SECTION 7

ECONOMIC GROWTH AND PRODUCTIVITY

MODULE 37: LONG-RUN ECONOMIC GROWTH

The purpose of this module is to introduce the concept of long-run economic growth. Once growth is defined and broadly explained as the product of national gains in productivity, upcoming modules can explore the role of productivity in more detail.

Student learning objectives:

- How we measure long-run economic growth.
- How real GDP has changed over time.
- How real GDP varies across countries.
- The sources of long-run economic growth.
- How productivity is driven by physical capital, human capital, and progress in technology.

Key Economic Concepts For This Module:

- The most common measure to track long-run economic growth over time and between nations is real GDP per capita.
- Economic growth is not simply the recovery from a recession. Economic growth fundamentally increases the nation's ability to produce goods and services.
- One way to think about economic growth is to think back to the model of production possibilities. Short-run recovery is a movement from a point inside the *PPC* to the limits of the *PPC*. Long-run economic growth is an outward shift of the entire *PPC*.
- The "rule of 70" approximates how many years it takes for a nation's economy to double in size.
- The most important factor in a nation's long-run economic growth is average labor productivity.
- Labor productivity is enhanced by more physical capital, more human capital, and faster progress in technology.

Common Student Difficulties:

- Students usually assume that the U.S. is a "rich" nation, but rarely know how much wealthier the average American is when compared to the average citizen around the world. Use the cross-country comparisons in the text to impress upon the students just how much wealthier the U.S. is to other nations students might hear about in the news.
- Students can mistake physical capital with technology. You might stress that the capital is the tool itself, the technology is the improvement in the tool.

In-Class Presentation of Module and Sample Lecture

Suggested time: This module can be covered in an hour-long class session with part of a second hour used to discuss the Household Production activity if it is assigned.

I. Comparing Economies Across Time and Space
- **A.** Real GDP per Capita
- **B.** Growth Rates

II. The Sources of Long-Run Growth
- **A.** The Crucial Importance of Productivity
- **B.** Explaining Growth in Productivity
  - **1.** Physical Capital
  - **2.** Human Capital
  - **3.** Technology

I. Comparing Economies Across Time and Space

Note: it might be helpful to ask the students how they would design a statistic to measure the growth of a nation's economy. The instructor might get several responses that we could describe as "short-run" measurements like, "a lower unemployment rate". Is it lower this month, or is it permanently lower? The measure must be trackable over time, and must be applicable across nations, not just ours.

A. Real GDP per Capita

The key statistic used to track economic growth is real GDP per capita—real GDP divided by the population size.

- GDP because, as we have learned, GDP measures the total value of an economy's production of final goods and services as well as the income earned in that economy in a given year. Think of this as the total size of the economic pie.
- Real GDP because we want to separate changes in the quantity of goods and services from the effects of a rising price level. This is the size of the pie after adjusting for inflation.
- Real GDP per capita because we want to isolate the effect of changes in the population. This gives us the size of each person's slice of the pie, if it were shared equally.

For example, other things equal, an increase in the population lowers the standard of living for the average person—there are now more people to share a given amount of real GDP. An increase in real GDP that only matches an increase in population leaves the average standard of living unchanged.

Note: the instructor may wish to discuss the differences between the real GDP per capita in the U.S. and some of our main trading partners. The graphs and charts in the text can be the foundation for these comparisons.

B. Growth Rates

Growth rates are like compounded interest.
If the annual interest rate is 10% at the bank, and you are saving $100, after year 1 you will have $110, an increase of $10. After year two, you will have $121, an <u>additional</u> increase of $11.

If the economy grows by 2% one year, and <u>another</u> 2% the following year, and another 2% the year after that, these annual growth rates are compounded into larger and larger increases in per capital real GDP.

Rule of 70 approximates how many years it will take for the economy to double at a given rate of economic growth.

# of years for a number to double = (70/annual growth rate of that number)

> **Example** If annual per capita real GDP increases at 5% every year, it will take approximately 14 years for it to double.

The million dollar question is why some nations have faster long-run economic growth than others.

II. The Sources of Long-Run Economic Growth

Three words: Productivity, productivity, productivity.

A. The Crucial Importance of Productivity

The authors stress: *Sustained growth in real GDP per capita occurs only when the amount of output produced by the average worker increases steadily.*

Labor productivity = (real GDP/# of people working)

If workers are creating more output, on average, the size of the economic pie will be rising and the average person's slice will also be rising.

What factors lead to higher productivity?

1. Physical Capital

If you give a worker more physical capital (tools) with which to do the work, he/she will almost always be more productive.
A carpenter with a hydraulic nail gun will build more houses in a year, than a carpenter with a claw hammer.
A book keeper with a laptop computer and software will create more financial statements in year than a book keeper with a hand-held calculator.

2. Human Capital

If a worker has more education and training, human capital, he/she tends to be more productive.

As jobs and the global economy become more complex, nations with a more highly educated workforce will be able to produce more output per worker than nations with a lower level of education.

Today nearly 30% of American workers have a college degree. In 1910, only 3% had college degrees. This significantly contributed to the growth of the U.S. economy.

3. Technology

We can think of technology as our collective body of knowledge. How do we know how to build a satellite that will orbit the earth and tell me how to get from my hotel in Washington, DC to the Lincoln Memorial? It takes years and years of collective learning to build such useful devices as GPS systems. These innovations, and many others large and small, are major factors in allowing an average worker to increase his/her output in a given year.

So, if you give a worker more tools, better tools, and the education and training to know what to do with them, that worker will be more productive.

In-Class Activities and Demonstrations

Household Production:

Ask the students to go home and make a list of the production that happens in the home or community. For example, meals are cooked, clothes are washed, children are bathed, dishes are cleaned, teams are coached, etc.

Observe household members engaged in these activities in a typical night. The student may watch Dad cook dinner, Mom coach soccer, and the teenager might be doing laundry.

Ask the student to make a list of the physical capital and technology that allows the household to be more productive. The microwave allows Dad to cook more quickly, which gives him time to check on Junior's homework. The washer and dryer allow the teenager to get the laundry done, while still allowing time to study for economics class. The cell phone allows Mom to coach soccer and order pizza from the car on the way home.

If the student can see that the physical capital and technology in the household increases each member's productivity, it will be clear that the same is true of the increased productivity in the workplace and nation.