

ECONOMIC GROWTH

FUNDAMENTAL QUESTIONS

1. What is economic growth?

Economists define **economic growth** as an increase in real national income, usually measured in terms of the percentage increase in real gross national product (GNP) or real gross domestic product (GDP). An alternative way of defining economic growth, one that more clearly shows growth's effects on individual people, is to look at growth as the percentage increase in the **per capita real GDP**: to look at changes in real GDP per person in the economy. After all, if real GDP increases 5 percent at the same time population increases 5 percent, real GDP may be higher, but the people in the economy are no better off than before: the increase in output is only enough to keep everyone at the same level as before. In this case, per capita real GDP would show no growth.

Although growth in per capita real GDP shows us how much is available to consume per person, it does not tell us everything about people's standards of living; we also need to look at income distribution and the quality of life. If all of the increase in output goes to a small proportion of the people within a country, most people's standard of living will be unchanged. If economic growth is accompanied by large decreases in environmental quality (more pollution, less wilderness, and so forth), many people may feel that their quality of life has decreased rather than increased.

2. How are economic growth rates determined?

Economic growth means a shift rightward of the aggregate supply curve, increasing the potential output of the economy. A country's economic growth rate is determined by the factors that determine the aggregate supply curve: the amount of productive resources available and technology. The faster the growth of productive resources and technological advancement, the higher a country's growth rate will be.

3. What is productivity?

Productivity is one way to look at the impact of advances in **technology** on economic growth. Productivity is the ratio of output produced to the amount of input used. Improvements in technology mean that productivity increases as we find new and better ways to use inputs to produce output. More specifically, **total factor productivity (TFP)** is a nation's output divided by its stock of labor and capital. Economic growth is the sum of the growth rate of total factor productivity and the growth rate of available resources.

4. What explains productivity changes?

Anything that affects how goods and services are produced can affect productivity. These factors include changes in the quality of labor, changes in the frequency of technological innovations, changes in energy prices, and a shift away from manufacturing toward services. Less obviously, the development of financial markets can affect productivity by making the allocation of resources more efficient.

Key Terms

economic growth
rule of 72

per capita real GDP
technology

total factor productivity (TFP)

Quick-Check Quiz

Section 1: Defining Economic Growth

- Economic growth is defined as an increase in
 - nominal GDP.
 - real GDP or real per capita GDP.
 - real national inputs.
 - nominal national inputs.
 - real government expenditures.
- Economic growth is usually measured as the
 - absolute increase in real GDP.
 - nominal increase in real GDP.
 - percentage increase in real GDP.
 - marginal increase in real GDP.
 - total increase in real GDP.
- For a country with a constant rate of growth, the time required for real GDP to double can be found by using the rule of
 - net interest.
 - 100.
 - 10.
 - 72.
 - total interest.
- Per capita real GDP is real GDP divided by
 - nominal national income.
 - real GNP.
 - 72.
 - government expenditures.
 - population.

5. What is the annual economic growth rate in Australia if real GDP at the beginning of the year is 528 billion dollars and real GDP at the end of the year is 509 billion dollars?
- 3.6 percent
 - 3.7 percent
 - 96.4 percent
 - 3.6 percent
 - 1.9 percent

Section 2: The Determinants of Growth

- In terms of the aggregate demand–aggregate supply model, economic growth is shown as a(n)
 - rightward shift in the aggregate demand curve.
 - rightward shift in the aggregate supply curve.
 - leftward shift in the aggregate demand curve.
 - leftward shift in the aggregate supply curve.
 - upward shift in both aggregate demand and aggregate supply.
- An abundance of natural resources
 - is always necessary for economic growth.
 - is necessary for economic growth only in capitalist countries.
 - is necessary for economic growth only in developing countries.
 - has no effect on economic growth.
 - can contribute to economic growth but is not necessary for growth.
- Growth in a country's capital stock is tied to
 - increases in the amounts of natural resources available.
 - current and future saving.
 - improvements in technology.
 - increases in the amount of labor available.
 - decreases in the labor force participation ratio.
- Which of the following is *not* one of the determinants of economic growth?
 - the size and quality of the labor force
 - the amount of capital goods available
 - technology
 - natural resources
 - the shape of the aggregate demand curve
- Other things being equal, a country's long-run aggregate supply curve will shift to the right when
 - expenditures on education decrease.
 - the quantity of natural resources falls.
 - the mortality rate rises.
 - the productivity of labor decreases.
 - technology advances.

Section 3: Productivity

- Total factor productivity is the ratio of
 - a firm's marginal revenue to its marginal cost.
 - a firm's total revenues to its total costs.
 - a nation's total income divided by its total output.
 - a nation's output to its stock of labor and capital.
 - a nation's labor supply to its capital stock.
- Economic growth is the sum of
 - total factor productivity and resources.
 - total factor productivity and marginal factor productivity.
 - growth in total factor productivity and growth in resources.
 - real GDP and national output.
 - GNP and GDP.
- From 1948 to the early 1990s, total factor productivity in the United States
 - increased at a constant rate.
 - decreased at a constant rate.
 - increased, but at a slower and slower rate.
 - increased, but at a faster and faster rate.
 - decreased, but at an uneven rate.
- Suppose that real output is growing at 2 percent, the labor force is growing at 1 percent, and capital stock is growing at 0.5 percent. If labor contributes 80 percent to real GDP and capital contributes 20 percent to total output, then the growth in total factor productivity must equal
 - 1.5 percent.
 - .5 percent.
 - 1.1 percent.
 - 1.4 percent.
 - 1.1 percent.

Practice Questions and Problems

Section 1: Defining Economic Growth

- Economic growth is an increase in _____, usually measured as a percentage change in _____ or _____.
- Small differences in rates of growth are magnified over time because growth is _____.
- In 2002, the real GNP of the country of Lalaland was 200 million lals; in 2003, the real GNP was 210 million lals. What was the growth rate in Lalaland in 2003?
 - 10 million
 - 10 percent
 - 5 percent
 - 4.76 percent
 - .05 percent

4. The income of the town of Kennebunkport has been growing by 3 percent per year. If this growth continues into the future, how long will it take until the town's income has doubled?
- about 33 years
 - about 24 years
 - about 2 years
 - about 3 years
 - about 216 years
5. Per capita real GDP is _____ divided by _____.
6. The table below shows the GDP and population in 2002 and 2003 in Aaaland and Zeeland (all figures are in millions in the country's currency).

Country	2002		2003	
	Real GDP	Population	Real GDP	Population
Aaaland	20,000	25	20,600	25
Zeeland	40,000	40	42,000	41

- a. Calculate the growth rates in GDP and in GDP per capita for the two countries.

Aaaland: GDP growth rate: _____
 GDP per capita growth rate: _____

Zeeland: GDP growth rate: _____
 GDP per capita growth rate: _____

- b. Which country is growing faster? Explain.

7. Looking at growth rates in GNP or GDP per capita does not give you a complete picture of the standard of living in different countries. What important factors are not included in the GNP or GDP per capita figures?

Section 2: The Determinants of Growth

- Economic growth shifts the aggregate _____ (demand, supply) curve to the _____ (right, left).
- The long-run growth of the economy rests on growth in productive resources such as _____, _____, and _____ and on advances in _____.
- The size of a country's labor force is determined by the _____ and the _____ of the population in the labor force.

4. Growth in a country's capital stock depends on current and future _____.
5. Technology is ways of combining _____ to produce _____.
6. What are two factors that cause developing countries to lag behind in the development and implementation of new technology?

Section 3: Productivity

1. Productivity is the ratio of _____ to the amount of _____.
2. _____ is the nation's real GDP divided by its stock of labor and capital.
3. In the United States, labor receives about 70 percent of national income and capital receives about 30 percent. If total factor productivity increases by 1 percent, labor increases by 1 percent, and capital increases by 3 percent, by what percentage will national income increase? _____
4. List four factors that may help explain why productivity changes.

Thinking About and Applying Economic Growth

I. Quality of Life and Economic Growth

One of the issues discussed in this chapter has been the difficulties of using standard measures of economic growth (growth in GDP or growth in GDP per capita) to show changes in the well-being of people. The effects on economic well-being of growth in GDP per capita do not take into account the distribution of income or quality-of-life issues such as pollution. When economic growth increases pollution, most people would agree that people are not really as much better off as the economic growth statistics show. Conversely, increases in the quality of life may not show up in the economic growth figures.

Since the middle 1960s, people have become more concerned about the environment and pollution. One of the ways the U.S. government has responded to this concern is by passing laws requiring businesses to install pollution control equipment. As a result of these laws and other factors, the air and water in most of the United States are substantially cleaner now than they were ten or fifteen years ago. Although most of us

would agree that cleaner air and water improve our quality of life, this improvement does not show up in the economic growth statistics. In fact, environmental improvements can result in lower measured economic growth. Let's take a look at the reasons for this.

1. Suppose that the Best-Yet Whatchamacallit Company has saved \$1 million. Best-Yet was planning to use the money to buy a machine that would produce an additional \$2 million worth of whatchamacallits every year for ten years. However, the government just passed a law requiring Best-Yet to buy \$1 million worth of pollution control equipment to eliminate the horrible-smelling green smoke that the factory emits. Figure out the following:
 - a. Effect on real GDP of an extra \$2 million worth of whatchamacallits produced per year:

 - b. Effect on real GDP of elimination of horrible-smelling green smoke:

2. Buying the whatchamacallit machine will _____ (raise, lower) total factor productivity.
3. Buying the pollution control equipment will _____ (raise, lower) total factor productivity.
4. Compare the timing of the decline in TFP growth in the United States and the environmental movement in the United States. Is there any possible connection? If there is, do you think productivity has really slowed down as much as the statistics show?

II. Government Policy and Growth

Government policies that hold down interest rates have adverse effects on economic growth in developing countries. Although low interest rates are intended to make it cheaper for local businesses to invest in new capital goods, they have the effect of drying up the supply of savings, since savers can get a higher return by taking their money out of the country or by making less productive investments on their own. Similar policies are sometimes followed in other economic sectors, with similarly bad results.

For example, many developing countries require farmers to sell their crops to the government, which resells the food to city dwellers. To keep the city dwellers happy, the prices charged for food are set very low, as are the prices paid to farmers. Think about the farmers' opportunity costs of growing food for sale, and predict what is likely to happen to the food supply in countries adopting this policy.



Chapter 17 Homework Problems

Name _____

1. a. What economic statistic would you look at to judge whether a country's economy has been growing over time?

b. What economic statistic would you look at to judge whether the individual people in a country have had a rising standard of living?

2. How can you show economic growth in the aggregate demand–aggregate supply model, and what causes economic growth?

3. What factors explain changes in productivity?

4. The population of the island of South Hamilton is growing at 5 percent per year. The real GDP of South Hamilton is growing at 8 percent per year. How many years will it take before the per capita GDP of the residents of South Hamilton doubles?

5. You have been hired by the United Nations to measure the economic well-being of the residents of two islands, East Podunk and West Podunk. You have the following data:

	East Podunk	West Podunk
1998 GDP	\$247,000,000	\$136,000,000
2003 GDP	\$298,000,000	\$175,000,000
1998 population	28,670	14,786
2003 population	30,421	17,172

Use all this information to evaluate which country is doing better economically.

If your instructor assigns these problems, write your answers above, then tear out this page and hand it in.

Answers

Quick-Check Quiz

Section 1: Defining Economic Growth

1. b; 2. c; 3. d; 4. e; 5. d

If you missed any of these questions, you should go back and review Section 1 of Chapter 17.

Section 2: The Determinants of Growth

1. b; 2. e; 3. b; 4. e; 5. e

If you missed any of these questions, you should go back and review Section 2 of Chapter 17.

Section 3: Productivity

1. d; 2. c; 3. e; 4. c

If you missed any of these questions, you should go back and review Section 3 of Chapter 17.

Practice Questions and Problems

Section 1: Defining Economic Growth

- real GDP; real GDP; per capita real GDP
- compounded
- c is correct. The growth rate is calculated this way:

$$\text{Growth rate} = \frac{\text{change in real GDP over year}}{\text{real GDP in beginning year}} \times 100$$

$$\text{For Lalaland, growth rate} = \frac{(210 - 200)}{200} \times 100 = 5 \text{ percent}$$

If you chose answer a, you found the amount of growth, not the growth rate. If you chose answer b, you must have thought that the actual change was the same as the percentage change. If you chose answer d, you used the GDP in the ending year (2003) rather than the GDP in the beginning year (2002). If you chose answer e, you forgot to multiply by 100 to convert the answer into a percentage.

- b is correct. You should use the rule of 72 to find the length of time to double income. Divide 72 by the percentage growth rate to find the time to double. In this case, $72/3 = 24$, or 24 years to double the town's income.

If you chose answer a, you forgot about the effect of compounding. The rule of 72 is just a shorthand way to look at compound growth. If you chose answer c or d, you need to review Sections 1.a.1 and 1.a.2. If you chose answer e, you multiplied the growth rate times 72 instead of dividing the growth rate into 72.

- real GDP; population
- | | |
|------------|---|
| a. Aaland: | GDP growth rate: 3 percent |
| | GDP per capita growth rate: 3 percent |
| Zceland: | GDP growth rate: 5 percent |
| | GDP per capita growth rate: 2.4 percent |

To calculate the GDP growth rate, see Section 1, question 3 above. To calculate the GDP per capita growth rate, you first need to calculate GDP per capita in both years; then you find the growth rate the same way you found the growth rate for GDP.

Aaaland: GDP per capita in 2002 is $20,000/25 = 800$
 GDP per capita in 2003 is $20,600/25 = 824$

GDP per capita growth rate = $(24/800) \times 100 = 3$ percent

Zeeland: GDP per capita in 2002 is $40,000/40 = 1,000$
 GDP per capita in 2003 is $42,000/41 = 1,024$

GDP per capita growth rate = $(24/1,000) \times 100 = 2.4$ percent

- b. Which country is growing faster depends on which statistic you want to look at. Aaaland's GDP per capita is growing faster, but Zeeland's GDP is growing faster. The size of Zeeland's economy is growing faster, but the average standard of living in Aaaland is growing faster.
7. income distribution
 quality of life

Section 2: The Determinants of Growth

1. supply; right
2. labor; capital; natural resources; technology
3. working-age population; participation
4. saving
5. resources; output
6. low levels of education
 limited financial resources (capital)

Section 3: Productivity

1. output produced; inputs
2. Total factor productivity
3. 2.6 percent
 Growth is growth in TFP plus growth in each resource \times that resource's share of national income. For this case, $\text{growth} = 1 (\text{TFP growth}) + .7 (1 \text{ percent growth in labor} \times \text{labor's } .7 \text{ share of national income}) + .9 (3 \text{ percent growth in capital} \times \text{capital's } .3 \text{ share of national income})$.
4. quality of the labor force
 number of technological innovations
 changes in energy prices
 shift from manufacturing to service industries

Thinking About and Applying Economic Growth

I. *Quality of Life and Economic Growth*

1. a. increases real GDP by \$2 million (assuming that the resources used, such as the \$1 million in savings, would not otherwise be used elsewhere in the economy)
b. no effect on real GDP (since green smoke is not bought and sold through markets)
2. raise
Buying the whatchamacallit machine increases output by \$2 million and the capital stock by \$1 million. Output is in the numerator of the TFP equation, and capital is in the denominator. Since the numerator (the top part) of the ratio increased by more than the denominator (the bottom part), TFP will increase.
3. lower
Buying the pollution control equipment increases the capital stock but does not increase output (as measured by GDP). Since the numerator is unchanged and the denominator increased, the ratio is smaller: investing in pollution control equipment makes TFP decrease.
4. The timing of the decline in TFP growth matches the timing of increases in investments in pollution control equipment. Although the amount spent on pollution control is not large enough to explain all of the decrease in the growth of TFP, it may account for some of the drop. Since we have a cleaner environment, pollution control equipment is doing something worthwhile, even though it does not show up in the standard economic statistics.

II. *Government Policy and Growth*

If the price paid for food crops is low enough, farmers will decide to do something else with their resources than grow food crops. They may switch to cash crops sold for export or just take more leisure, growing only enough to feed themselves and their families. Either way, the amount of food produced for sale to city dwellers will drop substantially. The low prices charged to city dwellers will not help them much when there is no food available for sale.

