Lesson 5: Economic Growth and Stability

Economic growth may be calculated as:
- The annual percentage change in real GDP, which tells us how rapidly the economy is expanding as a whole
- The annual change in real per capita GDP. Real GDP per capita is calculated as total real GDP divided by total population. It is a useful indicator of the standard of living in a country.

A small increase in the growth rate of per capita GDP can have a large impact on an economy's standard of living if sustained over time.

Rapid growth is not always sustainable and is typically associated with higher inflation, environment damage, and high savings (low consumption). Sustainable growth comes from an economy constantly adding to its productive capacity and enhancing its potential GDP.

The Production Function and Potential GDP

The Solow (neoclassical) growth model provides a framework for identifying the underlying sources of growth in an economy. The model is based on the production function.

$$Y = AF(L, K)$$

The production function asserts that an increase in an economy's potential GDP can be caused by:

- An increase in the quantity of inputs used in the production process (e.g. capital and labor).
- An increase in the productivity of these inputs with the application of better technology. Improving technology enables an economy to produce more output using the same quantity of inputs.

The Production Function and Potential GDP

Traditional economists focussed on labor as the only variable factor of production.
- Predicted that eventually, the marginal product of labor would decline to zero.
- This implies that there would be zero long term economic growth.
- Fortunately, this dire prediction never came true.

Subsequently, economists shifted their focus to capital.
Given diminishing marginal returns to capital, if capital were to grow at a faster rate than labor, the productivity of capital would decline, resulting in slower growth. This has the following implications:
- For long-term sustainable economic growth, countries cannot rely solely on increasing the quantity of capital relative to labor.
- Eventually there should be a convergence in incomes across developed and developing countries.

Because of diminishing marginal returns to labor and capital, the only way to "sustain" growth in potential GDP is growth in TFP (A).
- Improvements in technology result in an outward shift in the production function.

The Production Function and Potential GDP

The growth accounting equation shows that the rate of growth of potential GDP equals the growth in technology plus the weighted average growth rate of capital and labor based on their relative shares in national income.

Growth in potential GDP = Growth in technology + W_L(Growth in labor) + W_K(Growth in capital)

Highlights the fact that the contribution of labor and capital to GDP growth depends on their relative shares in national income.

Growth equation in per capita terms:

Growth in per capital potential GDP = Growth in technology + W_K(Growth in capital-labor ratio)

Advances in technology have a more significant impact on an economy's standard of living compared to capital.

Sources of Economic Growth

Growth in labor supply: The potential quantity of labor in an economy is measured in terms of total hours worked.

Total hours worked = Labor force ´ Average hours worked per worker

- The labor force is defined as the portion of the working age population (over the age of 16) that is employed, or available for work but not currently employed.
- Note that growth in the labor force is usually different from the population growth rate due to changes in the labor force participation rate and changes in hours worked per person.
- Labor supply is also affected by net immigration.

Improvements in quality of human capital:

Growth rate of labor productivity

Growth in physical capital stock

Improvements in technology

Availability of natural resources

Measures of Sustainable Growth

The growth accounting equation discussed earlier cannot be used to accurately estimate the growth rate of potential GDP

- There is no observed data on potential GDP and TFP.
- Information on quantities of labor and capital is not readily available (especially in developing countries).

Therefore, economists focus on labor productivity, an area where more reliable information is more readily available.

Labor productivity refers to the quantity of goods and services (real GDP) that a worker can produce in one hour of work.

Labor productivity = Real GDP/ Aggregate hours

Dividing the production function by L, the number of workers in an economy allows us to identify the factors that drive labor productivity:

$Y/L = A\mathbf{F}(1, K/$

Y/L equals output per worker (a measure of labor productivity). The equation above implies that labor productivity depends on:

- Physical capital per worker (K/L) or the mix of inputs (which is easily calculated based on input data).
- Total factor productivity or technology (A). This is a scale factor and can be estimated based on output and input data.

Therefore, labor productivity is much easier to measure directly than growth in potential GDP. Labor productivity can explain differences in living standards and long term sustainable growth rates across countries

Measuring Sustainable Growth

Potential GDP is a combination of aggregate hours and productivity of labor:

Potential GDP = Aggregate hours ´ Labor productivity

This equation can be expressed in terms of growth rates as:

Potential GDP growth rate = Long-term growth rate of labor force + Long-term labor productivity growth rate

Therefore, if the labor force is growing at 1% per year and productivity of workers is growing at 2% per year, then potential real GDP would be expected to grow at 3% per year.