Beyond the Solow Model: Endogenous Growth Theory

The Endogenous Growth Theory rejects Solow’s basic assumption of exogenous technological change.
Start with a simple production function: \( Y = AK \), where \( Y \) is output, \( K \) is the capital stock, and \( A \) is a constant measuring the amount of output produced for each unit of capital (noticing this production function does not have diminishing returns to capital). One extra unit of capital produces \( A \) extra units of output regardless of how much capital there is. This absence of diminishing returns to capital is the key difference between this endogenous growth model and the Solow model.

Let’s describe capital accumulation with an equation similar to those we’ve been using: \( \Delta K = sY - \delta K \). This equation states that the change in the capital stock (\( \Delta K \)) equals investment (\( sY \)) minus depreciation (\( \delta K \)). We combine this equation with the production function, do some rearranging, and we get: \( \Delta Y/Y = \Delta K/K = sA - \delta \)
\[ \frac{\Delta Y}{Y} = \frac{\Delta K}{K} = sA - \delta \]

This equation shows what determines the growth rate of output $\Delta Y/Y$.

Notice that as long as $sA > \delta$, the economy’s income grows forever, even without the assumption of exogenous technological progress.

In the Solow model, saving leads to growth temporarily, but diminishing returns to capital eventually force the economy to approach a steady state in which growth depends only on exogenous technological progress.

By contrast, in this endogenous growth model, saving and investment can lead to persistent growth.