views on government intervention.
5. How do new classical economists explain deviations from full employment?

STRUCTURE

26.0 Objectives

- To understand the Keynesian response to New Classical criticisms.
- To evaluate the concepts of persistence, rational expectations, and labor market functioning.
- To compare auction-market and contractual perspectives on wage determination.
- To highlight the implications of expectations and institutional mechanisms on macroeconomic policy effectiveness.

20.1 Learning Outcomes

After studying this lesson, learners will be able to:

- Identify the key areas of disagreement between Keynesian and New Classical economists.

- Explain the Keynesian interpretation of prolonged unemployment.
- Critically assess the assumptions behind rational expectations theory.
- Understand the Keynesian rationale behind sticky wages and labor market contracts.
- Discuss the policy implications of these theoretical debates.

26.2 Introduction

The Keynesian counter-critique emerged as a response to the New Classical school's criticisms, especially concerning expectations and market adjustments. While conceding some valid points—such as deficiencies in early Keynesian models regarding expectations—Keynesians maintain that Keynesian theory still offers a robust framework for understanding output and employment fluctuations. They advocate for the continued relevance of activist stabilization policies and reject several assumptions and implications of the New Classical approach.

26.3 Explanation- The Keynesian Counter critique

The theme that runs through the Keynesian response to the new classical criticisms is that, although they raise valid points, especially concerning the weakness of the Keynesian treatment of expectations formation, it is still, as the Keynesian Robert Solow puts it, "much too early to tear up the *IS-LM* chapters in the textbooks of your possibly misspent youth."[11] Keynesians continue to believe that Keynes provided the basis for a useful framework in which to analyze the determinants of output and employment. They continue to believe in the usefulness of activist policies to stabilize output and employment. The major areas in which the Keynesians have raised objections to the new classical view are as follows.

The Question of Persistence

In the preceding section, we saw that the new classical model, with the concept of rational expectations, could explain deviations from potential output. Unanticipated declines in aggregate demand would move output and employment below the potential levels. Keynesians argue that although such an explanation might be plausible for brief departures from potential output and employment, it is not adequate to explain the persistent and substantial deviations that we have experienced. An unanticipated decline in investment, such as we considered previously (Figure 12.3), might well cause output and employment to decline over a short period, let us say one year. By the next year, however, this decline in aggregate demand would be apparent; it would no longer be unanticipated. Labor suppliers would recognize that the price level had declined. Consequently, the shifts to the right in the labor supply curve and the aggregate supply curve discussed previously (see Figure 12.3) would restore employment and output to their initial levels.

This being the case, how can the new classical model explain unemployment rates of 10 percent or more in Great Britain for the entire period 1923-39 or during the Great Depression of

the 1930s in the United States, when the unemployment rate exceeded 14 percent for 10 consecutive years? In the more recent past, how can the model explain the movement of the unemployment rate during the deep and prolonged recessions of the mid-1970s and early 1980s?

New classical economists respond that although the source of the unemployment, the unanticipated change in aggregate demand, will be of short duration, the effects of the shock will persist. Consider, for example, the response to an unanticipated decline in demand. Assume that after one year or so, everyone recognizes that demand has fallen, so the change is no longer unanticipated. Declines in output and employment will have occurred. New classical economists argue that it will take time before such declines are reversed. Firms that have already cut output will not find it optimal to restore production immediately to presoak levels because of the cost of adjusting output Moreover, firms will have accumulated excess inventory stocks over the period during which output was in decline. It will take time to run off such stocks; in the meantime, production and employment will remain depresses? On the labor supply side, workers who have become unemployed will no find it optimal to take the first job offer that comes along but will search for the best opportunity. New classical economists argue that, as a consequence of these adjustment lags, lengthy deviations from full employment, such as the United states experienced during the mid-1970s and early 1980s, can be explained even though the shocks that cause such deviations are short-lived.

What about the depression in Great Britain and the United States in the 1930s? One proponent of the new classical position, Robert Barro, has explained the severity of the U.S. experience by the extent of the largely unanticipated monetary collapse during the early years of the Depression, when the money supply fell by one-third. The slow recoveryis viewed as a result of the massive government intervention during the New Deal period that subverted the normal adjustment mechanisms of the private sector.[12] Other new classical economists, such as Sargent and Lucas, agree with Keynesians that the Great Depression is not well explained by their theory, but do not find the Keynesian explanation convincing.

On this question of persistence, Keynesians remain unconvinced that adjustment? lags sufficiently explain prolonged and severe unemployment They believe that accepting the classical or new classical framework can explain episodes such as the Great Depression only as a result of factors on the supply side, which in their view are the only factors in these models that could cause prolonged unemployment. If markets clear and there is no involuntary unemployment, then, as Modigliani puts it, to the classical or new classical economists "what happened to the United States in the 1930s was a severe attack of contagious laziness."[13]

The Extreme Informational Assumptions of Rational Expectations

Keynesians accept the new classical economists' criticism of price expectations formulations based only on information about past prices. Such rules are naive because they assume that economic agents neglect available and potentially useful information in making their forecasts; Such naive assumptions about expectations came into use in the 1950s and early 1960s when the

inflation rate was both low and stable. In these circumstances, such rules might have been reasonable approximations of the way people made forecasts, because good forecasts could, in fact, have been based on :he past behavior of prices. With the volatile and, at times, high inflation of the post-1970 period, it is harder to believe that economic agents did not find it worthwhile to make more sophisticated forecasts,

Still, many Keynesians argue that the rational expectations assumption errs in assuming that economic agents are unrealistically sophisticated forecasters, especially when rational expectations are assumed for individual suppliers of labor. Keynesians criticize the assumption that individuals use *nil* available relevant information in making their forecasts. Such an assumption ignores the costs of gathering information.

The rational expectations theory also presumes that individuals use available information intelligently. They know the relationships that link observed variables with variables they are trying to predict. They are also able to understand the systematic response pattern of policymakers. For example, if the monetary policymaker typically responds to rising unemployment by increasing the money supply, the public will come to anticipate such policy actions. Moreover, they will be able to predict the price effects of such anticipated monetary policy actions. Many Keynesians deny that individual labor suppliers possess knowledge of both the working of the economy and the behavior patterns of policymakers

If the economy, including the behavior of policymakers, had been stable and subject to little change for a long period of time, it is perhaps reasonable to believe that economic agents would come to know the underlying relationships that govern policy variables and economic aggregates. The rational expectations assumption might be realistic in a long-run equilibrium model, but Keynesians argue that it is not realistic in the short run. In the short run, the cost of gathering and processing information may be high enough that labor suppliers making forecasts of the aggregate price level or inflation rate do not find it worthwhile to use much information over and above the past behavior of prices.

If expectations are not rational, there is a role for aggregate demand management aimed at stabilizing output and employment. Even systematic changes in aggregate demand will affect output and employment because they will not be predicted by economic agents. If private-sector aggregate demand is unstable, as Keynesians believe it is, a stabilization policy is needed. Further, the monetary and fiscal policymaking authorities should be able to forecast systematic changes in private-sector aggregate demand. These policymaking authorities *do* gather what they consider to be all the available and important information on variables they wish to forecast and control. They also invest considerable resources in trying to estimate the relationships that characterize the economy. Keynesians regard the rational expectations assumption as reasonably correct when applied to the policymakers. The policymakers can design policy changes to offset what to the public are unanticipated changes in private-sector aggregate demand. In essence, this role for stabilization policy stems from an *information advantage* on the part of the policymaker.

Keynesians conclude:

> Macroeconomic models based on the assumptions of the rational expectations hypothesis do not demonstrate the short-run ineffectiveness of policy, therefore, because they are not really short-run models. The information availability assumption of the rational expectations hypothesis implicitly places such models in a long-run equilibrium context in which their classical properties... are not surprising.[14]

New classical economists defend the rational expectations assumptions. They admit that the rational expectations hypothesis is "unrealistic," but as Bennett McCallum argues, "All theories or models are 'unrealistic' in the sense of being extremely simplified descriptions of reality.... So the true issue is: of all the simple expectation assumptions conceivable, which one should be embodied in a macro-economic model to be used for stabilization analysis?"[15] New classical economists favor the rational expectations assumption over the assumption that individuals form price expectations based on the past history of prices because the rational expectations hypothesis is consistent with individual optimizing behavior.

Auction Market Versus Contractual Views of the Labor Market

In the new classical view, as in the original classical theory, the money wage is assumed to adjust quickly to clear the labor market—to equate labor supply and demand. This is an *auction market* characterization. In contrast, in the Keynesian *contractual* view of the labor market, "wages are not set to clear markets in the short run, but rather are strongly conditioned by longer-term considerations involving . . . employer-worker relations."[16] The money wage is sticky in the downward direction. In Arthur Okun's phrase, the labor market functions more by the *invisible tandshake*than by the *invisible hand* of a competitive market mechanism. Most of the response to a decline in aggregate demand and, consequently, the demand for labor comes in the form of a reduction in employment rather than in a fall in the money wage.

Keynesians view the labor market as one in which long-term arrangements are made between buyers and sellers. In general, such relationships fix the money wage while leaving the employer free to adjust hours worked over the course of the explicit or implicit contract. Layoffs or reduced hours are considered an "acceptable" response on the part of the employer to a fall in demand. Applying pressure for wage cuts or replacing current workers with unemployed workers who will work for lower wages is not acceptable. This contractual Keynesian view explains wage stickiness on the basis of the institutional mechanisms that characterize the labor market. Much work is under way to investigate the theoretical reasons such labor market institutions have developed. Even without such theoretical foundations, the Keynesians argue that institutional mechanisms of this nature *do exist,* and they criticize new classical economists for ignoring these elements of reality that their model cannot explain.

New classical economists agree that the labor market is, at least in part, characterized by long-term contracts. They deny, however, that the existence of such contracts has, of itself, any

implication for whether the labor market will clear—that is, for whether there will be involuntary unemployment. They deny that the terms of labor contracts are so rigid that employers and employees cannot effect changes desirable to both parties. For example, if the money wage specified is too high to maintain the market-clearing level of employment, workers could give up other provisions in the contract, increase the work done per hour, or in extreme cases allow revision of the wage in some fashion. New classical economists do not deny that labor contracts cause some deviation of employment from the market-clearing levels, but they do not believe this deviation is significant.

26.4 Let Us Sum Up

The Keynesian counter-critique upholds the relevance of demand-side management and challenges the assumptions of the New Classical school. Persistent unemployment, the limits of rational expectations, and institutional wage rigidity form the core of their argument. Keynesians stress the importance of stabilization policy and reject the notion that markets always self-correct swiftly and efficiently.

26.5 Key words

- **Rational Expectations:** A theory assuming individuals use all available information optimally in forecasting future economic variables.
- **Persistence:** Long-lasting deviations from potential output or full employment.
- **Sticky Wages:** Wages that do not adjust downward easily in response to economic downturns.
- **Contractual Labor Market:** A labor market where wages are determined by contracts, not immediate supply-demand conditions.
- **Auction Market:** A market where wages and prices adjust instantly to clear demand and supply.
- **Adjustment Lags:** Delays in economic variables returning to equilibrium after a shock.

26.6 Suggested Readings

- Barro, R. (1989). *New Classical Macroeconomics*.
- Solow, R. (1980). *On Theories of Unemployment*.
- Modigliani, F. (1977). *The Keynesian Critique of Classical Theory*.
- Okun, A. (1981). *Prices and Quantities: A Macroeconomic Analysis*.
- McCallum, B. (1983). *Rational Expectations and Stabilization Policy*.

- Richard T. Froyen-Macroeconomics-Theories and Policies

26.7 Hints to Check Your Progress

- What are the main points of contention between Keynesian and New Classical economists?
- Why do Keynesians doubt the assumptions behind rational expectations?
- How does the contractual view of labor markets explain unemployment?
- In what way do Keynesians justify the need for policy intervention?
- Can rational expectations models account for historical economic downturns?

26.8 Examination Oriented Questions

1. Discuss the Keynesian critique of the New Classical theory with respect to persistent unemployment.
2. Explain the differences between rational expectations and naive expectations.
3. How do Keynesians view the role of stabilization policy in the short run?
4. Distinguish between auction market and contractual views of the labor market.
5. Why do Keynesians believe wages are sticky? What implications does this have for employment?

LESSON-24, REAL BUSINESS CYCLE MODELS-AGENTS OPTIMIZE AND MARKETS CLEAR, A SIMPLE BUSINESS CYCLE MODEL, EFFECTS OF A POSITIVE TECHNOLOGY SHOCK, MONETARY AND FISCAL POLICY IN A REAL BUSINESS CYCLE MODEL

STRUCTURE

27.0 Objectives

- To understand the foundations of Real Business Cycle models.
- To examine how rational expectations influence macroeconomic outcomes.
- To assess the impact of anticipated and unanticipated policy changes.
- To evaluate the implications of policy ineffectiveness in economic stabilization.

27.1 Learning Outcomes

By the end of this lesson, students will be able to:

- Explain the key assumptions of RBC and rational expectations models.
- Distinguish between the effects of anticipated and unanticipated monetary shocks.
- Analyze policy responses using the Lucas-Sargent Market Clearing Model.
- Critically assess the Policy Ineffectiveness Theorem and its implications.

27.2 Introduction

Real Business Cycle (RBC) models assert that economic booms and recessions result from the rational and optimizing behavior of agents reacting to external real shocks—such as technological innovations or fiscal changes—in fully competitive markets where prices and wages adjust freely. This perspective is rooted in the New Classical Macroeconomics, which incorporates rational expectations to explain how agents anticipate and respond to economic policies. The RBC approach challenges traditional views on the effectiveness of monetary and fiscal policies, especially when these are anticipated by the public.

27.3 Explanation

Real business cycle models suggest that booms and slumps are equilibrium responses to the constraints faced by the optimising agents.

The new classical macroeconomics argues that business cycles occur essentially in a typical market clearing framework in response to real shocks, which include, inter alia, technology shocks and fiscal shock. Moreover the new classical macroeconomics argues that anticipated monetary shock has no real effect on real variables. We also note that wages and prices are perfectly flexible, which ensure two classical results, viz., automatic full employment and long-term neutrality of money.

Although most macroeconomists agree that monetary policy can affect unemployment and output, at least in the short run, the new classical economics, developed by Robert Lucas, Thomas Sargent and Robert Barroemphasises the role of flexible wages and prices, but it adds a new feature, called rational expectations, to explain short-term economic fluctuations or the emergence of business cycles.

New classical macroeconomic holds that (i) prices and wages are flexible and (ii) people use all available imformation in making decisions and form their expectations on the basis of it. Under the assumption, the government cannot ‘fool’ the people, because people are well-informed and have access to the same information as the government.

According to rational expectations, forecasts are unbiased and are based on all available information. This means that people make unbiased forecast. The key assumption in new classical macroeconomics is that because of rational expectations the government cannot deceive the people with systematic economic policies.

Assumptions:

Rational expectations theory is based on three assumptions : (i) Individuals and business firms learn through experience to anticipate the consequences of changes in monetary and fiscal policies, (ii) They act instantaneously to protect their economic interests, (iii) All resource and product markets are purely competitive. This means that all markets clear automatically even in the absence of government intervention.

We may now turn to the implications of rational expectations in the context of business cycles. Here we present the new classical macroeconomic model developed by Robert Lucas and Thomas Sargent.

The Lucas-Sargent Market Clearing Model:

In this model all wages and prices are completely flexible with respect to expected changes in the general price level; that is, a rise in the expected price level results in an immediate and equal rise in wages and prices because workers try to keep their real wages from falling when they expect the price level to rise.

This view of how wages and prices are set indicates that a rise in the expected price level causes an immediate leftward shift in the aggregate supply (AS) curve, which leaves real wages unchanged and aggregate output at the natural rate (full-employment) level if expectations are realised.

The model then suggests that anticipated policy has no effect on aggregate output and employment; only unanticipated policy has an effect.

The Effect of Unanticipated Monetary Shock:

Let us now look at the short-run response to an unanticipated policy such as unexpected increase in the money supply. In Fig. 15.3 the AS curve is drawn for an expected price level P1. The initial aggregate demand curve AD1 intersects aggregate supply curve AS1 at point 1, where the realised price level is at the expected price level P1 and aggregate output is at the natural rate level Yn.

Since point 1 is also on the LRAS curve at the output level Yn, there is no tendency for the AS curve to shift. The economy remains in long-run equilibrium.

Now suppose the central bank feels that the unemployment rate is too high and so makes a large bond purchase that is unexpected by the public. The money supply increases and the AD curve shifts rightward to AD2. Since this shift is unexpected, the expected price level remains at P1 and the AS curve remains at AS1.

Equilibrium is now at point 2, the intersection of AD2 and AS1. Aggregate output increases above the natural rate level to Ya and the realised price level increases to P2. Thus in case of an unanticipated policy change money does not have a neutral effect on the economy.

Instead income fluctuation occurs due to monetary policy change. We may now examine the effect of an anticipated monetary shock in a market clearing rational expectations framework.

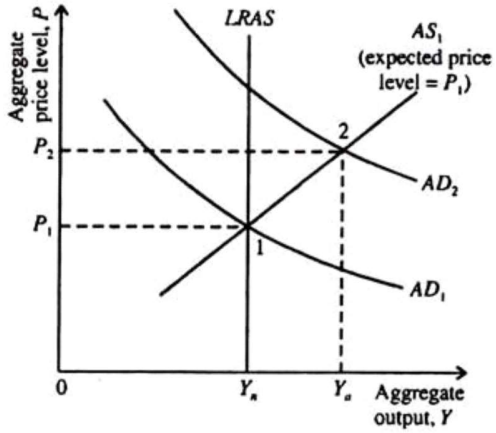


Fig. 15.3 Short-run Response to Unanticipated Expansionary Monetary Policy

The Effect of an Anticipated Monetary Shock:

Lucas believes that people can anticipate government policies to fight inflation and recession, given their knowledge of policy, past experience and expectations about the future. Consequently they act on this anticipation, effectively nullifying the intended effects of those policies. What, then, should the government do? It should follow strict guidelines rather than try to use discretionary policy to stabilise the economy.

Let us imagine that the central bank decides to increase the rate of growth of the money supply in order to stimulate output and raise employment. According to rational expectations theory if the public expects that the central bank will make open market operations in order to lower unemployment because they have seen it done in the past, the expansionary policy will be anticipated.

The outcome of such an anticipated monetary shock is illustrated in Fig. 15.4.

Since expectations are rational, workers and firms recognise that an expansionary policy will shifts the AD curve to the right from AD1 to AD2 and will expect the aggregate price level to rise to P2. Workers will demand higher wages so that their real earnings remain the same when the price level rises. So no extra labour is supplied and no extra output is produced.

The AS curve then shifts leftward to AS2 and intersects AD2 at point 2, an equilibrium point where aggregate output is at the natural rate level Yn and the price level has risen to P2.

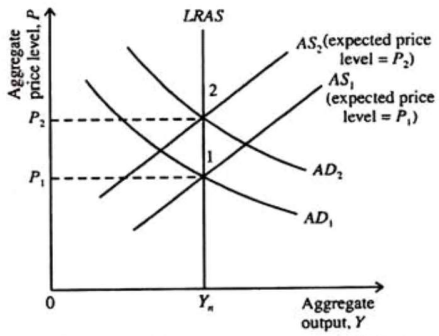


Fig. 15.4 Short-run Response to Anticipated Monetary Shock

The rational expectations framework demonstrates that aggregate output does not increase as a result of anticipated expansionary policy and that the economy immediately moves to a point of long-run equilibrium (point 2) where aggregate output is at the natural rate level. This proves the classical neutrality of money, i.e., money has a neutral effect on real variables such as aggregate output and employment.

Decline in Aggregate Output due to Expansionary Monetary Policy:

An important feature of the rational expectations hypothesis is that an expansionary policy such as an increase in the rate of money growth can lead to decline in aggregate output if the public expects an even more expansionary policy than the one actually implemented.

There will be a surprise in the policy, but it will be negative and drive output down. Policy makers cannot be sure if their policies will work in the intended direction.

To see how an expansionary policy can lead to a decline in aggregate output we look at Fig. 15.5. Initially the economy is at point 1, the intersection of AD1 and AS1; output is Yn and the price level is P1. Now suppose the public expects the central bank to increase the money supply in order to shift the aggregate demand curve to AD2.

As we saw in Fig. 15.3, the aggregate supply curve now shifts leftward to AS2 because the price level is expected to rise to P2.

Suppose that the expansionary policy of the central bank actually falls short of what was expected so that the aggregate demand curve shifts only to AD'2.The economy will move to point 2?, the intersection of the aggregate supply curve AS2 and the aggregate demand curve AD'2.

The result of the mistaken expectation is that output falls to Y'2, while the price level rises to P'2, rather than P2. An expansionary policy that is less expansionary than anticipated leads to an output movement directly opposite to that intended.

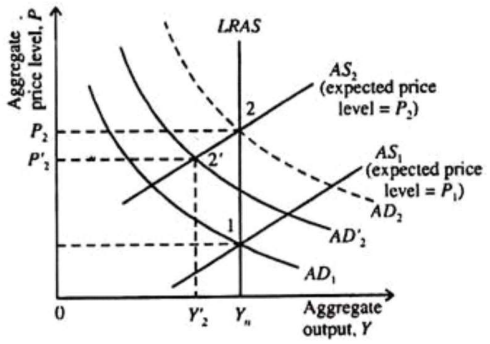


Fig. 15.5 Short-term responses to a policy that is less expansionary than expected

Implications for Policymakers:

The market clearing rational expectations framework implies that discretionary stabilisation policy cannot be effective and might have undesirable effects on the economy. The reason is that policy-makers cannot know the outcome of their decisions without knowing the public's expectations regarding them.

Policymakers' attempts to use discretionary policy might lead to unpredictable policy surprises, which, in turn, cause undesirable fluctuations around the natural rate level of aggregate output. To eliminate these undesirable fluctuations, the central bank and other policymaking agencies should abandon discretionary policy and generate as few policy surprises as possible.

In short, in the market clearing rational expectations framework when any policy is anticipated, aggregate output remains at the natural rate level. Yet the rational expectations model allows aggregate output to fluctuate away from the natural rate level as a result of unanticipated movements in the aggregate demand curve. The prediction that follows from the rational expectations model is a striking one.

The Policy Ineffectiveness Theorem:

Anticipated policy has no effect on the business cycle only unanticipated policy matters.

This conclusion is called the policy ineffectiveness proposition because it implies that one anticipated policy is just like any other; it has no effect on output fluctuations. However, this proposition does not rule out output effects from policy changes. If the policy is a surprise (unanticipated) it will have an effect on output.

27.4 Let Us Sum Up

Real Business Cycle models and rational expectations emphasize the self-correcting nature of the economy. When agents anticipate policy changes, their responses neutralize the intended effects, especially under flexible wage and price settings. The key takeaway is that only unanticipated

shocks can cause real deviations from equilibrium output, which challenges the efficacy of discretionary stabilization policies.

27.5 Key words

- **Real Business Cycle (RBC)**: A theory suggesting that real shocks, not monetary ones, drive economic fluctuations.
- **Rational Expectations**: The hypothesis that individuals form forecasts using all available information.
- **Market Clearing**: A situation where supply equals demand in every market.
- **Aggregate Supply (AS)**: The total output firms are willing to produce at various price levels.
- **Aggregate Demand (AD)**: The total spending on domestic goods and services at various price levels.
- **Policy Ineffectiveness Theorem**: A proposition stating that anticipated policy changes have no effect on output or employment.

27.6 Suggested Readings

- Lucas, R.E. (1972). *Expectations and the Neutrality of Money*.
- Sargent, T.J., & Wallace, N. (1975). *"Rational Expectations," the Optimal Monetary Instrument, and the Optimal Money Supply Rule*.
- Barro, R.J. (1976). *Rational Expectations and the Role of Monetary Policy*.
- Mankiw, N.G. (Latest Edition). *Macroeconomics*.
- Richard T. Froyen-Macroeconomics-Theories and Policies

27.7 Hints to Check Your Progress

- Define rational expectations and explain their significance in macroeconomic models.
- Discuss the difference between anticipated and unanticipated monetary policy effects.
- Evaluate the policy ineffectiveness theorem using examples from RBC models.
- Explain why market-clearing assumptions lead to full employment in RBC theory.

27.8 Examination Oriented Questions

1. What are the fundamental assumptions of Real Business Cycle models?

2. How does the Lucas-Sargent Market Clearing Model explain business cycles?
3. Differentiate between the effects of anticipated and unanticipated monetary shocks.
4. Discuss the implications of the Policy Ineffectiveness Theorem for macroeconomic policy.
5. How does rational expectations theory challenge the role of discretionary policy?

LESSON- 28, NEW KEYNESIAN ECONOMICS-STICKY PRICE (MENU COST), EFFICIENCY WAGE MODELS, AND INSIDER-OUTSIDER MODELS

M.A. Eco. Sem 1I **New Keynesian Economics** **Unit–IV**

ECO- 202 **Lesson 28**

STRUCTURE

28.0 Objectives

- To understand the evolution and principles of New Keynesian economics.
- To explore how wage and price rigidities affect macroeconomic outcomes.
- To analyze key concepts like menu costs, coordination failure, and efficiency wages.
- To examine the new synthesis of classical and Keynesian models in modern macroeconomics.

28.1 Learning Outcomes

After studying this lesson, learners will be able to:

- Describe the foundations and development of New Keynesian theory.

- Distinguish between New Keynesian and new classical viewpoints.
- Explain causes of price and wage stickiness.
- Evaluate theories such as menu costs, price staggering, and efficiency wages.
- Understand how modern macroeconomic models integrate classical and Keynesian ideas.

28.2 Introduction

New Keynesian economics emerged as a modern extension of Keynesian thought, adapting to critiques posed by the new classical school. Originating in the 1980s, it revises the original Keynesian framework by incorporating rational expectations and addressing why prices and wages are sticky. This school of thought continues to inform macroeconomic theory and policy, particularly in explaining short-term fluctuations and unemployment.

28.3 Explanation

New Keynesian economics is the school of thought in modern macroeconomics that evolved from the ideas of John Maynard Keynes. Keynes wrote The General Theory of Employment, Interest, and Money in the 1930s, and his influence among academics and policymakers increased through the 1960s. In the 1970s, however, new classical economists such as Robert Lucas, Thomas J. Sargent, and Robert Barro called into question many of the precepts of the Keynesian revolution. The label "new Keynesian" describes those economists who, in the 1980s, responded to this new classical critique with adjustments to the original Keynesian tenets.

The primary disagreement between new classical and new Keynesian economists is over how quickly wages and prices adjust. New classical economists build their macroeconomic theories on the assumption that wages and prices are flexible. They believe that prices "clear" markets—balance supply and demand—by adjusting quickly. New Keynesian economists, however, believe that market-clearing models cannot explain short-run economic fluctuations, and so they advocate models with "sticky" wages and prices. New Keynesian theories rely on this stickiness of wages and prices to explain why involuntary unemployment exists and why monetary policy has such a strong influence on economic activity.

A long tradition in macroeconomics (including both Keynesian and monetarist perspectives) emphasizes that monetary policy affects employment and production in the short run because prices respond sluggishly to changes in the money supply. According to this view, if the money supply falls, people spend less money and the demand for goods falls. Because prices and wages are inflexible and do not fall immediately, the decreased spending causes a drop in production and layoffs of workers. New classical economists criticized this tradition because it lacks a coherent theoretical explanation for the sluggish behavior of prices. Much new Keynesian research attempts to remedy this omission.

Menu Costs and Aggregate-Demand Externalities

One reason prices do not adjust immediately to clear markets is that adjusting prices is costly. To change its prices, a firm may need to send out a new catalog to customers, distribute new price lists to its sales staff, or, in the case of a restaurant, print new menus. These costs of price adjustment, called "menu costs," cause firms to adjust prices intermittently rather than continuously.

Economists disagree about whether menu costs can help explain short-run economic fluctuations. Skeptics point out that menu costs usually are very small. They argue that these small costs are unlikely to help explain recessions, which are very costly for society. Proponents reply that "small" does not mean "inconsequential." Even though menu costs are small for the individual firm, they could have large effects on the economy as a whole.

Proponents of the menu-cost hypothesis describe the situation as follows. To understand why prices adjust slowly, one must acknowledge that changes in prices have externalities—that is, effects that go beyond the firm and its customers. For instance, a price reduction by one firm benefits other firms in the economy. When a firm lowers the price it charges, it lowers the average price level slightly and thereby raises real income. (Nominal income is determined by the money supply.) The stimulus from higher income, in turn, raises the demand for the products of all firms. This macroeconomic impact of one firm's price adjustment on the demand for all other firms' products is called an "aggregate-demand externality."

In the presence of this aggregate-demand externality, small menu costs can make prices sticky, and this stickiness can have a large cost to society. Suppose General Motors announces its prices and then, after a fall in the money supply, must decide whether to cut prices. If it did so, car buyers would have a higher real income and would therefore buy more products from other companies as well. But the benefits to other companies are not what General Motors cares about. Therefore, General Motors would sometimes fail to pay the menu cost and cut its price, even though the price cut is socially desirable. This is an example in which sticky prices are undesirable for the economy as a whole, even though they may be optimal for those setting prices.

The Staggering of Prices

New Keynesian explanations of sticky prices often emphasize that not everyone in the economy sets prices at the same time. Instead, the adjustment of prices throughout the economy is staggered. Staggering complicates the setting of prices because firms care about their prices relative to those charged by other firms. Staggering can make the overall level of prices adjust slowly, even when individual prices change frequently.

Consider the following example. Suppose, first, that price setting is synchronized: every firm adjusts its price on the first of every month. If the money supply and aggregate demand rise on May 10, output will be higher from May 10 to June 1 because prices are fixed during this interval.

But on June 1 all firms will raise their prices in response to the higher demand, ending the three-week boom.

Now suppose that price setting is staggered: half the firms set prices on the first of each month and half on the fifteenth. If the money supply rises on May 10, then half of the firms can raise their prices on May 15. Yet because half of the firms will not be changing their prices on the fifteenth, a price increase by any firm will raise that firm's relative price, which will cause it to lose customers. Therefore, these firms will probably not raise their prices very much. (In contrast, if all firms are synchronized, all firms can raise prices together, leaving relative prices unaffected.) If the May 15 price setters make little adjustment in their prices, then the other firms will make little adjustment when their turn comes on June 1, because they also want to avoid relative price changes. And so on. The price level rises slowly as the result of small price increases on the first and the fifteenth of each month. Hence, staggering makes the price level sluggish, because no firm wishes to be the first to post a substantial price increase.

Coordination Failure

Some new Keynesian economists suggest that recessions result from a failure of coordination. Coordination problems can arise in the setting of wages and prices because those who set them must anticipate the actions of other wage and price setters. Union leaders negotiating wages are concerned about the concessions other unions will win. Firms setting prices are mindful of the prices other firms will charge.

To see how a recession could arise as a failure of coordination, consider the following parable. The economy is made up of two firms. After a fall in the money supply, each firm must decide whether to cut its price. Each firm wants to maximize its profit, but its profit depends not only on its pricing decision but also on the decision made by the other firm.

If neither firm cuts its price, the amount of real money (the amount of money divided by the price level) is low, a recession ensues, and each firm makes a profit of only fifteen dollars.

If both firms cut their price, real money balances are high, a recession is avoided, and each firm makes a profit of thirty dollars. Although both firms prefer to avoid a recession, neither can do so by its own actions. If one firm cuts its price while the other does not, a recession follows. The firm making the price cut makes only five dollars, while the other firm makes fifteen dollars.

The essence of this parable is that each firm's decision influences the set of outcomes available to the other firm. When one firm cuts its price, it improves the opportunities available to the other firm, because the other firm can then avoid the recession by cutting its price. This positive impact of one firm's price cut on the other firm's profit opportunities might arise because of an aggregate-demand externality.

What outcome should one expect in this economy? On the one hand, if each firm expects the other to cut its price, both will cut prices, resulting in the preferred outcome in which each makes thirty dollars. On the other hand, if each firm expects the other to maintain its price, both will

maintain their prices, resulting in the inferior solution, in which each makes fifteen dollars. Hence, either of these outcomes is possible: there are multiple equilibrium.

The inferior outcome, in which each firm makes fifteen dollars, is an example of a coordination failure. If the two firms could coordinate, they would both cut their price and reach the preferred outcome. In the real world, unlike in this parable, coordination is often difficult because the number of firms setting prices is large. The moral of the story is that even though sticky prices are in no one's interest, prices can be sticky simply because price setters expect them to be.

Efficiency Wages

Another important part of new Keynesian economics has been the development of new theories of unemployment. Persistent unemployment is a puzzle for economic theory. Normally, economists presume that an excess supply of labor would exert a downward pressure on wages. A reduction in wages would in turn reduce unemployment by raising the quantity of labor demanded. Hence, according to standard economic theory, unemployment is a self-correcting problem.

New Keynesian economists often turn to theories of what they call efficiency wages to explain why this market-clearing mechanism may fail. These theories hold that high wages make workers more productive. The influence of wages on worker efficiency may explain the failure of firms to cut wages despite an excess supply of labor. Even though a wage reduction would lower a firm's wage bill, it would also—if the theories are correct—cause worker productivity and the firm's profits to decline.

There are various theories about how wages affect worker productivity. One efficiency-wage theory holds that high wages reduce labor turnover. Workers quit jobs for many reasons—to accept better positions at other firms, to change careers, or to move to other parts of the country. The more a firm pays its workers, the greater their incentive to stay with the firm. By paying a high wage, a firm reduces the frequency of quits, thereby decreasing the time spent hiring and training new workers.

A second efficiency-wage theory holds that the average quality of a firm's workforce depends on the wage it pays its employees. If a firm reduces wages, the best employees may take jobs elsewhere, leaving the firm with less-productive employees who have fewer alternative opportunities. By paying a wage above the equilibrium level, the firm may avoid this adverse selection, improve the average quality of its workforce, and thereby increase productivity.

A third efficiency-wage theory holds that a high wage improves worker effort. This theory posits that firms cannot perfectly monitor the work effort of their employees and that employees must themselves decide how hard to work. Workers can choose to work hard, or they can choose to shirk and risk getting caught and fired. The firm can raise worker effort by paying a high wage. The higher the wage, the greater is the cost to the worker of getting fired. By paying a higher wage, a firm induces more of its employees not to shirk, and thus increases their productivity.

A New Synthesis

During the 1990s, the debate between new classical and new Keynesian economists led to the emergence of a new synthesis among macroeconomists about the best way to explain short-run economic fluctuations and the role of monetary and fiscal policies. The new synthesis attempts to merge the strengths of the competing approaches that preceded it. From the new classical models it takes a variety of modeling tools that shed light on how households and firms make decisions over time. From the new Keynesian models it takes price rigidities and uses them to explain why monetary policy affects employment and production in the short run. The most common approach is to assume monopolistically competitive firms (firms that have market power but compete with other firms) that change prices only intermittently.

The heart of the new synthesis is the view that the economy is a dynamic general equilibrium system that deviates from an efficient allocation of resources in the short run because of sticky prices and perhaps a variety of other market imperfections. In many ways, this new synthesis forms the intellectual foundation for the analysis of monetary policy at the Federal Reserve and other central banks around the world.

Policy Implications

Because new Keynesian economics is a school of thought regarding macroeconomic theory, its adherents do not necessarily share a single view about economic policy. At the broadest level, new Keynesian economics suggests—in contrast to some new classical theories—that recessions are departures from the normal efficient functioning of markets. The elements of new Keynesian economics—such as menu costs, staggered prices, coordination failures, and efficiency wages—represent substantial deviations from the assumptions of classical economics, which provides the intellectual basis for economists' usual justification of laissez-faire. In new Keynesian theories recessions are caused by some economy-wide market failure. Thus, new Keynesian economics provides a rationale for government intervention in the economy, such as countercyclical monetary or fiscal policy. This part of new Keynesian economics has been incorporated into the new synthesis that has emerged among macroeconomists. Whether policymakers should intervene in practice, however, is a more difficult question that entails various political as well as economic judgments.

New Keynesian Explanation of Business Cycles:

The new classical macroeconomics offers a strong criticism of orthodox Keynesian macro-economics on the ground that Keynesian macroeconomic models are primarily ad hoc in the sense that they are not based on economic agents' optimisationprogramme. In other words, the orthodox Keynesian economics does not have explicit micro-foundation.

Moreover, rigidity in nominal variables including wage and price is merely assumed without any rigorous analytical foundation. This is precisely the challenge that new Keynesian

macroeconomists responded to by offering specific micro-details of incomplete nominal adjustment.

The new Keynesian theories offer different explanation for wage-price stickiness. These theories include, among others, efficiency wage theory, small menu cost and aggregate demand externality and staggered price adjustment.

Most Keynesians do not accept the RBCT. They believe that short-run fluctuations in output and employment represent deviations from the economy's natural rate of unemployment — the rate which is consistent with absolute price level stability. Deviations from the natural rate occur due to the fact that wages and prices are slow to adjust to changing macroeconomic environment.

This inflexibility (stickiness) makes the short-run AS curve upward sloping rather than vertical. Consequently the economy experiences short-run output and employment fluctuations.

In Keynesian models unemployment is caused by due to rigidity of money wage caused by fixed-wage labour contracts and workers' backward-looking price expectations. When aggregate commodity demand falls, the demand for labour also falls. But due to money wage rigidity it is not possible to maintain the initial employment level in the short run.

New Keynesians like N. G. Mankiw and David Romer have suggested additional explanations of involuntary unemployment and, in the process, attempted to improve the microeconomic foundations of the Keynesian systems. According to them wage and price rigidities arise mainly from the behaviour of optimising agents.

There are three causes of rigidities of price and wage:

1. Product market imperfection, i.e., the existence of monopolistic competition and oligopoly;
2. Product price rigidity; and
3. Real rigidities — factors that make the real wage or firm's relative price rigid in the face of changes in aggregate demand.

On the basis of these assumptions, three types of new Keynesian models have been developed, viz., (i) sticky price (menu cost) models, (ii) efficiency wage models and (iii) insider-outsider models.

These models may now be discussed one by one:

(i) Sticky Price (Menu Cost) Models:

There is a puzzling aspect of business cycle theories based on the assumption that wages are slow to adjust. Unemployment is a very serious problem because it creates large social costs. Changing a wage or a price is a relatively simple and apparently cheap matter.

The payroll has to be reorganised, or new price tag has to be put on. The puzzle is why these apparently small costs obstruct price adjustment so as to solve the unemployment problem.

Small cost of changing prices can have large effect. When firms set prices optimally, they lose very little by meeting increases or decreases in demand by producing more or less without changing prices. Then if there is some small costs for the firm of changing its prices or wages, a small shift in demand will not trigger a price or wage change.

But if firms do not change prices in response to shifts in demand, then the economy exhibits price and/or wage rigidity. In fact, extremely small costs of changing prices can generate enough wage and price stickiness to give changes in the money stock substantial real effects.

Keynesian economists assumed money wage rigidity to explain unemployment. The product market was assumed to be perfectly competitive. So output and employment would adjust to changes in aggregate demand.

The new Keynesian sticky price model is based on the assumption that firms are imperfect competitors. So they face downward sloping demand curves for the products. Yet firms do not reduce prices when demand falls due to the existence of menu costs. Such costs refer to any type of cost that a firm is required to incur if it changes the prices of its products.

There are various costs of changing prices which may be explicit (such as the cost of printing new prices and bringing the information to the notice of the customers through advertising) or implicit such potential loss of customer goodwill or even initiation of a destractive price war in a recession (when all firms struggle to survive by cutting prices).

Consequently, output and employment fall when there is a fall in demand; the costs of changing prices prevent price adjustments.

Two reasons:

According to N. G. Mankiw, prices are sticky for two different but interrelated, reasons: (i) menu costs and (ii) aggregate demand externality.

(i) Menu costs:

Menu costs are costs of price adjustment. New, prices (menus) are to be printed in catalogues and announced through trade journals, magazines, and television programmes, and so on. Because of menu costs firms adjust prices at periodic intervals, rather than every now and then. Due to discrete rather than continuous prices, price adjustment fails to occur instantaneously — as Leon Walras had postulated in his general equilibrium analysis.

Whether menu costs can explain the short-run price stickiness is debatable. Critics of menu costs point out that since such costs are very small, they cannot explain such big events as economy-wise recessions. Supporters of menu cost argue that ‘smallness’ does not mean

'inconsequential'. Such costs may be small for the individual firm, but they can have widespread ramifications, or large effects on the whole economy.

(ii) Aggregate demand externality:

According to the supporters of the menu-cost hypothesis prices adjust slowly because there are externalities to price adjustment: price cut by a single firm is beneficial to various other firms in the economy. The lowering of price by a firm implies marginally lowering the average price level.

A fall in the price level increases what Don Patinkin calls real money balances. This, by shifting the LM curve to the right, increases GDP.

As the economy gradually moves into the expansionary phase of the business cycle the demand for the products of all firms increases automatically. This is known as aggregate-demand externality, i.e., the macroeconomic effect of one firm's price adjustment on the demand for all other firms' products.

In the presence of this aggregate-demand externality, small menu costs can make prices sticky, which, in its turn, can impose huge costs on society. When a firm plans to cut its present price (which is considered to be high), it takes into consideration both the cost and benefit of price adjustment (such as higher sales and profits).

Yet due to the aggregate-demand externality, the benefit to society of the price cut would exceed that of the firm.

An individual firm ignores this externality when making its own pricing decisions. This is why it may decide not to bear the menu costs and cut its price even though price cut is beneficial from the society's point of view. Thus, sticky prices may be optimal for those firms which set prices, even though they are not desirable from the point of view of the economy as a whole.

Recessions as Coordination Failure:

An important prediction of the new Keynesian economists is that recessions are the result of coordination failure. In a period of low economic activity output is low, workers are unemployed, and factories remain idle. For instance, output and employment were much higher and everyone was better-off in the 1920s compared to those in the 1930s. This was due to better allocation of resources.

If society as a whole fails to reach an economically feasible and universally desirable outcome, then its cause is not low demand or high prices, but lack of coordination of strategic activities such as wage fixation and price setting. Resources will be inefficiently allocated and recessions will occur (i.e., society will move inside the PPC) if some members of society fail to coordinate in some way.

Coordination problems arise due to lack of Synchronisedbehaviour on the part of economic agents. To be made specific, those who set wages and prices often fail to anticipate similar actions on the part of others. Coordination problem can be avoided to some extent through proper anticipation of the actions of rival firms.

For instance trade, union leaders negotiating wages are concerned about the wage increases other unions will be able to achieve. Firms setting pricing have to keep a close watch on the prices other firms will charge.

If we make a few assumptions we can show that recession is the outcome of coordination failure. Suppose there are two firms. Now money supply falls. Each firm has to decide whether or not to cut the price. Each firm is a profit-maximiser. But its profit depends not only on its own pricing decisions but also on the decisions of its rivals. The pay-off matrix of the two firms is presented in Table 15.1.

Table. 15.1 The Pay off Matrix of Two Firms

		Firm II	
		Cut price	Keep high price
Firm I	Cut price	60, 60	10, 40
	Keep high price	40, 10	30, 30

This an example of multiple equilibria. If both firms choose to maintain previous high price, then both will end up making low profit (30, 30). But each firm would hesitate to cut price as none is sure of the action that will be taken by its only rival. If a firm's rival prefers to stick to the original price then the firm cutting price will earn even lower profit (10). Hence recessions occur because of coordination failure.

Prices can be sticky because people expect them to be so. Yet stickiness is against every firm's best interest.

In the real world it is often difficult to achieve coordination since the number of firms setting prices is large. Prices can be sticky simply because people expect them to be sticky, even though stickiness is in the interest of nobody.

This statement may apparently appear to be subversive even though it contains an element of truth. In short, coordination failure occurs because the price (market) system often fails to serve as a communication device.

(ii) Staggered Price and Wage Adjustment:

Adjustment of wages and prices, throughout the economy is staggered, i.e., not everyone in the economy sets new wages and prices simultaneously. Staggering makes overall wages and price level adjust slowly, even when individual wages and prices change frequently.

Suppose first that price setting is synchronised. Every firm adjusts its prices on the first day of every month. Now suppose on the tenth day of the month money supply rises and thus aggregate demand. Till the tenth day of that month to the first day of the next month prices remain unchanged.

Therefore output rises in response to rise in demand. On the first day of the next month all the firms will end up raising prices in response to the rise in demand — resulting in a boom.

Now assume price setting is staggered. Half of the firms set their prices on the 1st of each month and the rest on the 15th. If the money supply rises on the 10th day of the month, then half of the firms can raise prices on the 15th. However, these firms will probably not raise price — fearing that the prices changed by other firms will reduce demand for their products.

Now, the firms who are scheduled to change their prices on the 1st of the next month will not change their prices (only a few a might) fearing that a change in relative price will reduce the demand for their product. Hence the aggregate price level will change slowly. Thus, staggering makes prices stidky.

Staggering also affects wage determination. Suppose there has been a fall in money supply. Hence, aggregate demand falls. To maintain full employment, nominal wage must fall to full extent (equi-proportionate). Each worker can take a cut in his nominal wage if all other wages fall equi-proportionately.

However, he will be reluctant to be the first one to accept a price cut as that will reduce his relative wage. Since setting of wage is staggered, this reluctance makes wages sluggish.

In a decentralised economy every wages and salaries are not synchronised. A firm which thought that a relative wage increase was appropriate for its workers would not know what other wages were. Hence it could not achieve that relative increase.

Staggered wage-setting provides information to firms and workers about wages and prices elsewhere. Non-synchronised wage and price setting thus seems desirable in a decentralised economy.

Moreover, staggered wage-setting adds some stability to wages. Without staggering, all wages and prices would go up in each period. There would be no base for setting each wage. Tremendous variability would be introduced in the price system. In such an unstable environment economic agents will not be able to take correct decisions.

In short, workers normally have wage adjustments infrequently, about once per year, or even more than one year. These adjustments are staggered over time. Since the wage is rarely changed within the year, the wage setting process creates wage stickiness.

Wages are set for long period because collective bargaining, threats of strikes or careful reviews of worker performance make adjusting the wage costly.

Since all unions and firms do not set new wages and prices at the same time, we find staggering of wage and price adjustment in the economy. Due to lack of synchronisation of the activities of different unions and firms staggering occurs, i.e., individual wages and prices change frequently even though the overall level of wages and prices adjust slowly and gradually (or show sluggishness).

The reason for this is that every firm prefers to wait and watch the actions of others. No firm wishes to take the lead, i.e., to be the first to announce a substantial price increase.

There is staggering in the labour market, too. This affects wage determination. If, for instance, the money supply falls aggregate demand will fall. This, in its turn, requires a proportionate fall in nominal wages to ensure full employment.

If all wage rates fall proportionately, each-worker would willingly accept a lower nominal wage. But each worker is reluctant 40 be the first to accept a wage cut because this means a temporary fall in his real wage.

Since the setting of wages is staggered, the reluctance of each worker to reduce his wage first makes the overall level of wages slow to respond to changes in AD. Alternatively stated, the staggered setting of individual wages makes the overall level of wages sticky.

Recent developments in the theory of short-run economic fluctuations make one thing clear at least — economic fluctuations are beyond the comprehensive power of most economists till date. Two main questions remain unanswered: (i) Are business cycles caused by the stickiness of wages and prices? (ii) Does money matter, or does monetary policy affect real variables?

The answers to these questions will determine the role of economic policy. The new Keynesian theories, based on the belief that wages and prices are sticky, suggest that monetary and fiscal policies should be used to stabilise the economy.

Since price rigidity is a form of market imperfection, it is the task of the government of a country to affect the economic well-being of the society as a whole by making an optimal correction of market failure.

By contrast the RBCT suggests that the government can exert very little, if any, influence on the economy and even if it could stabilise the economy, it should not attempt to do so. The upswings and downswings of the economy are the natural responses of the economy to changing technological possibilities.

Since this theory does not make any reference to market imperfection, the ‘invisible hand’ of the market is relied upon to ensure an optimal allocation of resources.

In short, while RBCT shows an undue reliance on intertemporaloptimisation and forward-looking behaviour, the new Keynesian theory stresses the importance of sticky prices and other market imperfections.

(iii) Hysterisis, Recession and Natural Rate of Unemployment:

Fluctuations in AD affect output and employment only in the short run. In the long run, economy returns to the level of output, employment and unemployment described by the classical model.

This hypothesis has been a challenge, demanding that through a number of mechanisms, recessions might leave permanent scars on the economy by altering the natural rate of unemployment.

Hysterisis describes the long-lasting influence of history on natural rate of output and employment. Recession might have the permanent effect in the following ways.

A person who has lost job during recession may lose his skill during the period of unemployment. Hence, when the recession ends it might be difficult for him to find a new job easily and quickly.

A long period of unemployment might reduce a individual's desire to find a job. So he falls in the category of discouraged worker, who has given up any job-finding activity.

Those who lose jobs, may also lose their influence on the wage-setting process. Unemployed workers may lose their status as union members, i.e., some insiders become outsiders in the wage-setting process. If the smaller group of insiders cares more about high real wage and less about employment, then the recession may permanently push real wages above equilibrium level and raise the magnitude of wait unemployment. Hysterisis suggests that recessions are more costly than the natural-rate hypothesis would suggest.

(iv) Efficiency Wages and Involuntary Unemployment:

Efficiency wage models suggest that the productivity of labour depends directly on the real wage paid to workers. The real wage is set to maximise the efficiency units of labour per rupee of expenditure, not just to clear the labour market.

Efficiency wage theory argues that wages are not cut because doing so reduces a firm's profits. However, efficiency wage theory permits real wage rigidity and involuntary unemployment. These points may now be discussed.

Let us define an index of worker efficiency, or productivity (e) such that

$e = f(w/P)$…(9)

Workers' efficiency varies directly with real wage. So the aggregate production function is

$Y = F[K, eL]$ …(10)

Output (Y) depends both on the amount of capital (K) and on the amount of labour input, measured in efficiency units. The number of efficiency units of labour equals the number of physical units (L), measured in man-hours per period, for example, multiplied by the index of

efficiency (e). Output increases either when more units of labour are hired (L increases) or when the efficiency of the existing labour force improves (e increases if w/P is raised).

In terms of the aggregate production function (10) the goal of the firm is to set the real wage so that the cost of an efficiency unit of labour is minimised, or to maximise the number of efficiency units of labour bought with each rupee of the wage bill.

This goal is achieved by increasing the real wage to the point where the elasticity of the efficiency index [f(w/ P)] with respect to (w/P) is 1. The condition that determines the optimal level of the real wage, called the efficiency wage (w/P)*, is

$$\frac{\%\text{ change in } f\left(\frac{W}{P}\right)}{\%\text{ change in}\left(\frac{w}{P}\right)} = 1 \qquad \ldots (11)$$

Many firms deliberately set real wage above the market-clearing level on efficiency grounds and in the process create involuntary unemployment.

The Rationale of Efficient Wage Theory:

Three reasons for the payment of efficiency wage are:

1. The shirking model:

By setting the real wage above the prevailing market level (i.e., a worker's true opportunity cost), a firm gives a worker an incentive not to cheat, i.e., work less or deliberately work slowly. If he does so he runs the risk of being fired and he knows that it would be difficult to get another job at this wage.

If firms can monitor job performance to some extent and incur some cost in doing it, such a high-wage strategy may pay good dividends in terms of efficiency gain (higher labour productivity or lower labour cost) and higher profitability.

2. Turnover cost model:

By paying a wage which is higher than the prevailing one, firms can reduce quit rate and save turnover costs (i.e., cost of selection, recruitment, and training). The high wage also allows firms to achieve another objective, viz., human resource development, i.e., development of a more experienced, and, therefore, more productive, work force,

3. Gift exchange model:

Wages higher than the customary level boost the morale of firms' workers and induce them to put forth more effort. Since employers voluntarily pay above market wage to workers (which is a form of gift) they reciprocate by imposing discipline on themselves, i.e., putting extra effort and, in the process, gaining efficiency.

However, if efficiency wage rates (i.e., real wage rates above the market-clearing levels) are set in a large number of sectors, substantial involuntary unemployment may result. If labour productivity increases, less workers will be required in each firm and the demand for labour will fall short of supply.

Workers will continue to seek high-paying jobs and prefer to remain unemployed when demand for labour is low rather than accept any low-paying jobs that may come along the line.

In efficiency models the real wage is fixed on efficiency grounds to meet condition (3). Such models can explain involuntary unemployment caused by real rigidity.

However, rigidity of real wage is not enough to explain such unemployment, which is also caused by menu costs. If prices are inflexible downward due to menu costs, then firms will have to keep money wage fixed in order to keep the real wage at the efficiency level.

If, in such a situation, aggregate demand falls, involuntary unemployment is bound to result due to a fall in output. Thus the real wage rigidity as also nominal rigidity and the menu costs together explain involuntary unemployment.

4. Insider-outsider model:

The term 'hysteresis', as noted earlier, is used to refer to the property that, when a variable is shocked away from an initial value, it shows no tendency to return even when the shock is over.

An interesting explanation for hysteresis in the unemployment process is the insider- outsider model. This model, like the sticky price models, is based on the assumption of imperfect competition.

According to this model, insiders (e.g., workers in unionised firms or industries) are the only group that affects the real wage bargain. Outsiders (e.g., the unemployed) seek jobs but cannot bargain for higher real wage. They cannot exert downward pressure on real wages because they are irrelevant to the wage-bargaining process.

In fact, the insiders are assumed to use their bargaining power to push the real wage above the market-clearing level, resulting in an unemployed group of outsiders. During recessions when workers are laid off insiders become outsiders.

So a sort of unemployment trap occurs. Once the recession is over and most workers go back to work, there are fewer insiders, the real wage rises and unemployment persists. The model explains the persistence of high unemployment due to fixed money wage contracts or backward-looking price expectations.

In fact, the real source of wage rigidity is captured by the efficiency wage theory. The theory explains real rigidities by stressing that firms pay wages above the market-clearing levels for reducing shirking on the jobs and minimising costs of production.

As Fig. 15.10(a) shows worker efficiency increases faster than the real wage up to point w* and more slowly thereafter. Consequently labour cost per unit of efficiency reaches its maximum at w* in Fig. 15.10(b). The value of w* is called the efficiency wage. So firms have no incentive to cut wages since this would actually increase their wage bill per unit of output.

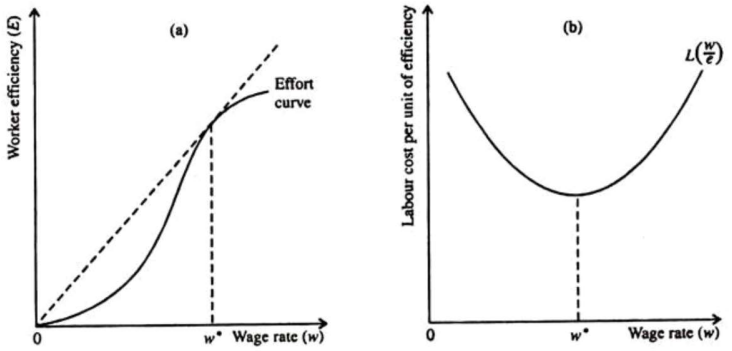


Fig. 15.10 The Relationship between the Relative Wage Rate and Worker Efficiency

The efficiency wage model explains why firms resist cutting their wages in response to a decline in demand. Recessions occur due to low demand and high price, caused by sticky prices of materials and sticky wages.

The Real Sources of Business Cycles:

The failure of MC to fall instantly and fully in response to nominal demand reflects a coordination failure. MC would drop if all workers and firms cut wages and prices together by the same percentage as nominal demand. But each is afraid to act first, since it would lose out if other workers and firms fail to act also.

Long-term labour contracts are an important source of sticky MC faced by business firms. Like monopolistic firms, firms and workers that are entering into long-term contracts impose a cost on society.

Wages negotiated under labour contracts are not completely rigid or fixed. Rather the change occurs when new contracts are signed.

However, all contracts do not expire at the same time. So in reality we find overlapping staggered contracts. With such contracts, wages adjust slowly and with a long lag, making marginal costs sticky for many firms. Much of the economy's adjustment to shifts in AD takes the form of business cycles in output and employment.

Policy Implications:

New Keynesian economics suggests — in contrast to some new classical theories — that recessions do not represent the efficient functioning of markets. The elements of new Keynesian economics, such as menu costs, staggered prices, coordination failures, and efficiency wages, represent substantial departures from the assumptions of classical economics, which provide the intellectual basis for economists' usual justification of laissez faire. In new Keynesian theories recessions are caused by some economy-wide market failure.

Thus, new Keynesian economics provides a rationale for government intervention in the economy, such as countercyclical monetary or fiscal policy. In other words the visible hand of the government has to supplement the invisible hand of the market to stimulate and stabilise the economy.

Just as the central bank is the lender of the last resort the government is the employer of the last resort. Thus the government has to spend more, even by money creation, to increase total desired expenditure. This will have job-creating and income-creating effect.

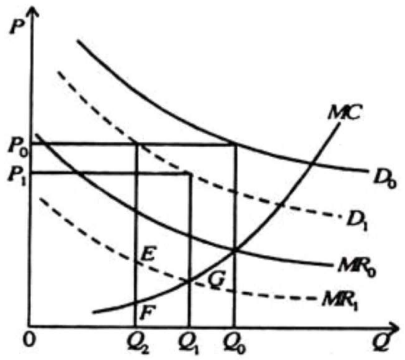


Fig. 15.8 Cost of Changing Price

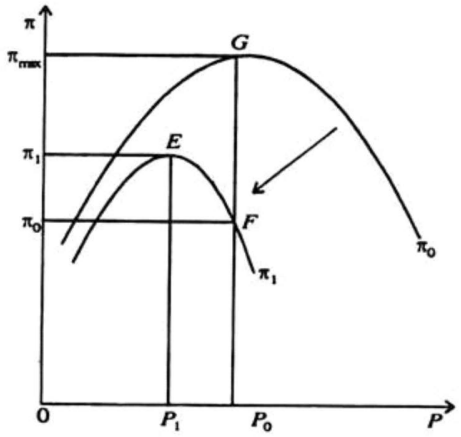


Fig. 15.9 Price Profit Trade-Off

28.4 Let Us Sum Up

New Keynesian economics modernizes traditional Keynesian thought by responding to classical critiques through rational expectations and microeconomic foundations. It emphasizes that wage and price stickiness, caused by menu costs, coordination failures, and efficiency wages, plays a critical role in short-run macroeconomic dynamics. The synthesis with classical theory has created a unified model that influences current economic policymaking.

28.5 Key words

- Sticky Prices: Prices that do not change instantly with economic conditions.
- Menu Costs: Costs firms face when changing prices.
- Aggregate-Demand Externality: When a firm's action affects overall demand beyond its direct customers.
- Staggered Pricing: Firms changing prices at different times, slowing overall adjustments.
- Coordination Failure: Failure to act collectively, leading to inefficient outcomes.
- Efficiency Wages: Higher wages aimed at improving worker productivity.
- New Synthesis: A macroeconomic model integrating Keynesian and classical elements.

28.6 Suggested Readings

- Mankiw, N. Gregory. *Macroeconomics*, latest edition
- Blanchard, Olivier. *Macroeconomics*
- Romer, David. *Advanced Macroeconomics*
- Taylor, John B. and Michael Woodford. *Handbook of Macroeconomics*
- Articles from the *Journal of Economic Perspectives* on New Keynesian thought
- Richard T. Froyen-Macroeconomics-Theories and Policies

28.7 Hints to Check Your Progress

- What distinguishes New Keynesian from new classical models?
- Explain how menu costs contribute to price stickiness.
- What role do aggregate-demand externalities play in macroeconomic dynamics?
- Describe efficiency wage theories.
- How does price staggering lead to slow adjustment of overall prices?

28.8 Examination Oriented Questions

1. Discuss the key features and assumptions of New Keynesian economics.
2. Explain the concept of menu costs and its macroeconomic implications.
3. How does price staggering influence aggregate price levels?
4. Define coordination failure and its role in economic recessions.
5. Evaluate the theory of efficiency wages in the context of persistent unemployment.

6. What is the 'new synthesis' in macroeconomics? How does it bridge classical and Keynesian theories?