

Chapter 2: A framework for analysis

Some basic tools

In order to chase the key question of why some countries are rich and whereas others are poor, we will use the basic tools for economic analysis.

Goods and services are produced using two inputs, namely labor and capital.

Capital refers to physical stock like machines, vehicles and other pieces of equipment used during the process of production as well as financial capital, like securities. The more capital that a worker has to work with, the more output the worker produces.

Differences in income between countries can be explained by differences in the capital available per worker in each country. These differences in capital can be explained by differences in investment. **Investment** is the goods and services used for production rather than for consumption. The **investment rate** is therefore the fraction of income, which is further invested. A higher investment rate might explain more capital available per worker.

Although investment explains a part of differences in income, most is explained by differences in productivity.

Productivity is the effectiveness, with which output is produced from a certain amount of inputs. Productivity differences can be caused by a technology difference.

Technology is defined by the state of available knowledge about how to do (produce) things. Technological progress increases the produced amount of output with the same input (e.g. Productivity). The way in which available technology and inputs are actually used in production output is called **efficiency**. Therefore:

$$\text{Productivity} = \text{Technology} * \text{Efficiency}$$

Factors which influence economic growth immediately are referred to as **proximate causes** of economic growth. The opposite is called **ultimate causes** of economic growth, which have only an indirect influence.

The underlying factors of why a country is poor or rich are called the **fundamentals**. They include culture or geography aspects and economic policies.

The production function

The production function describes the method to generate output, by relating the amount of input factors used to produce the output. These input factors are referred to as **factors of production**. Input factors are either labour or capital.

According to the productivity function, income inequality in two countries can be due to:

- Differences due to factor accumulation.
- Differences due to productivity.
- Both differences in factor accumulation and productivity.

A question that often has been asked is what influence an increase in savings would have on economic growth. Well the answer is that an increase in savings would raise the growth rate of output in the years immediately after it took place, but eventually the growth rate would return to its original level. However the growth rate has not changed in the long run, the level of output would be higher than it would have been when savings had not been increased.

Analysis of Data

Economic theories are often stated in the form of **economic models**, which are simplified representations of reality that can be used to analyse how economic variables are determined and how a change in one variable will affect others.

In order to find empirical proof for different economic models regarding economic growth, we will have to consider statistical evidence and therefore incorporate the basic statistical terms;

A scatter plot is used to sketch the relationship between two *variables*, one on the x-axis and one on the y-axis. Each observation is represented by a single point.

Outliers: observations which show a clear deviation from the normal pattern.

Correlation describes the relationship between two variables as one is changing. Is one increasing as the other one also increases (calories consumption/day increases together with GDP increasing) we define that relationship as a strong positive correlation. The degree of correlation is measured with a **correlation coefficient**, which can take a value between -1 and 1. A value of "0" states that there is no relationship between two variables; e.g. the amount of girls born is not dependent on the amount of sunshine days. There are three possible explanations for the correlation:

- *X causes Y:* variable X affects variable Y.
- *Y causes X:* variable Y affects variable X.
- *There is no direct causal relationship between X and Y:* But there is a third variable, Z, that causes both X and Y. This third variable Z is known as an **omitted variable**; the two factors do not influence themselves, but are both subject to a change in a third variable.

Reverse causation describes the phenomenon that not X influences Y, but Y effects X. For example, the correlation between cars owned per family and the income, could be interpreted that having more cars will lead to higher income. However, the opposite is true; the two variables have a reverse causation.

Cross-sectional-data: Observations of different units at a single point in time. A way to use these data is to examine how economic variables change over time for a certain period or decade.