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CONTEMPORARY PROBLEMS IN MACROECONOMICS

Accounting for the Sources of Economic Growth

Consider the following simple production function:

$$Y = F(K, N). \tag{1}$$

We then have:

$$\Delta Y = (MPK \times \Delta K) + (MPN \times \Delta N). \tag{2}$$

Divide both sides by *Y*, multiply top and bottom of the first term on the right-hand side by *K*, and top and bottom of the second term on the right-hand side by *N*, we get:

$$\frac{\Delta Y}{Y} = \left(\frac{MPK \times K}{Y}\right)\frac{\Delta K}{K} + \left(\frac{MPN \times N}{Y}\right)\frac{\Delta N}{N}. \tag{3}$$

Now, under the assumption of competitive capital and labor markets, $\left(\frac{MPK \times K}{Y}\right)$ is the share of capital in total output (call it α), and $\left(\frac{MPN \times N}{Y}\right)$ is the share of labor in total output. Under the assumption of constant returns to scale, Euler's theorem tells us that these two shares add up to 1. Therefore, we can re-write (3) as:

$$\frac{\Delta Y}{Y} = \alpha\frac{\Delta K}{K} + (1-\alpha)\frac{\Delta N}{N}. \tag{4}$$

In a more general case in which the production function [with Hicks-neutral technology] is:

$$Y = AF(K, N), \tag{5}$$

(3) can be re-written as:

$$\frac{\Delta Y}{Y} = \alpha\frac{\Delta K}{K} + (1-\alpha)\frac{\Delta N}{N} + \frac{\Delta A}{A}. \tag{6}$$

Equation (6) is called the fundamental equation of growth accounting.

Equation (6) can also be written as:

$$g_Y = g_A + \alpha g_K + (1-\alpha) g_N. \tag{7}$$

Equation (6), and its equivalent (7), is called the fundamental equation of growth accounting. g_A is called the rate of growth of Total Factor Productivity (TFP), or Multi-factor Productivity (MFP).