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Introduction

Ever since the end of Second World War, interest in the problems of economic growth has led economists to formulate growth models of different types.

These models deal with and lay emphasis on the various aspects of growth of the developed economies. They constitute in a way alternative stylized pictures of an expanding economy.

A feature common to them all is that they are based on the Keynesian saving-investment analysis. The first and the simplest model of growth—the Harrod-Domar Model—is the direct outcome of projection of the short-run Keynesian analysis into the long-run.

This model is based on the capital factor as the crucial factor of economic growth. It concentrates on the possibility of steady growth through adjustment of supply of demand for capital. Then there is Mrs. Joan Robinson's model which considers technical progress also, along with capital formation, as a source of economic growth. The third type of growth model is that built on neoclassical lines.

It assumes substitution between capital and labour and a neutral technical progress in the sense that technical progress is neither saving nor absorbing of labour or capital. Both the factors are used in the same proportion even when neutral technical takes place. We deal with the prominent growth models here.

Although Harrod and Domar models differ in details, they are similar in substance. One may call Harrod's model as the English version of Domar's model. Both these models stress the essential conditions of achieving and maintaining steady growth. Harrod and Domar assign a crucial role to capital accumulation in the process of growth. In fact, they emphasise the dual role of capital accumulation.

On the one hand, new investment generates income (through multiplier effect); on the other hand, it increases productive capacity (through productivity effect) of the economy by expanding its capital stock. It is pertinent to note here that classical economists emphasised the productivity aspect of the investment and took for granted the income aspect. Keynes had given due attention to the problem of income generation but neglected the problem of productive capacity creation. Harrod and Domar took special care to deal with both the problems generated by investment in their models.

General Assumptions:

The main assumptions of the Harrod-Domar models are as follows:

(i) A full-employment level of income already exists.

(ii) There is no government interference in the functioning of the economy.

(iii) The model is based on the assumption of "closed economy." In other words, government restrictions on trade and the complications caused by international trade are ruled out.

(iv) There are no lags in adjustment of variables i.e., the economic variables such as savings, investment, income, expenditure adjust themselves completely within the same period of time.

(v) The average propensity to save (APS) and marginal propensity to save (MPS) are equal to each other. APS = MPS or written in symbols,

$S/Y = \Delta S/\Delta Y$

(vi) Both propensity to save and "capital coefficient" (i.e., capital-output ratio) are given constant. This amounts to assuming that the law of constant returns operates in the economy because of fixity of the capita-output ratio.

(vii) Income, investment, savings are all defined in the net sense, i.e., they are considered over and above the depreciation. Thus, depreciation rates are not included in these variables.

(viii) Saving and investment are equal in ex-ante as well as in ex-post sense i.e., there is accounting as well as functional equality between saving and investment.

These assumptions were meant to simplify the task of growth analysis; these could be relaxed later.

Harrod's growth model raised three issues:

(i) How can steady growth be achieved for an economy with a fixed (capital- output ratio) (capital-coefficient) and a fixed saving-income ratio?

(ii) How can the steady growth rate be maintained? Or what are the conditions for maintaining steady uninterrupted growth?

(iii) How do the natural factors put a ceiling on the growth rate of the economy?

In order to discuss these issues, Harrod had adopted three different concepts of growth rates: (i) the actual growth rate, G, (ii) the warranted growth rate, G_w (iii) the natural growth rate, G_n.

The Actual Growth Rate is the growth rate determined by the actual rate of savings and investment in the country. In other words, it can be defined as the ratio of change in income (AT) to the total income (Y) in the given period. If actual growth rate is denoted by G, then

$G = \Delta Y/Y$

The actual growth rate (G) is determined by saving-income ratio and capital- output ratio. Both the factors have been taken as fixed in the given period. The relationship between the actual growth rate and its determinants was expressed as:

$GC = s \ldots(1)$

where G is the actual rate of growth, C represents the capital-output ratio $\Delta K/\Delta Y$ and s refers to the saving-income ratio $\Delta S/\Delta Y$. This relation stales the simple truism that saving and investment (in the ex- post sense) are equal in equilibrium. This is clear from the following derivation.

Since

$$G = \frac{\Delta Y}{Y}$$

$$C = \frac{\Delta K}{\Delta Y} = \frac{I}{\Delta Y} \qquad [\because \Delta K = I]$$

Because

$$s = \frac{S}{Y}$$

Substituting the value of G, C, and s in equation (1), we get

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

or

$$\frac{I}{Y} = \frac{S}{Y}$$

or

$$I = S$$

This relation explains that the condition for achieving the steady state growth is that ex-post savings must be equal to ex-post investment. **"Warranted growth"** refers to that growth rate of the economy when it is working at full capacity. It is also known as Full-capacity growth rate. This growth rate denoted by G_w is interpreted as the rate of income growth required for full utilisation of a growing stock of capital, so that entrepreneurs would be satisfied with the amount of investment actually made.

Warranted growth rate (G_w) is determined by capital-output ratio and saving- income ratio. The relationship between the warranted growth rate and its determinants can be expressed as

$G_w C_r = s$

where C_r shows the needed C to maintain the warranted growth rate and s is the saving-income ratio.

Let us now discuss the issue: how to achieve steady growth? According to Harrod, the economy can achieve steady growth when

$G = G_w$ and $C = C_r$

This condition states, firstly, that actual growth rate must be equal to the warranted growth rate. Secondly, the capital-output ratio needed to achieve G must be equal to the required capital-output ratio in order to maintain G_w, given the saving co-efficient (s). This amounts to saying that actual investment must be equal to the expected investment at the given saving rate.

Instability of Growth:

We have stated above that the steady-state growth of the economy requires an equality between G and G_w on the one hand and C and C_r on the other. In a free-enterprise economy, these equilibrium conditions would be satisfied only rarely, if at all. Therefore, Harrod analysed the situations when these conditions are not satisfied.

(*i*) If $\quad G > G_w$ $^{\bullet}$
     then $\quad C < C_r$

(*ii*) If $\quad G < G_w$
     then $\quad C > C_r$

We analyse the situation where G is greater than G_w. Under this situation, the growth rate of income being greater than the growth rate of output, the demand for output (because of the higher level of income) would exceed the supply of output (because of the lower level of output) and the economy would experience inflation. This can be explained in another way too when $C < C_r$ Under this situation, the actual amount of capital falls short of the required amount of capital.

This would lead to deficiency of capital, which would, in turn, adversely affect the volume of goods to be produced. Fall in the level of output would result in scarcity of goods and hence inflation. This, under this situation the economy will find itself in the quagmire of inflation.

On the other hand, when G is less than G_w, the growth rate of income would be less than the growth rate of output. In this situation, there would be excessive goods for sale, but the income would not be sufficient to purchase those goods. In Keynesian terminology, there would be deficiency of demand and consequently the economy would face the problem of deflation. This situation can also be explained when C is greater than C_r.

Here the actual amount of capital would be larger than the required amount of capital for investment. The larger amount of capital available for investment would dampen the marginal efficiency of capital in the long period. Secular decline in the marginal efficiency of capital would lead to chronic depression and unemployment. This is the state of secular stagnation.

From the above analysis, it can be concluded that steady growth implies a balance between G and G_w. In a free-enterprise economy, it is difficult to strike a balance between G and G_w as the two are determined by altogether different sets of factors. Since a slight deviation of G from G_w leads the economy away and further away from the steady-state growth path, it is called 'knife-edge' equilibrium.

G_n the Natural growth rate is determined by natural conditions such as labour force, natural resources, capital equipment, technical knowledge etc. These factors place a limit beyond which expansion of output is not feasible. This limit is called Full-Employment Ceiling. This upper limit may change as the production factors grow, or as technological progress takes place. Thus, the natural growth rate is the maximum growth rate which an economy can achieve with its available natural resources. The third fundamental relation in Harrod's model showing the determinants of natural growth rate is

$G_n C_r$ is either $=$ or $\neq s$

Interaction of G, G$_w$ and G$_n$:

Fig. 17.1 When G_n > G employment increases so as to achieve full employment.
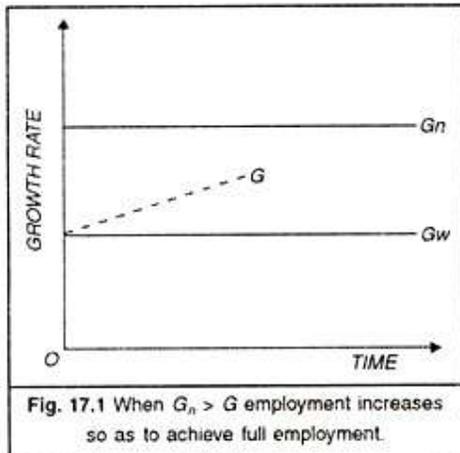
Comparing the second and the third relations about the warranted growth rate and the natural growth rate which have been given above, we may conclude that G$_n$ may or may not be equal to G$_w$. In case G,, happens to be equal to G$_w$, the conditions of steady growth with full employment would be satisfied. But such a possibility is remote because of the variety of hindrances are likely to intervene and make the balance among all these factors difficult. As such there is a definite possibility of inequality between G$_n$ and G$_w$. If G,, exceeds G$_w$, G would also exceed G$_w$ for most of the time as is shown in Figure 17.1, and there would be a tendency in the economy for cumulative boom and full employment.

Such a situation will create an inflationary trend. To check this trend, savings become desirable because these would enable the economy to have a high level of employment without inflationary pressures. If on the other hand G$_w$ exceeds G,,, G must be below G,, for most of the time and there would be a tendency for cumulative recession resulting in unemployment (Figure 17.2).

Fig. 17.2 When G_n > G_w there is growth of unused capacity of capital and employment continues to fall till G_w = G_n