Principles of Economic Growth

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Appendix 2.1. The Harrod–Domar Model

The Harrod–Domar model rests on two simple assumptions about economic behaviour. First, household saving (S) is taken to be proportional to output (Y), so that

$$S = sY \tag{1}$$

where s is the saving rate, a number like 0.2, for example, which is close to the 1995 world average. Second, the stock of capital (K) is also taken to be proportional to output:

$$K = vY \tag{2}$$

where v is the capital/output ratio, a number like 1, 2, 3, or 4, depending on the state of development of the country in question. Rich countries typically have more capital than poor countries relative to output. Capital is difficult to measure accurately except as the sum of previous investments discounted by the assumed rate of depreciation (assumed, because depreciation of capital, like capital itself, cannot easily be measured directly).

To these two assumptions about the behaviour of households and firms is then added the definition of gross investment (I) as the sum of net investment (i.e. the change in the capital stock ΔK, where Δ denotes change) and replacement investment δK, where the depreciation rate δ is the proportion of the capital stock that wears out every year by assumption:

$$I = \Delta K + \delta K \tag{3}$$

The unobservable depreciation rate δ can be a number like, say, 0.04 or 0.10, or even a much larger number in countries where capital loses its worth or wastes away rapidly.

At last, we write down the condition that saving must equal investment for the national economy to be in equilibrium:

$$S = I \tag{4}$$

Notice now that for a given capital/output ratio (v), equation (2) can be rewritten as $\Delta K = v\Delta Y$. Using this, substituting equations (1) and (3) into equation (4), and manipulating the result, we get the following expression for the proportional increase in output—the rate of economic growth:

$$\frac{\Delta Y}{Y} = \frac{s}{v} - \delta \tag{5}$$

This is the Harrod–Domar equation for growth. For example, if the saving rate (s) is 0.21, the capital/output ratio (v) is 3, and the depreciation rate (δ) is 0.04, not unreasonable assumptions in many cases, then the corresponding rate of growth of output ($\Delta Y/Y$) is 0.03 or 3 per cent. If the saving rate rises from 0.21, the world average in 1995, to 0.36, as in Thailand in 1995,[1] then the growth rate would increase from 3 per cent per year to 8 per cent, other things being equal. If

the capital/output ratio decreases from 3 to 2.1 (and $s = 0.21$ again), then growth rises from 3 to 6 per cent a year. An increase in the depreciation rate, however, reduces growth point for point. We see that reasonable variations in the parameters of the model yield rates of growth within a plausible range.

But this cannot be the end of the story since population growth has not yet been taken into consideration, as discussed in Appendix 2.2.