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Accounting for Growth

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Abstract:

Growth accounting is a procedure used in the economy to measure the contribution of various factors to economic growth and to indirectly calculate the rate of technological change, measured as a residual indicator in the economy. The accounting for growth breaks down the growth rate of the economy's total output into two factors, namely the increase in the number of factors used (usually an increase in capital and labor force). This can not be explained by the changes observed in the utilization factor. The inexplicable part of GDP growth is then seen as an increase in productivity (getting more production with the same amount of costs) or as a well-defined measure of technological progress.

This method has been applied to almost every economy in the world and the general conclusion is that the observed levels of economic growth can not be explained simply by changes in capital in the economy or by the rate of growth of the population and Workforce. As a result, technological progress plays a key role in the economic growth of countries or in their absence. Economists measure large differences in GDP per capita over time and across countries. Our first impulse is the interpretation of these data using a production function that links per capita production to the capital-to-labor ratio. If the indicator is 0.25, then this function (Y / L) = (K / L) 0.25

Suppose we are interested in the difference as a percentage of GDP per capita between two times in time or between two countries. Mathematically, percent differences behave more like logarithms. If we took the logs on both sides of the production function, we would have a log (Y / L) = 0.25 log (K / L)

Considering this as a percentage-of-change equation, he says that for every one percentage point difference in the capital-labor ratio, we should get a difference of 0.25 percentage points per employee. Conversely, if we find that in one country output per employee is 10% higher than in another, we expect that in a more productive

country, capital per employee will be increased by 40%.

Theoretically, capital-to-labor ratio differences should account for all differences in output volume per employee. There is nothing else in the equation.

The capital-to-labor ratio is certainly important. Countries increase this ratio by capital accumulation. This means that a significant portion of production goes to investment, which helps to increase the capital stock. In his text, Delong has a chart that shows that in most countries with high labor productivity indicators, the share of investment accounts for more than twenty percent of output. Conversely, in most low-productivity countries, investment levels are below twenty percent.

However, capital-labor ratio differences can not account for more than half of the output differences per worker. This is true whether you were trying to explain the volume of production per employee over time in one country or trying to explain the differences in production volume per employee in different countries.

Another way of expressing this is that the differences in output per employee are larger than you expect based on the capital-to-labor ratio. In the United States, output growth per worker has been faster than expected due to an increase in the capital / labor ratio. In addition, the difference between per capita output in the United States and other countries is larger than could be expected with differences in capital-labor ratios.

This phenomenon of unexplained differences in productivity per employee was discovered for the first time in the 1950s and is called the "rest". The rest is so important that we have to find a place in the production function. In Delong's Macroeconomics manual, this is called E, work efficiency. Using this formulation, the production function is (Y / L) = (K / L) 0.25E0.75

Suppose productivity per worker in the United States is $ 30,000 a year. Suppose fixed capital per employee is $ 250,000. Can you calculate the value of E?

Work Accounting and Growth

This new design, the efficiency of the work, gives us another element in the equation. The increase in output per employee is explained by the weighted average of capital gains per employee and the growth in labor efficiency. Take the logs on both sides of the This new design, the efficiency of the work, gives us another element in the equation. The increase in output per employee is explained by the weighted average of capital gains per employee and the growth in labor efficiency. Taking the logs from both sides of the new production function gives log (Y / L) = .25 log (K / L) + .75 log (E)

We now have an equation that says economic growth is the weighted average of capital-to-labor ratio growth and labor-efficiency growth. Remember that work efficiency is not a number that you can see in the president's economic report or in another collection of government statistics. This is all that is needed for the production function to match the observed data on output per employee and capital per employee.

After formulating the term "labor efficiency", economists must analyze what defines it. Some likely factors include:

• education by employee

• knowledge

• economic, political and social systems

Of these factors, the only one that has a ready scale is education. In fact, some of the differences in work efficiency over time and between countries can be explained by differences in the average number of years of training per student. However, education does not explain enough that we know that it is an inhibitory factor that determines E.

Knowledge is an important factor in explaining E's differences over time. Today, we simply know what we did not know many years ago. For example, even if we lose all our medical equipment and doctors, we will know more about sanitation and health than we did hundreds of years ago.

Some of our knowledge is scientific and technical. Other knowledge is more prosaic. When you start a new job, you usually receive formal guidance, company management and the help of experienced employees who, through trial and error, have learned the best way to do their job. All this knowledge, from abstract science to everyday experience, contributes to E.

Some knowledge is in the public domain, and some are property. Most scientific knowledge is available to anyone who can understand it. However, other knowledge, from the Coca-Cola formula to the source code of Microsoft software, is considered secret by the owners of the company.

Since most knowledge is in the public domain, this knowledge is not a promising explanation for E differences in different countries. Even private knowledge is not limited to one country. For example, Coca-Cola has factories around the world, so its secret formula is used by workers around the world.

When we try to explain the differences in the efficiency of work in different countries, economists are almost inevitably forced to focus on the differences in economic, political and social systems. Delong's contrast between joining an employee in neighboring countries in pairs of

Communist and non-Communist countries certainly underscores this problem.

The production function is the basis for the recognition of growth. This leads to an approach that divides growth into two components: the capital / labor ratio and labor efficiency.

Labor efficiency is constructed indirectly, on the basis of the balance resulting from an attempt to explain the difference in output per employee based on differences in the capital-labor ratio. Economists believe that education, knowledge and the social system influence the effectiveness of work.

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