
UNIT 11 TRADITIONAL THEORIES OF BUSINESS CYCLES

Structure

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11.0 OBJECTIVES

After going through this Unit you should be in a position to:

- outline the views of Schumpeter on economic fluctuations;
- analyse the ideas developed by Goodwin in terms of business cycles as an outcome of class conflict;
- explain the three-departmental schema and political business cycle expounded by Kalecki; and
- explain the process of business cycles viewed as an outcome of transitions in financial optimism as suggested by Hyman Minsky.

11.1 INTRODUCTION

Two different theses about cycles in economic activity in the developed world currently exist. One is the real business cycle (RBC) approach (to which you will be introduced in Unit 12) and the other is generically referred to the classical business cycle (CBC) orientation as an umbrella for all methodologies other than the RBC. The first approach (RBC) proposes that fluctuations in economic activity are driven by real shocks, while the latter body of work (CBC) suggests that a modern economy is a monetary and financial system and, therefore, cycles are generated as economic agents take positions in financial markets. For our purposes, it is sufficient to observe that by quantitative testing, which is not necessarily theory-driven, the CBC approaches are not inferior as explanations of fluctuations in the developed world. In other words, it is not illegitimate to explain business cycles without recourse to so-called first principles. This means that it is unnecessary to conduct the enquiry solely on the basis of infinitely-lived agents optimising their intertemporal objective functions. Secondly, the dichotomy between real sector and financial sector may not apply. Note that business cycle is a feature of the capitalist economy. It turns out that aggregate investment contributes to most of the fluctuations of GDP in most developed economies.

A stylised fact is that both a long and a short cycle in aggregate output can be discerned for both the prewar and the postwar period. The long cycle, of a length of

six to nine years, is most pronounced for the structure of fixed investment. The short cycle, of a duration of three to four years, dominates the cyclical structure of inventory investment. The relative strength of these cycles is explained by the speed with which the associated capital stock can be adjusted. The speed is naturally greatest for inventories, intermediate for equipment and machinery, and the longest for building and structures. The term business cycle here is taken to mean the irregular periodic movement brought about by a first-order difference or differential equation.

The traditional approach to business cycles by and large emphasized real factors. Few and far between were the classical economists who satisfactorily (even to themselves!) integrated monetary and financial factors into their study of the rhythmic waves of activity that characterised capitalist economies. Thus, we record below three important moments in the evolution of thought on business cycles associated with landmarks in the subject. First is the seminal contributions of Richard Goodwin who pioneered the tools and techniques of dynamic economic analysis. Modern work in complex economic dynamics can be traced back to one or other of his papers. His models were cast entirely in real terms. Secondly, springing from the same Marxian stock, although developing his trade cycle by first grounding his framework in the monopoly capitalism of his time, is the theory of Michal Kalecki. We should note that Kalecki, the Polish economist-mathematical statistician, is one of the founding fathers of modern macroeconomics. His long-term dynamics, then, follows from his short-term dynamics. The rudimentary inclusion of monetary elements are to be found here in the accommodating stance of the Central Bank to any lead provided by the investment plans of businessmen. Finally, the veil of money is completely torn asunder in the work of Hyman Minsky for whom the capitalist economy is a financially layered entity prone to fluctuations in connected financial and real activities. The list is, by no means, exhaustive. For example, the set of non-RBC approaches to business fluctuations is dense. Dennis Robertson, for instance, emphasised monetary factors in the genesis and propagation of cycles. Another illustrious member of that tradition was Ralph Hawtrey who underscored the importance of bank credit which is indispensable for carrying inventories. Reductions in interest rates induce businessmen to carry larger inventories. Greater orders, in their turn, encourage increased investment and, with a lag, investment in fixed capital.

11.2 SCHUMPETER'S VIEWS

The work of Schumpeter, perhaps, best embodies the difficulty of moving from an evenly rotating economy adequately described by the tools of the theory of value to a punctuation of general equilibrium by innovation/by the heroic entrepreneur. Schumpeter assumed a private enterprise economy in which there is freedom of contract. The individual is assumed to constitute the unit of analysis. The theory of marginal utility is the demonstration that the fulcrum of wants and thereby the utility character of commodities determine all aggregate phenomena. The theory of imputation explains the values of all individual commodities. Quantities of commodities and their values mutually determine one another (see MEC-001: Microeconomic Analysis, particularly Block 6 on general equilibrium). Thus, theorems about complements and substitutes and ratios of exchange, prices and the law of supply and demand can be proved. The grand achievement of Walras was to derive the conditions of general equilibrium. The system of exchange relationships renews itself from period to period. Sellers of commodities reappear as buyers with the wherewithal to purchase the commodities which would maintain their consumption and capital intact in the subsequent period at the current level and so on. The economy is dynamic in this sense. Each period is the basis of the next in that it generates data that enable workers and capitalists to repeat the same process in the next time interval. The economic system is thus stable.

Money can be incorporated into the capitalist dynamic. As with the means of production, there is no need to construct an independent exchange value of money as it is no more than a temporary abode of purchasing power. Money is valued according to the value of consumption goods which it commands. Walras' analysis is carried out for the case of a given quantity of fiat money. Money is no more than an additional item in the initial endowment of households and firms. It has a price by virtue of its marginal utility functions. The price, emerging in the capital market, equates the demand for money with the available stock (of money).

Banking plays no role in this "circular flow". "Development", on the other hand, is the emergence of surprises from within the "industrial and commercial" life of the economy. Schumpeter, it is well known, laid stress on the institution of "new combinations" by means of the creation of purchasing power by banks. All the same, the annual growth of savings which is the resultant of previous "development" is no less important. There are upper bounds to the possibility of financing entrepreneurs with no prior savings. Schumpeter examines the case of a gold standard and the institution of central banking. New commodities financed by the creation of fresh purchasing power will flow after a time lag. In the short run, prices will rise and the value of gold contained in the gold coin will exceed the value of the monetary unit. Bank IOUs will be presented for redemption. The solvency of banks will be threatened. If, in addition, there are constraints to the commodity complement of the freshly-minted notes coming to the market on time, banks must intervene with the savings of depositors. Thus, reserves are important both for commercial banks as well as central banks.

11.3 RICHARD GOODWIN

Richard Goodwin developed the Marxian conception that the power of the working class varies inversely with the size of the reserve army of labour. A militant working class will agitate for and succeed in gaining an increasing share of wages in income. However, the rise in wages has an adverse effect on the rate of accumulation and thereby on the employment rate. A cycle is generated by the interaction between the reserve army of labour, the distribution of income and the rate of accumulation. Class conflict, thus, is homeostatic and distributive shares remain more or less constant over the long run.

Goodwin invoked a predator-prey model involving distributive conflict between capitalists and workers. He assumed full utilization of capacity and investment determined by savings. The following account is drawn from Lance Taylor's text referred to in Section 11.7. Let $K = \kappa X$, with κ as the capital-output ratio. The symbol X stands for real output, a measure of production inclusive of intermediate inputs and K stands for the aggregate capital stock. The employed labour force is $L = bX$. Let the total population be denoted by N and the growth rate of N is n . The

employment ratio λ is $\lambda = \frac{L}{N} = \frac{b(K/\kappa)}{N}$. The wage share is ψ and on the assumption that all profits are saved, the growth rate g of the capital stock becomes $g = (1 - \psi) X/K = (1 - \psi)/\kappa$.

In the long run, the growth in the employment ratio is a function of the growth in output and employment, dots on variables denoting time derivatives

$$\dot{\lambda} = \lambda(g - n) = \lambda\left\{\left[(1 - \psi)/\kappa\right] - n\right\}$$

Along the Phillips curve lines (to be discussed in Block 6), the wage share is assumed to rise in response to the employment ratio

$$\dot{\psi} = \psi(-A + B\lambda)$$

At a stationary point, $\dot{\lambda} = \dot{\psi} = 0$, the Jacobian of the above system takes the form

$$J = \begin{bmatrix} 0 & -\lambda/\kappa \\ \beta\psi & 0 \end{bmatrix}$$

The two state variables dampen fluctuations in one another with no intrinsic dynamics of their own. They chase each other around a closed orbit in the (λ, ψ) plane which encircles the stationary point (λ^*, ψ^*) . The workers are the predators since the labour share rises with λ . Economic activity and employment are the prey since a higher value of ψ squeezes profits and reduces accumulation and growth.

The literature developing Goodwin's insight has developed his idea that class struggle takes place in the labour market. Investment is an accommodating variable which adapts to the flow of saving. Saving is determined by income distribution which is determined in the labour market. The weakness of his model (and the strength of Kalecki's as we will see later in the next Section) is paying no attention to effective demand problems or, in Marx's terms, the realisation problem. Relatedly, Goodwin's models are classics in the genre of completely real dynamical systems in which money and finance play no role. From a financial perspective, it might be felt that the conflict between workers and capitalists is misspecified. Rentiers are owners of capital and the stock market needs to figure in any analytical description of a financially complex economy. The traditional class conflict might apply to the conflict between workers and the managers of firms. Besides, the parameters that generate Goodwin-type and real models are 'slow-moving'. The pace of changes in variables such as real wages, and their inverse profits, is slow. The effective labour force that feeds the reserve army grows steadily over time. These models cannot explain the manias, panics, and crashes, to use the evocative title of Charles Kindleberger's remarkable precursor to the next section, that distinguish the ebb and flow of activity in a modern capitalist economy.

Check Your Progress 1

- 1) Describe Schumpeter's account of the traverse from dynamics to development as the outcome of the interaction of the entrepreneur and the bank.

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- 2) Report on any later elaborations of Goodwin's predator-prey model of the cycle.

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1.4 MICHAL KALECKI

The innovation associated with methodologies close to Keynes like that of Michal Kalecki is to begin with the postulate that an oligopolistic market structure is an adequate characterisation of a modern economy. Therefore, the price of the product of an industry is the outcome of firms imposing a mark-up on average prime costs which are assumed to be approximately constant up to full capacity. The mark-up, synonymous with the degree of monopoly of the industry, determines the profit margin and the share of profits in aggregate income. The level of profits is determined by the level of investment that entrepreneurs implement. In other words, pricing and investment behaviour determine the level of employment and output. The mark-up rate is believed to be relatively insensitive to the state of demand. Fluctuations in economic activity flow mainly from fluctuations in investment expenditures.

11.4.1 A Three-Departmental Schema

Kalecki announces his Marxian pedigree by subdividing the economy into three Departments; Department I producing investment goods, Department II producing consumption goods for capitalists and Department III producing consumption goods for workers. Suppose that in a certain period, the annual wage bill increases as a result of increasing wage rates. Let the pre-change wage bills in the first two Departments be denoted by w_I and w_{II} and the fraction by which wages change by α . Thus the increment in the wage bill in the first two Departments is $\alpha(w_I + w_{II})$. Profits in these Departments decline correspondingly. However, the increment in the wage bill of these Departments means an equal rise in profits of Department III. Either output or prices or both will rise there. Total profits remain unaltered.

In the above framework the effect of a rise in wages is the rise in the prices of investment goods and capitalist consumption goods. Since the volume of capitalist investment and consumption is maintained in the short run, profits in the first two Departments rise by $1+\alpha$. The production and consumption of wage goods remain unchanged. As a result, profits in the third Department also rise by $(1+\alpha)$. Thus the volume of production in all three Departments remains unaltered while the value in each increases by $(1+\alpha)$.

Higher markups will encourage trade unions to bargain with their employers for higher wages since firms can 'afford' to pay them. If their demands are granted but other things remain the same, prices will also increase. A fresh round of demands for higher wages would emanate and a price-wage spiral would ensue. However, businessmen would be averse to making their goods more and more expensive. Thus, trade union power restrains the magnitude of markups. If working class action is

powerful, a redistribution of national income from profits to wages could take place. In our example, profits in Department III increase in the same proportion as wage rates. However, if there is a redistribution as a result of the reduction in markups there, the wage bill in the third Department increases more than the wage rates. There is a rise in output and employment there but not in the first two Departments.

11.4.2 The Political Business Cycle

The setting for the regime is parliamentary democracy. In such a milieu, the government is sensitive to the electoral process. The elections are the outcomes of business, working class and other group interests. The thrust of Kalecki's theory is: of whose interests does the government consider in making policy choices?

A government spending program could ensure full employment in a capitalist regime if sufficient unutilised capacity to employ the labour force existed. However, business would be averse to government intervention designed to deliver full employment. The opposition to government intervention by the capitalist class is not comprehensible at first glance. Because profits rise with full employment output. Additional government spending is unaccompanied by increased taxation. However, the fear of strengthening worker voice and of inflationary pressures is overpowering. Under a capitalist system, business has an edge over government because private investment, and the level of employment it determines, depends on the state of confidence. However, once the government establishes itself as an employer of last resort, it can be indifferent to investor optimism and pessimism. Thus, budget deficits are viewed with hostility by the capitalist class. There is no complaint against policies that strengthen profit-making activity like protectionist tariffs, regulation of trade unions and so on. Short-lived and moderate cycles would emerge from a situation where the government would stimulate the economy only to withdraw at the first signs of an upswing under the guise of an unviable financial position and then re-enter when unemployment approached alarming levels. Thus, there would be a swing between combating employment and inflation.

The cycle is related to politics. Consider a party, earlier in opposition that is elected to clamp down on a wage-price spiral. The new party in power implements a deflationary package. The effects of the stance become eventually evident in growing unemployment. Discontent resurfaces and the possibility of defeat at the next election looms large. A sharp policy reversal is the result. In sum, the stop-go cycle consists of two moments: overacting too late as a consequence of doing too little earlier.

Kalecki foresaw increasing government encroachment in the areas traditionally devoted to private enterprise. Initially, the government would enter spheres that did not impinge on private activities like physical and social infrastructure. There would be no protests from businessmen as the returns on private investments would not be affected. However, the capitalist class feared that the next step would be the takeover or nationalisation of transport and public utilities. Again, businessmen would not be averse to government support of consumption by means of family allowances, price subsidies for basics, children's allowances and so on. Private enterprise is not affected. However, a regime of permanent full employment would be resisted strenuously. The confidence and demand of the working class would grow. While it is true that with full employment, profits would rise, Kalecki believed that the capitalist class would take a cut in profits in favour of power over the working class. An additional reason is tacit: A purposeful stance towards full employment might entail a redistribution of income. Income policies, then, would be energetically opposed.

Can stimulating business optimism be adequate for pulling an economy out of a recession? Kalecki thought not. While pro-cyclical interest rate policies might blunt the duration and amplitude of the cycle, full employment will not be attained even in

the boom although the level of employment will fluctuate less. If the measure is repeated period after period, a situation can be envisaged when the rate of interest is negative and a corporate income tax is transformed into a subsidy. None of these have any bearing on the mood of businessmen whose behaviour is coloured by their expectations of the future founded on the data of the present. During a particularly severe downturn, investment plans would be immune to any fall in the interest rate. Tax stimuli might be ineffective as the shift in the investment schedule is larger than any movement along the curve. Consequently, it is not inconsistent with encouraging private investment to induce public investment as well. The capitalist class would not resist public investment financed by borrowing. What they would strenuously resist is output generation by subsidising consumption and a regime of full employment.

Check Your Progress 2

- 1) Specify, in detail, the various components that, put together, generate the cycle according to Michal Kalecki.

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11.5 HYMAN MINSKY

A fruitful transition from the short-run dynamics of a macroeconomic model and the real-financial fluctuations associated with Hyman Minsky would be the probe of a benchmark macroeconomic model offered by him below.

Minsky considers the following equations:

$$Y = C + I$$

$$C = C(Y)$$

$$I = I(P_{IS}, \bar{W})$$

$$P_K = L(M, \bar{K})$$

$$P_{ID} = P_K$$

$$P_{IS} = P_{ID}$$

$$M_D = M_S$$

The model is certainly familiar from introductory macroeconomics where the exogenous variable M is money, and the subscripts D and S against it denote demand and supply of money in the money market equilibrium condition. $\bar{K}$ and $\bar{W}$ are the given capital stock and wage bill respectively, which are given. The 'price' of money $P_M = 1$. P_{IS} is the supply price of a unit of investment, P_K is the market price of existing real capital and P_{ID} is the demand price of a unit of investment. The explanatory sequence is as follows: The portfolio balance equation or the liquidity

preference relation above yields a value of P_K for every quantity of M . Given W , I adjusts so that $P_{IS} = P_K$. Once I is given, C and Y are determined.

However, productivity of capital takes the form of expected future earnings (gross profits after taxes) of an assembly of capital goods within a producing unit. Recall the arithmetical relation from basic macroeconomics that the value of the capital stock will necessarily equal the discounted value of a stream of future returns. The discussion of the marginal efficiency of capital MEC is relevant here and can be substituted for the equation for P_K . Hence, this one is the unstable equation in the system and shifts downwards whenever a wave of pessimism overcomes investors. Changes in investors' confidence can lead to potentially destabilising macroeconomic cycles even when the interest rate is relatively stable in the face of aggregate demand shocks. Building upon Keynes, Minsky argued that the explanation for the level of aggregate demand must be sought in the financial markets, in the financing of investment plans. Disequilibria therein affect the valuation of capital assets relative to the price of current output and this price ratio determines investment activity. Keynes' *General Theory*, Minsky explained, was concerned with how these two sets of prices (capital and financial assets, on the one hand, and current output and wages, on the other) were determined in different markets by different explanatory variables which gave rise to fluctuations in economic activity.

In order to understand a modern economy from an appropriate Wall Street perspective rather than through the metaphor of a village fair, the cash flows and related balance sheets of categories of economic agents must be displayed. The flow of funds accounts will depict consistent interlocking asset and liability positions of different classes of receipts and payments. Positions held here determine the flows of goods and services. Balance sheets for a Minsky-type financial instability model are as follows where the details will be found in Lance Taylor's text mentioned in section 11.7.

Households		Firms		Banking System		Government
M	Ω_h	qPK	L_h	T	M	T
L_h			L_b	L_b		
$P_v V$			$P_v V$			
			Ω_f			

Corporate net worth Ω_f is not restricted to be null and emerges as an endogenous variable in the model. Government debt T is held only by the banking system. The money supply rule is, therefore $M = \zeta T$ where ζ is the money multiplier and the supply of bank loans to firms is $L_b = (\zeta - 1)T$. The economy-wide wealth constraint is $\Omega_h + \Omega_f = qPK + T$, where PK is the "replacement cost" of the capital stock and q is Tobin's q . Thus qPK would be the asset value of the capital stock. Given the shares v and λ_h^s of their wealth Ω_h that households hold in the form of equity and loans to firms respectively, their balance sheet identity can be used to scale their net worth to the money supply. Note that rentiers and workers can be distinguished (recall the remarks made in connection with the appraisal of Goodwin) in the equity value $P_v V$ of rentiers. We have

$$\Omega_b = M / (1 - v - \lambda_h^s) = M / \mu$$

where μ is the share of Ω_h held as money. The loan market equilibrium condition is

$$\lambda^d qZ - [(\lambda_h^s / \mu)\zeta + (\zeta - 1)] = 0$$

where $Z = PK/T$ is the capital-debt ratio, the state variable.

Minsky suggested that the arguments of the loan demand function λ^d are the interest rate i and the expected profit rate $r^e = r + \rho$, where r is the observed rate of profit and ρ is an indicator of business confidence. The share of money and loans in household wealth are assumed to depend on the same explanatory variables and u , the capital-output ratio as an indicator of the level of economic activity. The expected profit rate also determines the capital asset valuation ratio q . The latter is set equal to r^e capitalized by borrowing costs, $q = (r + \rho)/i$. When businessmen are optimistic, the investing community ratifies their confidence by increasing its estimates of corporate wealth. From their balance sheet, the net worth of firms $\Omega_f = qPK - L_h - L_b - P_v V$ follows endogenously from the level of q and loan and equity market clearing. For given levels of ζ and Z , the excess demand for loans (the loan market equilibrium condition above) will be a decreasing function of the interest rate. An increase in Z steps up the demand for loans, thereby driving up i . Conversely, an increase in the supply of loans, a higher ζ , lowers the interest rate.

Potential effects of changes in ρ or r on excess loan demand are more interesting. The basic assumption here is that liquidity preference is high in conditions of fundamental uncertainty. During a boom, the speculative demand for money decreases more than the transactions demand goes up. This portfolio switch bids up equity prices P_v in the equilibrium condition of that market

$$(v/\mu)\zeta T - P_v V = 0$$

The relative supply of loans goes up. Excess loan demand becomes less sensitive to changes in actual and anticipated profit rates. The slope of the “loan market” curve, or the LM curve so to speak, in the (r, i) plane becomes more shallow at higher levels of r . If investment demand depends on q , then the IS or “commodity market” curve determines macroeconomic equilibrium. A higher level of confidence shifts the LM schedule upward and the IS rightward, leading to a new equilibrium with higher values of r and i . The shift in liquidity preference, however, means that the increase in i relative to r will be greater at a low initial profit rate than at a high one.

In order to generate an oscillatory response, note that Z will evolve over time according to

$$\dot{Z} = Z(g - \gamma_g Z)$$

where g is the rate of growth of the capital stock from the IS-LM model and γ_g is the share of the fiscal deficit in the value of the capital stock. Since a higher value of Z raises the interest rate, $\partial g / \partial Z < 0$. Therefore, $\partial \dot{Z} / \partial Z < 0$.

The other state variable is the state of confidence which, through positive feedbacks, can generate cycles. A higher value leads to an increase in investment and the growth rate. Thus, $\partial \dot{\rho} / \partial \rho > 0$. Changes in ρ , as well, depend on the state of the economy. For instance, confidence might increase when the actual profit rate r is high or the interest rate i is low. Thus,

$$\dot{\rho} = f(r/i)$$

where f is an increasing function.

The two equations above can generate a clockwise cycle. The system is potentially unstable because a higher value of ρ can make the r/i ratio go up, $\partial \dot{\rho} / \partial \rho > 0$. A higher Z raises the interest rate and reduces the level of economic activity and profits. That is, $\partial \dot{Z} / \partial Z < 0$. A sudden loss of confidence at an initial steady state means that ρ jumps downwards. Consider the stable case when the Jacobian of the system above is positive. The “confidence” schedule, $\dot{\rho} = 0$, must be steeper than

the “velocity” schedule, $\dot{Z} = 0$. It continues to decline, with Z also falling because the interest rate is relatively high and investment is decreasing. After some time, Z may fall far enough to reduce pressure on the loan market and permit the r/i ratio to rise. When the trajectory crosses the “confidence” schedule, ρ will begin to rise, finally stimulating growth enough to allow $\dot{Z} > 0$. The upswing might last some time, until the trajectory crosses the flattened “confidence” schedule at high values of Z and ρ . Depending on the strength of the positive feedback to confidence, the system may oscillate back to the original steady state, orbit it forever, or diverge on a spiral path.

The swings in confidence might be dampened by the interventions of central banks. Here ρ would be affected by shifting the interest rate through changes in the credit multiplier. However, if the authorities step in to support confidence, ρ itself may move upward over time leading to increasingly fragile financial positions.

Hyman Minsky’s cycle moves through the following stages: “Hedge financing” best describes the tranquil period when the anticipated cash flows from operations are adequate to meet future commitments on debts. Over a few such years, confidence and optimism build to generate “speculative financing” wherein the present value of cash flows over a finite horizon are not expected to meet payments commitment. As a run of good years continues, “Ponzi financing” schemes are generated which are outright pyramidal swindles where a subclass of individuals roll over their debt by emitting fresh debt in a never-ending spiral. It is worth observing, as a footnote here, that the standard infinite-horizon optimisation exercise includes the well-known “No Ponzi Games condition” that excludes these schemes on the grounds of the rationality of borrowers and lenders. At the euphoric peak of the cycle, as both short-term and long-term interest rates drive speculative and Ponzi behaviour, the present values of some Charles Ponzi-type investors will turn negative. Reneging on their commitments will lead to the distress of their lenders who will encash other financial assets. The prices of assets across the board will plummet precipitously impacting on investment plans and profits. While the upper point of the cycle, then, is characterised by a Keynes-type evaporation of the wave of optimism or animal spirits, the lower turning point is a process of debt deflation leading to a stable system with modest hedge funding of projects.

Check Your Progress 3

- 1) Provide the details of the movement of financial arrangements in a capitalist economy from hedge to speculative to Ponzi financing in the theory of Hyman Minsky.

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- 2) Write a Keynesian macroeconomic model with the key price ratios associated with Hyman Minsky. Discuss the stability properties of the model.

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11.6 LET US SUM UP

In this unit we discussed some of the early works on business cycles. Economic fluctuations have been explained by economists from various schools of thought. Some of the early works include that of Schumpeter, Goodwin, Kelecki and Minsky. Schumpeter's work based on innovations as a cause of business cycle, as you will observe in the next unit, laid foundation for recent models such as real business cycles. The political business cycle of Kalecki, which divides the economy into three departments, analyses the process of ups and downs in economic activity. The model by Minsky, through rigorous mathematical analysis, shows the oscillation around a steady state by invoking the inconsistencies in real and financial sectors.

11.7 KEY WORDS

Downswing	: It refers to contractionary phase of business cycle.
Endogenous	: A characteristic emanating from within the system.
Exogenous	: A characteristic decided outside the system and taken as given for the model.
Ponzi Financing	: The method of financing where in order to repay previous debt households take recourse to fresh borrowing.
Upswing	: It refers to the expansionary phase of business cycle.

11.8 SOME USEFUL BOOKS

Kalecki, Michal, 1953, *Theory of Economic Dynamics*, London: Allen and Unwin

Kalecki, Michal, 1971, *Selected Essays on the Dynamics of the Capitalist Economy: 1933-1970*, Cambridge: Cambridge University Press

Schumpeter, J.A., 1951, *The Theory of Economic Development*, Cambridge: Harvard University Press.

Skott, Peter, 1989, *Conflict and effective demand in economic growth*, Cambridge: Cambridge University Press

Taylor, Lance, 2004, *Reconstructing Macroeconomics*, Cambridge, Massachusetts: Harvard University Press

Despite the proliferation of work building on Minsky's insights, you can do worse than refer to some of his books. For example, the following are representative

Minsky, Hyman, 1975, *John Maynard Keynes*, New York: Columbia University Press

_____, 1986, *Stabilizing an Unstable Economy*, New Haven: Yale University Press.

For a business cycle model that connects the real and the financial sectors see

Boyd, Ian and John M. Blatt, 1988, *Investment Confidence and Business Cycles*, Berlin: Springer-Verlag.

11.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Your answer should be based on Section 11.2.
- 2) Read Section 11. 3 and answer.

Check Your Progress 2

- 1) Note that the expectation is that you fill in the equations and combine them and deliver an unstable difference-differential equation.

Check Your Progress 3

- 1) Go through Section 11. 5 and answer.
- 2) Go through Section 11. 5 and answer.

UNIT 12 REAL BUSINESS CYCLES

Structure

- 12.0 Objectives
- 12.1 Introduction
- 12.2 New Classical Business Cycle Theory
- 12.3 Real Business Cycle Theory
 - 12.3.1 An Island Economy
 - 12.3.2 Imperfect Information
 - 12.3.3 Cyclical Fluctuations
- 12.4 Let Us Sum Up
- 12.5 Key Words
- 12.6 Some Useful Books
- 12.7 Answers/Hints to Check Your Progress Exercises

12.0 OBJECTIVES

After going through this Unit you should be in a position to:

- explain the underlying ideas behind real business cycles theory;
- appreciate the importance of technological innovation; and
- appreciate the possibility of economic fluctuations due to supply shocks.

12.1 INTRODUCTION

The extent of this module is partly indicated in the title. It is about real business cycle (RBC) theory. In addition, it exposes you to New Classical Business Cycle theory, a specie which belongs to the same genus that spawns the RBC approach. The literature in the field is technical, so we will work through some elementary, but not trivial, treatments of the subject and strongly recommend plunging into the classics in the area, once some quantitative skills have been imbibed.

The present Unit connects, as promised and naturally, from the study of business cycles in the previous Unit. Intimately, however, the springs of this Unit are less cycles as developed there and your exposure to the traditional theory of unemployment, and more your education in microeconomics that ends with the theory of general equilibrium. The perspective of the former is that business cycles emerge naturally in the evolution of a capitalist economy as a system. Particularly, the connection between the short-run dynamics of traditional theories of employment and the cycles that emerge from their long-run extension would be written along aggregative lines. The painstaking work of pioneers like Wesley Clair Mitchell and others consisted in closely scrutinising the time series of important macroeconomic magnitudes and tracing short and long cycles therein. The strategy of the latter, on the other hand, is to develop the story of market-clearing over time to account for the phenomenon of fluctuations and cycles. A distinction is made between the two notions. Fluctuations might not present the periodicity indicated in the word ‘cycles’. Real business cycles are fluctuations generated by shocks which might not reflect the rhythms of ebb and flow of classical cycles. New Classical Business Cycle research, on the other hand, is oriented towards explaining the familiar pattern of boom and slump, one following the other in regular succession. Perhaps for this reason, the role of money and finance in both approaches might be distinguished. In the former, the shocks referred to are changes in technology and tastes. Money is a veil. On the other

hand, money and finance are part of the model of expansion and contraction developed by New Classical Business Cycle theorists.

12.2 NEW CLASSICAL BUSINESS CYCLE THEORY

As mentioned earlier, the following exposition follows the elementary account in the book:

Yang, Xiaokai, *Economics: New Classical versus Neoclassical Frameworks*, Oxford: Blackwell Publishers. The book goes on to rigorously develop some models and you are encouraged to follow them up.

One reason for natural unemployment in a new classical general equilibrium model is changes in the structure of the division of labour (A brief idea about new classical economics was given in Unit 1. Their views about unemployment will be discussed in Block 6). Consider an economy with m consumer goods and n traded goods. Of these goods, suppose the price of oil rises. The equilibrium values of m and n changes. The demand for luxury sedans, say, might vanish as people stop consuming inessentials. The producers of those goods will be unemployed. They are free to move to sectors which do not face an impact of this exogenous shock. However, since there is considerable educational capital that has been invested in mastering the nuances of limousine manufacture and the costs of moving are invariably high, these individuals will not be immediately productive as the correspondingly skilled workers in the other sectors. In other words, an economy with a division of labour into specialists will face the phenomenon of unemployment. In fact the two are connected in a relationship: the more elaborate the division of labour, the greater will be the level of unemployment as a response to shocks from without. The situation would not occur in autarky. Since each individual consumes what she produces, any stochastic shocks will be accommodated by an optimal reallocation across the spectrum of goods consumed.

Some features distinguish New Classical features of business cycles from other forms of business cycle. The extent of the division of labour and the level of specialisation for each individual are grounded in dynamic microeconomic choices. The model generates persistent, regular, endogenous, and efficient business cycles. It also simultaneously generates endogenous, and efficient, unemployment. The model is consistent with empirical phenomena like the fact that the output of durables fluctuates more than the output of nondurables.

One insight is that the business cycle is inextricably linked with trade and financial openness. In its modern form it is exemplified in developed economies with a complex division of labour and high productivity. Let us consider an economy that consists of many agents. Each individual can produce a perishable good called corn and a durable good called tractors. A tractor is indivisible and each driver can drive only one tractor as a capital input in the production of food at any point of time. Each job is skill-specific and two types of cost will be incurred if an individual shifts between activities. There is obsolescence of knowledge and memories will decay when an individual moves from one activity to the other. There is also an entry cost, a nontrivial investment in education that an individual has to incur before she enters any activity. A tractor has a life of two years. Each individual's utility function is defined over consumption (food) and the objective is to maximise the present value of total utility.

At least three possible equilibrium situations follow. The first is autarky. Each individual divides her time between manufacturing a tractor and using it to produce food in the first year, and produces only food in the second year. This structure is cycle-free. Yet, such an economy cannot garner Smithian gains from the division of labour. The second structure is one in which the division of labour is fully accomplished. The population is divided between producers of food and producers of

capital goods. In each year, professionals drive tractors to produce food. The producers of tractors manufacture them in the first year and are unemployed in the next. Total output in the first year is higher than the second. Thus, we see a business cycle of two years with unemployment in the second year. Learning by doing is maximal here and the society is best poised for the accumulation of human capital. The third structure is partial division of labour. Here, producers of tractors move to the production of food in the second year. Thus, farmers are completely specialised and can reap those economies whereas producers of tractors are not.

In the second structure, producers of tractors sell tractors and buy food in odd years. The value of tractors sold must be in excess of the value of food that is produced. The difference is required as a wherewithal for tractor specialists to buy food in even years when they are unemployed. Since corn is perishable and tractor producers face the problem of the double coincidence of wants in even years, the institution of fiat or credit money is indispensable for exchange to take place. Since the discounted optimisation problem is carried out for a representative agent, the present value of real income between farmers and manufacturers of the capital good must not be different. In the light of the earlier considerations, this means that income in the tractor goods-producing sector must be higher than the income in the corn-producing sector by an amount that compensates for unemployment in the sector producing durable goods in the recession.

It has already been indicated that the non-autarkic economies cannot operate without fiat or credit money. For example, in the second structure, farmers sell food but do not purchase goods in even years, while tractor manufacturers buy food but do not sell goods in even years. Then, tractor producers must save some of the income generated from selling their vehicles in odd years to eat in the following even years. Savings cannot be in the form of goods, so a commodity money will not solve the problem. The only redressal is the introduction of an entity outside the system that has the power to print intrinsically worthless pieces of paper whose value is determined by the price level in the process of exchange. It is equally possible for a bank to mediate between agents and across time, induced by arbitrage opportunities, offering its own 'inside' money. It can be shown that rules of allocation and even accumulation can be obeyed with these monetary arrangements. Indeed, without money the models with exchange cannot be in dynamic general equilibrium even if they are Pareto superior to autarky.

To generalise, the following elements accentuate cycles: the division of labour, the length of the roundaboutness of production, the durability of goods, the income share of durable goods, the costs of moving between jobs, transaction costs, and the degree of learning by doing. Correspondingly, countercyclical factors are: a decrease in the roundaboutness of production, a decrease in the level of the division of labour, a decrease in the durability of goods, decreases in transaction costs and a decrease in the degree of learning by doing.

Check Your Progress 1

- 1) Explain the basic tenets of the new classical business cycle theory. What are the factors that accentuate cycles?

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12.3 REAL BUSINESS CYCLE THEORY

The parable that motivates this discussion originated with Edmund Phelps and invites you to think that all men (and women) are islands. They have perfect information about the prices of goods and services on their islands but cannot sample the prices on other islands except by rowing there, a costly activity. Consequently, they can only form estimates of the general price level, the average of all prices. Thus, an increase in the *general* price level will be misperceived as an increase in the price of goods on the island, a (small) subset and, therefore, sub optimal decisions about consumption, production, and investment will be taken. In the spirit of the earlier section, the following account in the next is drawn from the book:

Barro, Robert, *Macroeconomics*, New York: John Wiley & Sons, Inc.

12.3.1 An Island Economy

Consider an economy as a sea with islands of local markets. Each household produces goods and sells them on one and only one of the arrays of these markets. Goods differ according to location, physical characteristics, and so on. Accordingly, we index goods by the symbol z , where $z = 1, 2, \dots, n$. The index might specify a location or be associated with an assemblage of characteristics of goods, methods of production etc. $p_t(z)$ is the price of a good or, indeed, a basket of commodities of type z during period t . Thus, the RELATIVE PRICE $p_t(z)/p_t(z')$ is the price of commodities of type or location z relative to commodities of type or location z' . Distinct is the GENERAL PRICE LEVEL p_t which is the average of the prices in the islands at date t . If $p_t(z) > p_t$, then locale z appears relatively attractive to sellers in the given period. There will be a rush of productive resources from other employments to island z . The increased supply of goods in our market will, in the familiar manner, drive down the local price to the average price. Similar reasoning applies to a case when the price of the commodity/at the location z is less than the general price level. Assuming freedom of entry and exit, the average of all prices will be an efficient estimator of the local price.

At the beginning of period t , a producer in market z has a stock of capital $k_{t-1}(z)$. Assuming a production function f with standard properties, the quantum of goods produced is given by $y_t(z) = f(k_{t-1}(z), l_t(z))$. Total revenue earned by sellers from sales is the product of this quantity with the local price. However, people typically shop at different locations and the variable of interest to them will be p_t , the index of generalized purchasing power. In that case, people will calculate the real value of the revenue from production which is $(p_t(z)/p_t) \cdot f(k_{t-1}(z), l_t(z))$.

Thus, an increase in the relative price above, physical output remaining constant, means a greater value of sales. From the perspective of a producer, this increase is no different from a corresponding upward shift in the production function. Earlier, when deciding how much to work and produce, workers and producers looked at the physical marginal product of labour. Now, in order to calculate the effect on real sales revenue, producers multiply that number by the relative price to get the real value of the marginal product of labour. Then, as earlier, a shift in one component of the product, the relative price, appears identical to a proportional shift in labour's physical marginal product schedule. Consequently, producers respond in the familiar fashion.

Coming to the inducement to invest, the amount of investment is determined by the marginal product of capital. However, the marginal product of this factor determines the flow of next period's output as a result of an increase in this period's capital stock. According to the standard definition, it takes one period for investment to raise productive capacity. Thus, the real value of capital's marginal product which

determines investment decisions is defined as the product of this period's marginal product and next period's relative price $p_{t+1}(z)/p_{t+1}$.

How would producers respond to a rise in $p_t(z)/p_t$? There are two possibilities. This hike is temporary and confined to the present period. In other words, people do not expect a similar increase in the future. Then, as discussed earlier, the change is tantamount to an upward shift in the schedule of labour's marginal product in t but not in later periods. Two kinds of substitution effects are implied. In the first case, within the time period, there is a movement away from leisure and towards consumption. In addition, there is also an intertemporal substitution effect in a shift away from today's leisure and towards tomorrow's leisure. The second effect suggest that the impact on current work and production will be strong.

A second possibility attendant on a high relative price today is an increase in the expected relative price $p_{t+1}(z)/p_{t+1}$. In that case, there is a positive effect on investment today. Producers will purchase additional capital from other markets in order to capitalise on the higher relative price for goods sold later in location z . The first impulse would be an increase in the demand for local resources in market z albeit at the high current relative price. Apart from the technical assumption that goods and services on hand tend to be needed first, the high prospective relative price tomorrow can induce investors to spend at a high relative price today. A high prospective relative price means that the high current relative price is no more an opportunity to reap present rewards. The intertemporal substitution effects referred to will become weak. In other words, there might be a negligible response on work effort and the supply of goods today.

A high relative price cannot persist. The increased investment that results increases productive capacity in that market. The augmented supply of goods in future will exert downward pressure on future relative prices. Thus, the high relative price must persist long enough to generate positive effects on investment. If not, the intertemporal substitution effect will remain strong. We regard the nominal interest rate as a system-wide variable determined on a centralised credit market. Correspondingly, the real interest rate r_t is an economy-wide variable as well. Buyers who visit island z will be deterred in their consumption $c_t^d(z)$ and investment demands $i_t^d(z)$ by a high relative price. Given the latter, a high real interest rate means a greater supply of goods to market z but reduced demands for consumables and investment goods there. Clearing of the local market is given by the equation:

$$Y_t^s(z)[p_t(z)/p_t, p_{t+1}(z)/p_{t+1}, r_t, \dots] = C_t^d(z)[p_t(z)/p_t, r_t, \dots] + I_t^d(z)[p_t(z)/p_t, p_{t+1}(z)/p_{t+1}, r_t, \dots]$$

12.3.2 Imperfect Information

Buyers and sellers are perfectly informed about the local price but must form estimates about the average of all prices. At the outset, let us assume that there is no reason for buyers and sellers in market z to believe that their local market is in any sense different from the average market anywhere. Thus, as a preliminary estimate, the local price is not assumed to be different from the expected general price level. We assume RATIONAL EXPECTATIONS in its weak form, which implies that people do not make systematic forecasting errors. In addition, we assume that the information set of all agents is identical. Thus, the PRIOR of the future general price level, p_t^e , is the same across all agents. When interval t actually unfolds, the selling price, $p_t(z)$, will empirically be known. It is unlikely that this price will be equal to the earlier estimate of the general price level. Since the information set has at least one additional element now, the actual local price, the estimate of the general price level can be updated with this new data. For instance, if the local price turns out to be higher than expected, it is likely that the average of all prices also exceeds the earlier

estimate. Call $p_t^e(z)$ the EX POST price expectation, the notation signifying that this estimate differs from the prior due to an updating formula triggered by the arrival of information about the local market z . The simplest algorithm is to give a weight of θ to the local price and, therefore, a weight $1-\theta$ to the prior general price level in forming the new estimate of the general price level. Thus, $p_t^e(z) = \theta p_t(z) + (1-\theta)p_t^e$. Clearly, people will set a high value of θ if their market differs little from other markets in price space. On the other hand, the weight on the general price level would be higher in the absence of aggregate shocks that change the general price level over time. For instance, we would attach limited credence to the general price level if the environment is buffeted by unpredictable changes in money and factors that influence the demand for money.

A person's ex post expectation of the average price level will determine her perception of her relative price. Call $p_t(z)/p_t^e(z)$ the PERCEIVED relative price that determines demand and supply functions in market z . The interaction of both schedules determines equilibrium price and output $p_t(z)$ and $y_t(z)$. Now, an increase in the PRICE RATIO $p_t(z)/p_t^e$ leads to an increase in the perceived relative price. However, by virtue of the updating formula, the ex post price expectation rises by a fraction, θ , of the increase in the local price. Thus, the perceived relative price rises by less than the price ratio. For example, suppose the prior expectation of the price level is 100 and $\theta = 1/4$. Then, if the local price is 104, $p_t(z)/p_t^e = 1.04$. In that case, $p_t^e(z) = 1/4 \cdot 104 + 3/4 \cdot 100 = 101$.

Hence, $p_t(z)/p_t^e(z) = 104/101 \approx 1.03$. That is to say, if the weight placed on the local price is one fourth, the perceived relative price responds by approximately twenty five percent less than the price ratio. In general, the higher is the weight, the lower is the reaction. The local market clears when the price ratio equals one. By the same token, the market-clearing perceived relative price is unity as well.

Suppose, now, there is a surprise increase in the stock of money M_t . People did not anticipate this change when they formed their priors. Suppose the local price rises in a typical market. The prior being given, the price ratio goes up. Therefore, the perceived relative price increases as well. Thus, the typical individual believes that she is operating in a market where the relative price is high. This belief is false because, by definition, the general price level is the average of the local prices across markets. However, since the average price level and the quantity of money are not elements of the information set, the representative individual underestimates the rise in the general price level/overestimates the relative price in her local market. Consequently, people increase their supplies of goods and lower their demands.

An increase in the perceived relative price raises the relative price people expect in the local market for the next period. Thus, investment demand today rises and the supply of goods falls. The demand and supply curves now combine two effects of changes in the price ratio. First, there is the effect from the current perceived relative price making the supply curve more positively sloped. Second, there are the effects from the change in the prospective relative price, $p_{t+1}(z)/p_{t+1}$, reducing the negative slope of the demand curve. Let us assume that the latter effect is stronger. The promise of favourable prospective returns far outweighs the high perceived current-relative-price, leading to aggressive expansion plans. Secondly, there are effects on the real interest rate. The supply of goods exceeds the demand in the typical market. Thus, in the aggregate, desired savings exceeds net investment demand. The expected real interest rate falls to bring the two into equality. That is, the aggregate demand curve shifts rightward and the supply curve shifts leftward. The lower expected real interest rate motivates people to consume and invest more but to work and produce less.

What is the outcome on output in the typical market? The high price ratio stimulates supply but depresses consumption and investment demand. Also, the anticipation of a high prospective relative price encourages investment but reduces the supply of present commodities. Lastly, the fall in the expected real interest rate increases investment and consumption demand but weakens supply. Then, the conclusion that output increases in the typical market depends upon the powerful positive effect of the hike in the prospective relative price on local investment demand. In that case, the monetary disturbance would stimulate local investment, output, and work effort. Since the analysis is conducted for the representative market, the general result is an increase in aggregate investment, output and work.

The steps following from the surprise increase in money and prices to increased work, output and investment are as follows. In the first place, a rise in the general price level appears no different from a rise in the relative price to suppliers in market z . They work more and increase production because they confuse a change in the general price level with a local change that would warrant an increase in activity. Secondly, the change in the price ratio makes people believe that the favourable condition in the local market will persist. They, therefore, raise their expectations of the future relative price. Once again, people are fooled into believing that there is a change in local demand and increase investment. These plans show up in the current purchase of goods and services at the local price. Despite the high relative price, investors proceed with their projects in order to avail of the expected high returns later.

The misperceptions would not arise if people had perfect information about money and prices. Suppose everyone correctly anticipates a once-and-for-all increase in the quantity of money from the last period to the present. Then the higher value of M_t today will result in a one-to-one increase in p_t^e . The actual prices and the prior expectations increase in the same proportion. There will be no effects on the supply of and demand for commodities in market z and, consequently, no effects on work and production and the real interest rate. In conclusion, fully anticipated increases in money and prices are neutral. The theory does not support the case for using monetary policy to smooth out business fluctuations.

Now, during period t , producers are unlikely to find that the actual price at which their goods sell locally equals the prior expectation p_t^e . There are two possibilities, once again. Some special reason like a shift in the demand in market z might have caused a shift in the relative price of local goods. Besides, the forecast of the general price level is unlikely to be precise. The general price level will be higher or lower than the prior expectation of its level. We continue to assume that the process of shopping is less than complete, that agents will continue to operate with data about a small sample of extant prices. When information is incomplete, the perfect information about the local price is informative about the general price level.

Suppose people predict the general price level with a high level of accuracy. The situation can be explained by the authorities pursuing a monetary policy that provides perfect stability. In other words, there would not be unpredictable shifts in the quantity of money, M_t , from period to period. Then, buyers and sellers would not need to make discontinuous adjustments to their priors when they observe the local price. They would believe that movements in $p_t(z)$ signaled changes in $p_t(z)/p_t$, rather than movements in p_t . The greater the confidence in the credibility and reputation of the monetary authorities, the greater the implications of being fooled by monetary surprises. Still, by rational expectations, people infer that they are right on average. They will regard changes in $p_t(z)$ as evidence that $p_t(z)/p_t$ has changed. Consequently, they will substantially change their demands and supplies. In other words, a surprise increase in the money supply induces a large increase in output.

On the other hand, consider an economy in which the monetary authorities are capricious, changing the money supply widely from period to period. As a result, the general price level diverges sharply from the forecasted level. Here, people have less confidence that a change in the local price reflects a change in the relative price. They would believe that a high local price signaled a more than proportionate expected general price level. In that case, $p_i(z)/p_i^e$ and, therefore, demands and supplies are relatively unresponsive to observed changes in the local price. In this case, a monetary surprise has small output effects. The conclusion is that the greater the volatility of the time series of money, the smaller the real effect of monetary shocks. A greater volatility of money induces agents to associate increases in local prices with surprisingly high general price levels. The authorities will find it more difficult, in these circumstances, to fool people into believing that relative prices have changed.

Fundamentally, at stake here might be the much-vaunted efficacy of the price system as the most efficient and parsimonious signaling device. A great fluctuation in money supply from one interval of time to the next means that prices become less responsive to changes in local prices. In other words, agents make fewer mistakes when price changes are a reflection of unexpected changes in money and the general price level. However, the flip side is that people make larger mistakes when relative prices change. The greater the uncertainty about money and the general price level, the less prices become useful as the conveyor of information par excellence. Thus, the economy becomes less responsive to changes in fundamentals, shifts in tastes and technology, that require optimising and efficient reallocation of resources. In conclusion, while changes in variations in the average growth of money are neutral, changes in the predictability of money have real effects. Thus, the best monetary policy is one that is most predictable.

12.3.3 Cyclical Fluctuations

Consider a situation where the value of money above trend indicates an unexpectedly high level of money in the recent past. The model predicts that this excess above trend would induce a higher level of output, work effort, and investment, all relative to trend. That is to say, money, employment, and investment would vary procyclically. These predictions correspond to the data. On the other hand, some predictions generated by the model fit the data less tightly. A monetary shock would, according to the theory, lead to an increase in the general price level and a fall in the expected interest rate. The evidence seems to not to support the proposition that the rise in the price level is procyclical and the expected real interest rate is countercyclical. Since the production function is assumed not to change, and the capital stock is given in the short run, the increase in the employment of labour implies that the marginal and average products of labour fall. The theory predicts that labour productivity and the real wage rate would be low when the volume of output and labour input are high. That is to say, labour productivity and the real wage rate vary counter-cyclically. This proposition, again, is not consistent with the data.

The conclusion is that there might be limitations to a model constructed to explain business fluctuations driven entirely by monetary surprises. Incorporating shifts in the production function and assigning monetary shocks a secondary role might be a superior strategy.

Check Your Progress 2

- 1) Real business cycle models explain fluctuations in output by means of exogenous shocks. The outcome is irregular fluctuations. Elaborate upon the difference between such random movements and the periodicity of cycles.

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Compare and contrast new classical models and real business cycle models of fluctuation with the models of cycles and unemployment in your module on cycles.

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- 2) Can there be surprise changes in the quantity of money when expectations are rational? In that case, do the monetary authorities possess the weapon of counteracting business cycles through unexpected increases in the quantity of money?

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- 3) When expectations are rational, agents cannot make mistakes on average in forecasting the price level. How, then, do we explain persistent deviations of aggregate output from trend?

12.4 LET US SUM UP

In this unit we discussed real business cycles which asserts that economic fluctuations are an outcome of real shocks to the economy. It is based on the assumption of rational expectations and shows that monetary policy has no real effects and shift in aggregate demand is not an important cause of fluctuations in output and employment.

The new classical business cycle theory puts emphasis on the changes in the structure of the division of labour. International trade and financial openness have made modern economics highly specialised with respect to division of labour and there is greater roundaboutness in production. Along with this there is an in-built force causing fluctuations in output and employment.

In real business cycle theory emphasis is given on real shocks such on technological change which shifts the production function. A productivity shock changes the level of output produced by given amount of inputs. The new classical economists, however, have not been able to convince all and the new-Keynesian economists still believe in the importance of aggregate demand in economic fluctuations. We will learn more about new-Keynesian view in Block-6.

12.5 KEY WORDS

Division of Labour	: A method of organizing production in such a manner that each labour specializes in a part of the production process. It was Adam Smith who emphasized on the gains to the economy due to division of labour.
Learning by Doing	: It refers to the improvement in efficiency of labour through experience.
Pareto Efficiency	: It refers to allocation of resources in such a manner that further change in the allocation pattern cannot improve the utility or satisfaction of one individual without reducing that of another.
Transaction costs	: The additional costs, apart from price of the commodity, required to carry out a transaction/ exchange.

12.6 SOME USEFUL BOOKS

Barro, Robert, *Macroeconomics*, New York: John Wiley & Sons, Inc.

Dornbusch, R., S. Fischer, and R. Startz, 2004, *Macroeconomics*, Take McGraw-Hill, New Delhi, Chapter 20.

Yang, Xiaokai, *Economics: New Classical versus Neoclassical Frameworks*, Oxford: Blackwell Publishers.

12.7 ANSWER/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Read Section 12. 2 and answer.

Check Your Progress 2

- 1) Go through Section 12.3 and answer.
- 2) Go through Section 12.3 and answer.
- 3) Go through Section 12.3 and answer.