UNIT 2 HARROD-DOMAR GROWTH MODEL

Structure

2.0 OBJECTIVES

After reading this unit you should be able to:

- Understand the background in which this model came to be developed by two different economists, each working independently enters at the others, but still reaching the same results;
- Appreciate the role of savings and investment in the growth process, as expounded by Harrod, and the implication of this relationship;
- Express the role of savings and investment in the growth process, as expounded by Harrod, and the implications of this relationship;
- Identity the similarities and dissimilarities between the Harrod Model and the Domar Model; and
- Develop an integrated view of the Harrod Model and the Domar Model, and get a clear idea of the usefulness and limitations of this integrated model.

2.1 INTRODUCTION

Economic growth, as you have been in Unit 1, refers to a process of sustained increase in real national income of a country. A number of theories have tried to

study the process of economic growth as it has unfolded in the past especially within the free market framework. These theories are economic growth are also referred to as growth models, especially when the quantitative interrelationships among the critical variables in the process of economic growth are set out in a rigorous form. In the remaining units of this block and the subsequent two blocks you will study in depth about different models of economic growth as formulated by different economists at different point of time. Each of these models emphasises upon a different sector or a set of factors that in the opinion of their exponents is the major factor that influenced economic growth. In this unit, we begin with an in-depth analysis of what had come to be known as the Harrod-Domar Model (HDM) of growth.

2.2 BACKGROUND TO THE HARROD-DOMAR GROWTH MODEL

This model of growth was developed by two different economists, each working independently of the other, but almost con-currently. These two economists were R.F. Harrod and E.D. Domar. Harrod, of course, published his theory earlier than Domar. Harrod's book *Towards a Dynamic Economics* was published in 1948, while Domar's book *Essays in the theory of Economic Growth* was published in New York in 1957. Harrod Model and Domar Model may differ in details, but the ideas contained in both of the models are so similar that the two models have got integrated and more generally are presented as a single united model, known as the Harrod-Domar Model (HDM).

HDM integrated the classical and Keynesian analysis of economic growth. In the HDM, capital accumulation plays a crucial role in the process of economic growth. Both the classical economists and the Keynesians had recognised the critical role of capital accumulation in the process of economic growth. But the classical economists considered only the capacity of the capital accumulation, and, believing that supply created its own demand, did not pay attention to the demand side. Keynesians, on the other hand, erred in the opposite direction. Concerned primarily with the short-period, they considered only the adequacy of demand and neglected the problem of increase in capacity through investment in the long run. HDM considered both the sides of the investment process.

2.2.1 Essence of the Model

Starting from a full employment equilibrium level of income, the HDM postulated that continuous maintenance of this equilibrium required that the volume of spending generated by investment must be sufficient to absorb the increased output resulting from investment. Given the marginal propensity to save, the more the capital is accumulated and the larger the initial national income. The larger must be the absolute volume of net investment, maintenance of full employment, therefore, required an ever-expanding amount of net investment. This, in turn, required a continuous growth in real national income. Capital accumulation and growth of income must go side by side.

An increase in capital expands the productive capacity of the economy. If it is not accompanied by an increase in income, any of the following things may happen:

- The new capital may remain untitled.
- The new capital may replace old capital depriving the latter of its labour and/or markets.
- The new capital may be substituted for labour (and possibly other factors).

Thus, increase in capital unaccompanied by an increase in income would result into unemployment of capital and /or labour. Excessive capital accumulation may result into overproduction and consequently into a fall in investment leading to depression.

2.2.2 Assumption of the Model

The HDM is based on the following assumption:

1) An initial full-employment level of income exists.
2) There is no government interference in the functioning of the economy.
3) The exogenous factors do not influence the growth variables, i.e., it is a closed economy model.
4) There are no lags in adjustment, i.e., the economic variables like savings, investment, income, expenditure adjust themselves in the same period. Any change in saving brings about the corresponding change in investment in the same period.
5) The average propensity to save(S/Y) and marginal propensity to save($\Delta S/\Delta Y$) are equal to each other, i.e,. the absolute change in saving is equal to the relative change in saving.
6) Propensity to save and "capital coefficient"(capital-output ratio) are constant. The law of constant returns operated because of the fixity of capital-out ratio.
7) Income, investment and savings are all defined in the net sense. It implies that these variables exclude depreciation.
8) Saving and investment are equal in ex-ante and ex-post sense, i.e., accounting and functional equality between saving and investment the equality can be expressed as:

$$S_0 = I_0 \text{ (accounting equality)}$$

$$S_e = I_e \text{ (functional equality)}$$

S_0 and I_0 are observed saving and investment. S_e and I_e are expected saving and investment.

All these assumptions are not necessary for the final solution of the problem; nevertheless, they serve the purpose of simplifying the analysis.

2.3 THE HARROD MODEL (HM)

R.F. Harrod tries show in his model how steady (i.e., equilibrium) growth may occur in an economy. Once the steady growth is interrupted and the economy falls into disequilibrium, cumulative forces tend to perpetuate this divergence thereby leading to either secular definition or secular inflation. In other words, Harrod's growth model concentrated largely on the following question:

- How can steady growth-rate be achieved with fixed capital-output ratio (capital coefficient) and fixed saving-income ratio (propensity to save)?
- How can the steady growth-rate be maintained or what are the conditions for maintaining the stable growth?
- How do natural factors put a ceiling on the growth-rate of the economy?

The model seeks to provide answers to these questions.

2.3.1 Statement of the Model

The Harrod model is based on three growth rates. *One*, there is the **actual growth rate** denoted by G. It is determined by the saving ratio and the capital-output ratio. It shows short-run cyclical variation in the rate of growth. *Two*, there is the **warranted growth rate** denoted by G_w. It is the full capacity growth rate of income in an economy. *Three*, there is the **natural growth rate** denoted by G_n. This is regarded as 'the welfare optimum'. It may also be called the potential or the full employment rate of growth.

1) **Actual Growth Rate (G)** : The first fundamental equation in the HM is as follows:

$$GC = s \qquad \text{.....(1)}$$

where

G = actual rate of growth (or $\Delta Y/Y$)

C = the marginal capital output ratio[or $(I/\Delta Y)$]

s = saving income ratio [or (S/Y)]

The eq.(1) explains the simple truth that savings and investment are equal to each other in terms of ratio. Substituting the values of G,C and s in eq.(1) explains this phenomenon:

$$GC = s$$

Substituting the values, we get

$$(\Delta Y/Y) \times (I/\Delta Y) = S/Y$$

or
$$\frac{\Delta Y}{Y} \times \frac{I}{\Delta Y} = \frac{S}{Y}$$
$$= \frac{I}{Y} = \frac{S}{Y}$$

or $I = S$

The equality between saving and inves

tment (export sense) is thus a necessary condition for achieving steady growth. It is also called the dynamic equilibrium.

2) **Warranted Growth Rate (G_w)** : It is the full capacity growth rate of income in an economy. It is also known as 'full employment growth rate' or 'potential growth rate'. The equation for warranted growth can be stated as follows:

$$G_w C_r = s \qquad \text{.....(2)}$$

where,

G_w = warranted growth rate

C_r = amount of capital required to maintain the warranted growth rate

s = saving-income ratio

Eq.(2) states that if the economy is to advance at the steady rate of G_w that will fully utilise its capacity, income must grow at the rate of s/C_r per year, i.e., $G_w = s/C_r$.

If income grows at the warranted rate, the capital stock of the economy will be fully utilised; the entrepreneurs will be willing to continue to invest the amount of saving generated at full potential income. G_w is therefore, a self-sustaining rate of growth and if the economy continues to grow at this rate, it will follow the equilibrium path shown in

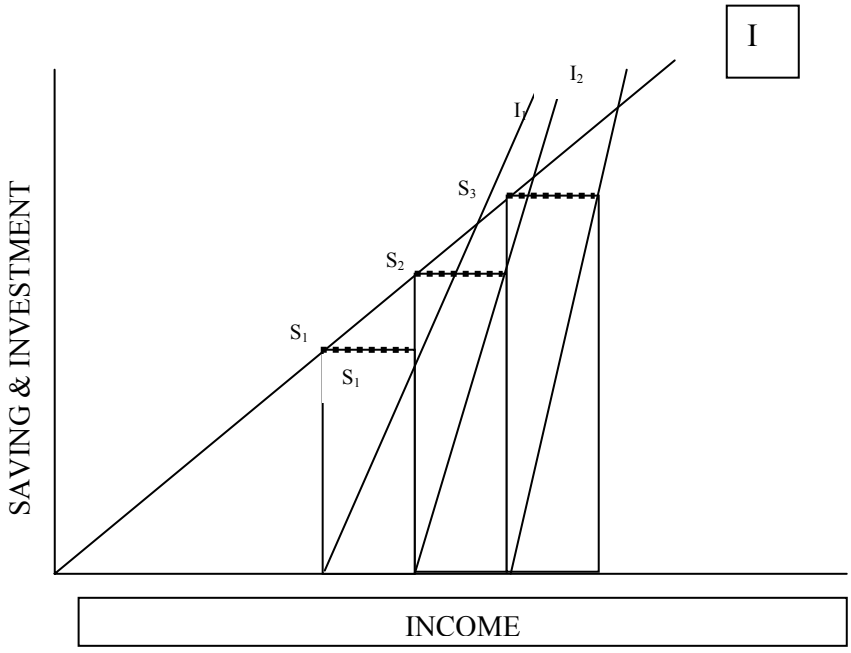

Fig. 2.1

In Fig.2.1, income is measured along the horizontal axis, and saving and investment are measured along the vertical axis. It would be seen that the change in income from Y_1 toY_2 induced investment would be to equal savings S_1 at A(Y_2). This investment, in turn, raised income to Y_3 and Y_3 induced I_2 to equal S_2 at B(Y_3). I_2 in turn raised income to Y_4 and Y_4 induced I_3 to equal S_3 at C(Y_4 income). In this way, the economy moves on the growth path.

The point of intersection of the investment line and the line running parallel to the Y-axis indicated the required investment that is forthcoming.

The greater proportion of savings, the greater must be the rate of increase in output to induce sufficient investment to maintain equilibrium if we assume no change in the investment co-efficient.

In brief, the warranted growth rate equation in the model implies that actual investment (ex-post investment) must be equal to expected investment (ex-ante investment), if an economy is to achieve stable growth. In such a situation, the following equalities will obtain:

$G = G_w$, and

$C = C_r$

The economy would be in equilibrium.

If these equalities do not obtain, the economy will be pushed into a state of disequilibrium if either of the following situations obtain.

a) $G > G_w$

or

$C < C_r$

b) $G < G_w$

or

$C > C_r$

a) **State if disequilibrium when $G > G_w$**

Under this situation, growth rate of income is higher than the growth rate of output. It means that the demand for output(because of higher lever of income) would exceed the supply of output (because of lower level of output). The economy would experience inflation.

Stated another way, if $C<C_r$, the actual amount of capital falls short of the required amount of capital. This will lead to the deficiency of capital. This, in turn, would adversely affect the goods to be produced. Fall in output would affect the goods to be produced. Fall in output would affect the goods to be produced. Fall in output would result in scarcity of goods, and hence inflation.

Either of the two ways lead to inflation. And growth under inflationary situation is not stable.

b) **State of disequilibrium when $G < G_w$**

In this situation, the growth rate of income is less than the growth rate of output. There would be more goods for sale but the income would be insufficient to purchase these goods. There would be deficiency of demand and the economy would face the problem of over production.

Similarly, when $C>C_r$, actual amount of capital would be larger than the required amount of capital for investment. The larger amount of capital available for investment. The larger amount of capital available for investment would lower the marginal efficiency of capital in the long-period. Secular decline in the marginal efficiency of capital would lead to depression and unemployment.

Economic growth under the situation of depression cannot be stable.

Harrod stated that once g departs from G_w, it will further depart away from equilibrium. He writed: "Around that line of advance which it adhered to would alone give satisfaction, centrifugal forced are at work, causing the system to depart further and further form the required line of advance." Thus, equilibrium between G and G_w is a knife-edge equilibrium. It follows that one of the major tasks of public policy is to bring G and G_w together in order to mainatain long-run stability.

For this purpose, Harrod introduces his third concept of natural rate of growth.

3) Natural Growth-rate (G_n): It is the maximum growth rate that an economy can achieve with its available natural resources. The equation for the natural growth rate can be state as follows:

$$G_n\ C_r = \text{or} \neq s \qquad \text{.....(3)}$$

It stated that the natural growth rate is determined by macro variables like population, technology, natural resources and capital equipment. These factors, place a ceiling beyond which expansion of output is not possible.

Interaction between G, G_w and G_n

Comparing G_w and G_n, it may be concluded that G_n may or may not be equal to G_w. In case G_n happen to be equal to G_w, the condition of steady growth would prevail. But such a possibility is remote one because a variety of factors (influencing G_n and G_w) come into play and make balance between these two growth-rated difficult. There exists a greater probability of inequality between G_n and G_w. It may take two terms:

a) $G_w > G_n$

b) $G_n > G_w$

a) $G_w > G_n$: It G_w exceeds G_n, G would lie below G_n for most of the time.

In this situation, there would be a tendency for cumulative recession. A downward trend would set in, resulting in unemployment and depression. However, downward trend cannot continue indefinitely. The reason is that lower limit to depression is set by the minimum consumption level. The consumption cannot fall below a minimum level. The minimum consumption requirements can be made possible by reducing the working capital. The entrepreneurs may not reduce fixed capital in the hope that future might entail bright prospects for investment. These two factors would gradually set the wheels of recovery in motion. The economy would experience upward trend.

b) $G_n > G_w$: In this situation, G would also exceed G_w for most of the time,

There would be a tendency for cumulative boom and full employment. Such a situation will create inflationary trend. To check this trend, savings should be encouraged, as these would ensure a high level of employment without inflationary pressures.

2.3.2 Assumptions of the Model

- The HM is based on the following assumptions:
- The level of ex-ante aggregate saving is a constant proportion of aggregate income. It means propensity to save is assumed to be constant.
- Technical progress has been assumed to be labour argumenting or 'neutral'. This implies that neutral technical progress is the basis of the model.
- The requirements of capital and labour per unit of output are constant, i.e., capital-output and labour-output ratios are assumed constant.
- Constant returned to scale operate. This implies that output increased at a constant rate.

2.3.3 Policy Implications of the Model

The policy implications of the model are simple and straight forward. These can be briefly summarised as follows:

Saving is a virtue in any inflationary gap economy and a vice in a deflationary gap economy. In an advanced economy the saving coefficient, s, has to be moved up or down as the situation demanded.

2.3.4 The Harrod Model and Trade Cycles

Harrod has used his model to explain trade cycles. In the recovery phase, because of the existence of unemployed resources, $G > G_n$. When full employment is reached $G = G_n$. If G_w exceeds G_n at the full employment, slump is inevitable. Since G had to fall below G_w, it will, for the time being, be driven progressively downwards. Further, G itself fluctuated during the course of the business cycle. Savings as a fraction of income, though fairly steady in the long run, fluctuate in the short run. In the short run, savings tend to be residual between the earning and normal consumption. Companies, also, are likely to save a large portion of their short-period increased in net receipts. Thus, even it G_w is normally below G_n, it is likely to ride above G_n in the later stages of advance, and, if it so happens, a vicious spiral of depression is inevitable when full employment is reached. If G_w does not ride above

G_n in the course of advance, there would be continued pressure to advance when full employment is reached; this would lead to inflation and consequently, sooner or later, to a rise of G_w above G_n, resulting ultimately into a vicious spiral of depression. Actually, G may be reduced before the employment is reached because of immobilities, frictions, and bottlenecks and, if it so happens, depression may come before full employment is reached. If G_w is far above G_n, G may never rise far above G_w during the revival and the depression may result long before full employment is reached.

2.3.5 Critique of the Harrod Model

The instability in Harrod's model is due to the rigidity of its basic assumptions, viz. fixed production function, a fixed saving ratio, and a fixed growth rate of labour force. Economists have attempted to relieve this rigidity by permitting capital and labour substitution in the production function, by making the saving ratio a function of the profit rate and the growth rate of labour force as a variable in the growth process.

Check Your Progress 1

1) Why is the model discussed in this unit known as the Harrod-Domar Model?

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2) State in brief the basic formulations of the Harrod model of growth.

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3) How does the Harrod model explain the occurrence of trade cycles?

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2.4 THE DOMAR MODEL (DM)

The fundamental question around which E.D. Domar builds his model can be stated as follows:

Investment leading to an increase in productive capacity and income, what should be the rate of increase in investment which would equalise the increase in income and the increase in productive capacity, so that full employment is maintained?

Domar answers this question by forging a link between aggregate supply and aggregate demand through investment.

2.4.1 Statement of the Model

Domar model is based on the dual character of investment: one, investment increases productive capacity, and two, investment generated income. The two sides of investment provide solution for steady growth. The following symbols are used in DM.

Y_d = Level of national income or level of effective demand at full employment (demand side)

Y_s = Level of productive capacity or supply at full employment level (supply side)

K = real capital

I = net investment, which implies change in stock of real capital, i.e. ΔK

d = marginal propensity to save, which is the reciprocal of multiplier i.e., (mp λ =1/multiplier)

σ = productivity of capital

We can make use of these notations to frame a set of equations that help formulate the DM.

The demand side of investment can be represented by an equation as follows:

$Y_d = I/d$

This equation explains two things as follows:

i) The level of effective demand (Y_d) is directly related to the level of investment(I). An increase in investment will result in an increase in effective demand, and vice versa.

ii) The effective demand is inversely related to the marginal propensity to save (d). An increase in marginal propensity to save will decrease the level of effective demand and vice-versa.

Eq.(1) represents the demand side of investment.

The supply side of investment can be represented by an equation as follows:

$Y = \sigma k$ .....(2)

Eq.(2) explains that supply of output(Y_s) at full employment depends upon two factors, ie.., productive capacity of capital(σ) and the amount of real capital(K). A change in the supply of any of these will result in a corresponding change in the supply of output. For example, an increase in the productivity of capital will result

in an increase in output, and vice-versa. Likewise, an increase in the amount of real capital will lead to an increase in output, and vice-versa.

Equilibrium: In equilibrium, the demand and supply should balance. Therefore,

$$Y_d = Y_s$$

or $I/d = \sigma K$

By cross multiplication,

$$I = d\sigma K \quad \text{.....(3)}$$

Eq.(3) explains the condition for steady growth.

Steady growth is possible when:

Investment equals the product of saving-income ratio, capital productivity and capital stock.

From this the condition for *maintaining* the steady growth can be explained. For this we have to give increment to the demand and supply conditions presented above.

The demand equation in its incremental form can be stated as follows:

$$\Delta Yd = \Delta I/d \quad \text{.....(4)}$$

Increments have been shown in the level of effective demand and investment because they are variables, but increment has not been shown in d because it is constant in terms of the assumptions employed.

The supply equation it its incremental form can be stated as follows:

$$\Delta Y_s = \sigma \Delta K \quad \text{.....(5)}$$

Eq.(5) explains that change in the supply of output (ΔY_s) would be equal to the product of change in real capital (ΔK), and the productivity of capital (σ). The change in real capital is expressed as net investment. Therefore, ΔK represented investment(I). Substituting I in place of ΔK in eq.(5), we get.

$$\Delta Y_s = \sigma I \quad \text{.....(6)}$$

The equilibrium between eq.(4) and eq.(6) provides us the condition for maintaining the steady growth. In equilibrium

$$\Delta Yd = \Delta Y_s$$

or $\Delta I/d = \sigma I$

cross-multiplying , we get,

$$\Delta I/I = \sigma d \quad \text{.....(7)}$$

Eq.(7) explains that the growth-rate of net investment $\Delta I/I$ should be equal to the product if marginal propensity to save (d) and productivity of capital (σ). This equality must be maintained to ensure stable and steady growth.

Donar gives a numerical example to explain this condition of maintaining steady growth.

Let σ = 25% per year

d = 12%

Y = \$150billion a year

If full employment is to be maintained, an amount equal to $150\times\frac{12}{100}$ =\$18 billion should be invested. This will raise productive capacity by the amount invested σ times i.e., by $150\times\frac{12}{100}\times\frac{25}{100}$ =\$4.5 billion, and the national income will have to rise by the same amount. But the relative rise in income will equal the absolute increase divided by the amount itself, i.e.,

$$150\times\frac{\frac{12}{100}\times\frac{25}{100}}{150}=\frac{12}{100}\times\frac{25}{100}=3\%$$

Thus in order to maintain full employment, income must grow at a rate of 3% per annum. This is the equilibrium rate of growth. Any divergence from this "golden path" will lead to cyclical fluctuation when ΔI/I greater than σ d the economy would experience boom. The economy would suffer from depression, it ΔI/I is less than σ d.

2.4.2 Assumption of the Model

The Domar model is based on the following assumption.

1) Income is determined by investment through multiplier. For the sake of simplicity, saving-income ratio is assumed constant.

2) Productive capacity is created by investment according to the potential social average investment productivity. For the sake of simplicity this is also assumed to be constant.

3) Investment is induced by output growth together with entrepreneur confidence.

4) Employment depends upon the 'utilisation ratio' expressed as the ratio between actual output and productive capacity.

5) Past and present investment can greater productive capacity at a given ratio.

2.4.3 Policy Implication of the Model

An economy always faced a serious dilemma if sufficient investment is not forthcoming today, unemployment will occur today; but if enough in invested today, still more will be needed tomorrow in order to increase demand so that the expanded capacity can be utilised and excessive capital accumulation avoided tomorrow; otherwise the excessive accumulation will cause a fall in investment leading to a depression day after tomorrow. To stay at the same place, therefore, the economy must move faster and the economy must move faster and faster, otherwise it will slip downward.

Check Your Progress 2

1) Discuss the principal features of the Domar Model of growth.

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2) State the conditions necessary for steady growth.

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3) State the conditions necessary for maintaining for maintaining steady growth.

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2.5 COMPARISON OF HARROD MODEL AND DOMAR MODEL

Harrod model and Domer model show both similarities and dissimilarities with each other. Let us have a look at these.

2.5.1 Similarities

The two models are similar in substance. Harrod's is domar's d. Harrod's warranted rate of growth (G_w) is Domar's full employment rate of growth ($d\sigma$). Harrod's $G_w=s/C_r \equiv$ Domar's $d\sigma$).

To prove it

$$d = \frac{S}{Y} \text{ or } S=dY \qquad \text{.....(1)}$$

$$\sigma = \frac{\Delta Y}{I} \text{ or } \Delta Y = I\sigma \qquad \text{.....(2)}$$

Since S=I, and substituting S for I in eq.(2), we have

$$\Delta Y = dY\sigma \qquad [\because S=dY]$$

or $$\frac{\Delta Y}{Y} = d\sigma \qquad \text{.....(3)}$$

$\therefore \quad G_w = d\sigma \qquad (\text{since } G_w = \frac{\Delta Y}{Y})$

In other words, Harrod's Gw is the same as Domar's $d\sigma$, but in reality, Domar's rate of growth r=ds ¬'s Harrod's G_w, and Domar's $r = d\sigma$ is Harrod's natural growth rate. In Domar's model s is the annual productive capacity of newly created capital which is greater than σ which is the net potential social average productivity of investment. It is the lack of labour and other factors of production which reduced Domar's growth rate from r=ds to $r\ d\sigma$. Since labour is involved in σ therefore Domar's potential growth rate resembled Harrod's natural rate. We may also say that the excess of s over σ in Domar's model expresses the excess of G_w over G_n in Harrod's model.

2.5.2 Dissimilarities

Both the models, no doubt, are based on similar assumptions, yet there are differences in the two models. These dissimilarities can be presented as below:

Dissimilarities between the Domar Model and Harrod Model.

	Parameter	Domar	Harrod
1.	Long-run difficulty	"Under-investment sapping growth"	Labour shortage deflecting growth
2.	Position of labour input	Shortage of certain labour may trigger scrapping and the inhibition of investment; optional element	Determinant of natural rate of growth: key element
3.	Centrifugal force from equilibrium	Continuously undermined investment incentives	Unstable adjustment process
4.	Reason for fixed capital output ratio	Assumed for inconvenience	Due to fixed interest rate, low substitutability, etc.
5.	State of economy	Idle capacity prevalent	Labour unemployment common place

Further differences between the two models are revealed when we discuss their policy implications. Domar's model explains the technological relationship between the capital accumulation and full employment growth rate of output. Harrod model shows the behavioral or psychological relationships between the capital accumulation and full capacity growth rate of output. Domar's analysis is based on the principle of multiplier, whereas Harrod's analysis is based upon the principle of acceleration. Domar's model suggests the role of planned investment in the economic development, while Harrod's model stresses on induced investment.

2.6 HARROD-DOMAR GROWTH MODEL

You have read about the Harrod Model (HM) and the Domar Model (DM) separately. By now, you would have understood that the two models are similar in substance, although they may differ in details as also in policy implications. Now we have reached a stage in our study where we can integrate these two models in the form of what has come to be known as the Harrod-Domar Growth Model (HDM).

2.6.1 Substance of the Model

The main points of the HDM can be summarised as follows:

1) Investment is the central theme of the HDM. It plays a dual role. ON the one hand it generates income and on the other it creates productive capacity.
2) The increased capacity results in greater output and greater employment, depending on the behaviour of the income.
3) Condition regarding the behaviour of income can be expressed in terms of growth-rates, i.e., G Gw and Gn. The equality between these growth rates would ensure full employment of labour and full utilisation of capital stock.
4) These conditions, however, designate only a steady-line of growth. The actual growth rate may differ iron the warranted growth rate. If the actual growth rate is higher than the warranted rate of growth, the economy will experience cumulative inflation. If the actual growth-rate is lower than the warranted growth-rate, the economy will hurtle towards cumulative deflation.
5) The business-cycles are viewed as the deviations from the path of steady growth. These deviations cannot go on indefinitely. There are constraints on upper and lower limits. The "full employment ceiling" acts as an upper limit and autonomous investment and consumption act as a lower limit. The actual growth-rate fluctuates between these two limits.

2.6.2 Limitations of the Model

HDM throws light on the important determinants (and policy implications) of economic development, yet they are not free from criticism. The HDM has been criticised on the following grounds:

1) The HDM assumes key parameters, like the propensity to save and the capital-output ratio, to be constant. In reality, these are likely to change over the long run. Changes in these parameters would change the requirements of steady growth.
2) The HDM includes only aggregates as variables. A model constructed on the basis of such aggregates cannot show the inter-relations between the sectors and as such is not meant for demonstrating the structural changes which constitute a basic aspect of the economic development of a developing economy. Harmonious growth of different sectors of the economy is very important for steady growth. Deviations from steady growth may be caused by a lack of harmony between the growth of different sectors even when aggregative requirements for stability are fulfilled.
3) The HDM assumes the production function to be fixed and therefore there is no scope for substitution between different factors. Actually different factors of production, at least to a limited extent, can be substituted for each other. Substitutability between different factors increases the flexibility of the economy and thereby decreases the possibilities of cumulative deviations from the path of steady growth.
4) The HDM pays attention only to the requirements of steady growth and neglect the rate of growth. It is more useful for developed countries whose main aim is stability and not the rate of growth. In contrast, developing countries are interested more in the rate of growth. They would not mind following policies, which create fluctuations if these considerably raise the rate of growth.
5) The HDM is purely laizzez-faire only based on the assumption of fiscal neutrality and designed to indicate the conditions of progressive equilibrium for a developed economy. The policy implications, therefore, are not very relevant to the developing economies.

Despite these limitations, the HDM is an important model because it represented a stimulating attempt to dynamise and secularise Keynes' static short-run saving and investment theory.

Check Your Progress 3

1) State the similarities between the Harrod Model and the Domar Model.

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2) State the differences between the Harrod Model and the Domar Model.

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3) What are the basic features of the Harrod-Domar Model of growth? Also state the limitations of this model.

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2.7 LET US SUM UP

The Harrod-Domar growth model was developed separately, but concurrently, by two economists. Both the Harrod Model and the Domar Model brought out the importance of saving and investment in the process of economic growth. Both the models sought to lay out the conditions for steady growth; the non-fulfilment of these conditions would lead to disequilibrium, resulting in inflationary and deflationary gap. Although both the models differed in details, they were the same in substance. Therefore, both the models stand out integrated, and are known as the Harrod-Domar Model of Growth. The model was developed in the context of advanced market economies. But it has been widely used in formulating plan models in developing economies.

2.8 KEY WORDS

Capital-Output Ratio: The number of units of capital required to produce a unit of output.

Investment: That part of national income which is spent on the acquisition of capital goods.

Natural Growth Rate: Refers to the maximum growth rate which an economy can achieve with its available natural resources.

Savings: That part of national income which is not spent on the purchase of consumer goods.

Warranted Growth Rate: Refers to that growth-rate of the economy when it is working at full capacity and making optimum use of machine and manpower.

2.9 SOME USEFUL BOOKS

Meier, Gerald M. and Rauch, James E (eds.) (2000). *Leading Issues in Economic Development (7th edition*). Oxford University Press, Oxford.

Solow, Robert M. (2000), *Growth Theory: An Exposition (2nd edition).* Oxford University Press, Oxford and New York.

Surrey, M.J.C. (ed.) (1976). *Macroeconomic Themes*. Oxford University Press, Oxford.

2.10 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) See Section 2.2
2) See Sub-section 2.3.1
3) See Sub-section 2.3.4
4) See Section 2.2
5) See Sub-section 2.3.1
6) See Sub-section 2.3.4

Check Your Progress 2

1) See Sub-section 2.4.1
2) See Section 2.4.1
3) See Sub-section 2.4.1

Check Your Progress 3

1) See Sub-section 2.5.1
2) See Sub-section 2.5.2
3) See Sub-section 2.6.1 and 2.6.2