

Economic Growth

18

- PRODUCTIVITY
- HUMAN CAPITAL
- POTENTIAL GDP

LIVING STANDARDS

In 1948 real GDP per capita (in 2009 dollars) in the United States was \$13,758. By 2016 it had risen to \$57,300. These figures indicate that the standard of living quadrupled in those 68 years. Real GDP per capita represents how much was produced, per person in the nation. When more goods and services are produced, this implies more material wealth. This is the essence of economic growth—increments in material wealth. The percentage change in real GDP, or real GDP per capita, is the customary measure of economic growth.

Of course, not all growth is good. Some bemoan the congestion, pollution, and loss of simplicity that sometimes accompany economic growth. Nevertheless, generally speaking, more output per person implies higher living standards. Life is more harsh in Tanzania, where GDP per capita is less than \$1,000, than in Australia where GDP per capita is over \$20,000.

In the United States since World War II, real GDP typically grows about three percent a year. Real GDP per capita has an average growth rate of just under two percent for the same period. This means that American citizens enjoy a standard of life that improves just under two percent a year.

Even small differences in the rate of growth can add up over the years. Imagine two economies, both with a real GDP per capita of \$30,000. If real GDP per capita grows by one percent a year in the first economy and two percent a year in the second, then in 25 years the first economy will have a real GDP per capita of \$38,500, while in the second it will rise to \$49,200.

This brings us to the “rule of 70.” It will take 10 years for GDP, or any variable, to double if it grows by seven percent a year. More generally, a variable will double in $70/x$ years, where x is the annual growth rate of the variable. So if the standard of living grows at five percent a year, we can expect the standard of living to double in $14 (= 70/5)$ years.

It is well known that the fruits of economic growth are not shared equally among the population in America. Since income is unequally distributed, so is the economic bounty. In fact, America has one of the more skewed distributions of income in the industrialized world. Roughly half of all the income goes to 20 percent of the families. The poorest 20 percent of the population earns only five percent of all the income. Growth theorists argue about what can be done about disparities in living standards within a nation. Some see the disparity as a natural consequence of growth, while others insist that economic growth need not result in economic inequality.

DETERMINANTS OF ECONOMIC GROWTH

The production possibilities frontier can be used to summarize the factors that cause an economy to grow. Our previous analysis indicated that two factors could cause the production possibilities frontier to shift outward: (1) an increase in the amount of resources, and (2) a technological advance that increases productivity. When the production possibilities frontier shifts outward, it implies that the economy's potential for production has increased. Potential GDP is the amount that can be produced using resources fully and efficiently.

Figure 18.1 illustrates how an increase in a particular resource, labor, would affect the production possibilities frontier. If the economy was producing at point A before the increase in the amount of labor in the economy, it could now produce at a point such as B, where more guns and butter are consumed.

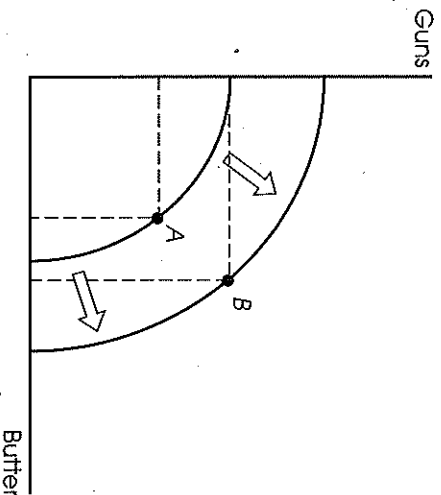


Fig. 18.1 An Increase in Labor Force

Figure 18.2 shows how a technological advance in butter production would affect the production possibilities frontier. Apparently the technological advance has no application in gun production because the intersection of the frontier on the vertical axis has not changed. Nevertheless, the economy can consume more guns and butter after the technological advance. This can be seen by comparing points A and B in Figure 18.2.

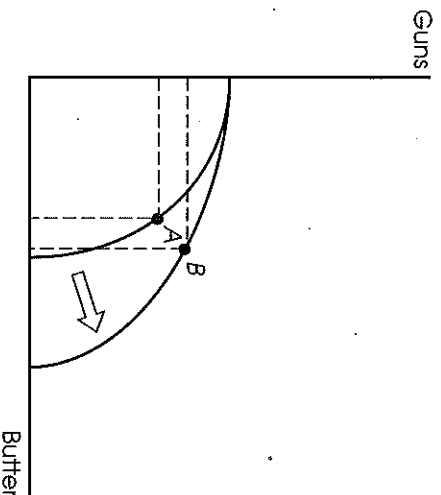


Fig. 18.2 A Technological Advance in Butter Production

The aggregate demand/aggregate supply (AS/AD) model can also illustrate economic growth. If the long-run aggregate supply curve is used, then shifts in aggregate demand have no effect on the equilibrium quantity of output. Only a shift to the right of the long-run aggregate supply curve can increase equilibrium output. This is shown in Figure 18.3.

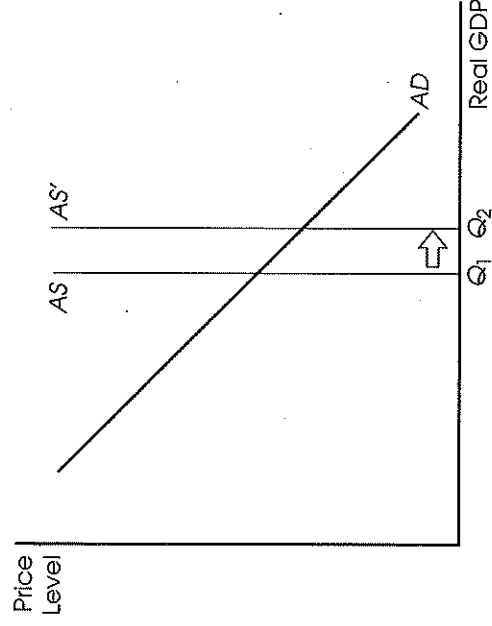


Fig. 18.3 An Increase in Long-Run Aggregate Supply

The only question that remains is, what can cause the long-run aggregate supply curve to shift to the right? Readers with good retention will remember that there are two factors that could cause the long-run aggregate supply curve to shift to the right: (1) an increase in the amount of resources, and (2) a technological advance that increases productivity. These are the same two factors that can cause the production possibilities frontier to shift outward.

Our investigation of the production possibilities frontier and the AS/AD model indicates that there are two general factors affecting economic growth: (1) resource availability and (2) the productivity of those resources. To dig deeper, we now ask what can affect resource availability and productivity.

The Determinants of Resource Availability

Recall that resources are classified into three categories—land, labor, and capital. One way to promote economic growth is to promote the availability of each of these classes of resources. For instance, you might think that the amount of natural resources, what economists call land, is strictly limited, but that is not true. New deposits of oil, natural gas, and minerals are continually being discovered. Also, advances in agriculture and irrigation can make more land available for farming. Discoveries of mineral deposits and the creation of arable fields are examples of natural resources becoming more readily available. This results in more production and, therefore, economic growth.

The availability of labor is primarily based on demographic factors. These demographics are a major concern in Russia. It is expected that the labor force in Russia will shrink due to a decline in the birth rate. A smaller labor force means an important resource is less available. This will have a negative impact on economic growth in Russia.

But the supply of labor is not only affected by demographic factors. Government-subsidized child care could increase the supply of labor as could education and training

TIP

Economic growth can be portrayed with an outward shift of the production possibilities frontier or a rightward shift in the long-run aggregate supply curve.

TIP Many theories of economic growth focus on the idea that savings can be used to increase the amount of capital in the economy.

programs. Both these policies have been suggested as ways to encourage the supply of labor and economic growth.

Capital is the term economists use to indicate plant and equipment. An expansion of the amount of plant and equipment in the economy would shift the production possibilities frontier outward or the long-run aggregate supply curve to the right. In either case, the result is economic growth. Economists have advocated a variety of policies that would promote spending on plant and equipment. Tax breaks for businesses that expand their capital stock have been tried as a means to spur investment spending. Lower interest rates may also help. What would lower interest rates? Expansionary monetary policy, for one thing. Another idea for lowering interest rates and promoting capital accumulation is policies to stimulate savings. Growth theorists have long realized that increased savings could lower borrowing costs for firms and thereby encourage spending on plant and equipment.

The Determinants of Productivity

- Productivity is output per unit of input.
- Labor productivity is the amount of output per unit of labor.
- Capital productivity is the amount of output per unit of plant and equipment.
- Total productivity is the amount of output per unit of all inputs.
- Labor productivity is the standard type of productivity. If a particular sort of productivity is not mentioned, it is safe to assume the discussion is about labor productivity.

Table 18.1 highlights the fact that labor productivity is important for economic growth. From 1948 until 1973 the United States enjoyed robust growth in labor productivity and living standards, as measured by real GDP per capita, increased accordingly. From 1973 until 1999, the growth rate of labor productivity has slowed and so has economic growth.

What determines the productivity of labor? One of the most important factors is the amount of capital relative to the amount of labor. An increase in the amount of plant and equipment per worker will increase labor productivity.

Also, technology can affect the productivity of labor. The innovations that brought a personal computer to almost every office worker's desk undoubtedly raised productivity.

Another factor affecting productivity is the skill level of work force. Education and training can raise labor productivity. Economists call attempts to improve the quality of the labor force investments in "human capital." Human capital is the skill and knowledge embodied in the labor force. A labor force with high levels of human capital is more productive.

TIP When the word *growth* appears in a question, you should think about the long run and the factors that affect economic long-run growth—resources and technology.

Table 18.1 Labor Productivity and the Standard of Living in the United States

Period	Average Growth Rate of Labor Productivity (%)	Average Growth Rate of Real GDP per Capita (%)
1948-1973	2.9	2.1
1973-1999	1.6	1.4

Source: U.S. Bureau of Labor Statistics; Bureau of Economic Analysis; U.S. Bureau of the Census



SUMMARY

- Economic growth is defined, as the growth of output usually as measured by real GDP or real GDP per capita. In the United States, real GDP per capita has grown about two percent a year since World War II. However, the fruits of economic growth are not shared equally by all Americans. The top 20 percent of families garner 50 percent of all the income earned.
- Economic growth is the result of increased resource availability or increased productivity. Long-run output can increase only if more resources are on hand or those resources are more productive; however, there are a variety of factors that can impact resource availability and productivity. Table 18.2 delineates these factors.
- Finally, economists recognize that economic growth has its price. Economic growth can degrade the environment, cause congestion, and lead to more hectic lifestyles. Still, most people would prefer to live where real GDP per capita is high than where it is low.

Table 18.2 Determinants of Economic Growth

Increased Resource Availability
<ul style="list-style-type: none">■ Discovery of new natural resources■ Growth of the labor force■ Growth of the capital stock
Increased Productivity
<ul style="list-style-type: none">■ More capital per unit of labor■ Technological progress■ Better educated and trained work force



TERMS

Capital plant and equipment

Capital Productivity the amount of output per unit of plant and equipment

Economic Growth growth of output usually measured by the percentage change in real GDP or real GDP per capita

Human Capital the skill and knowledge embodied in the labor force

Labor Productivity the amount of output per unit of labor

Potential GDP the amount that can be produced using resources fully and efficiently

Productivity output per unit of input

Total Productivity the amount of output per unit of all inputs

FORMULAS

Rule of 70 Years it takes a variable to double = $70/\text{the annual growth rate of the variable}$

MULTIPLE-CHOICE REVIEW QUESTIONS

- Economic growth is
 - measured by the number of businesses in the economy.
 - shared equally among the population.
 - critical for raising the standard of living in a nation.
 - measured by the amount of government spending.
 - measured by the unemployment rate.
- The standard of living is measured by
 - GDP.
 - GDP per capita.
 - real GDP per capita.
 - actual GDP per capita.
 - the unemployment rate.
- Which of the following will result in economic growth?
 - A decrease in the unemployment rate
 - An increase in the unemployment rate
 - An increase in the size of the labor force
 - A decrease in the population
 - A change in political leadership
- Which of the following will promote economic growth?
 - Government regulation
 - A new production technique that lowers costs
 - Increased taxes
 - More strict pollution standards for corporations
 - Reduced taxes
- Which of the following will promote economic growth?
 - An increase in the amount of capital
 - Lower wages
 - Price controls that keep prices low
 - Increased government spending
 - A decrease in the money supply
- If real GDP per capita was \$10,000 in 1990 and \$15,000 in 2000, then the total amount of economic growth is
 - 0.5 percent
 - 5.0 percent
 - 50 percent
 - 3.3 percent
 - More information is required to determine the amount of economic growth.
- If real GDP per capita was \$20,000 in 1980 and \$21,000 in 1990, then we conclude that the standard of living has increased
 - 0.5 percent
 - 5.0 percent
 - 50 percent
 - 3.3 percent
 - More information is required to determine the amount of economic growth.
- The standard of living will increase if
 - everyone takes more leisure time.
 - the population grows.
 - GDP increases.
 - real GDP increases.
 - real GDP increases at a greater rate than the population.
- Output in country A is 1,200 units and its population is 100 persons. Output in country B is 2,400 units and its population is 400 persons.
 - Country A has a higher standard of living than country B.
 - Country A has a lower standard of living than country B.
 - Country A and B have identical living standards.
 - Country A is less productive than country B.
 - More information is needed to determine which country has the higher standard of living.

10. Output in country X is 30,000 units and there are 3,000 persons working, while country Z has an output of 40,000 units and 8,000 workers.
- The productivity of labor in country Z is 33 percent higher than in country X.
 - The productivity of labor in country Z is 25 percent higher than in country X.
 - The productivity of labor in country X is 33 percent higher than in country Z.
 - The productivity of labor in country X is 25 percent higher than in country Z.
 - The productivity of labor in country X is twice as much as country Z.
11. The government can promote economic growth by
- setting a minimum wage.
 - regulating industry.
 - taxing firms that waste resources.
 - job training programs.
 - restricting imports.
12. Private industry can promote economic growth by
- implementing innovative production techniques.
 - offering products at artificially low prices.
 - giving a significant amount of profits to charity.
 - hiring workers who are not really needed.
 - adhering to environmental standards.
13. The size of the labor force in Japan is expected to shrink as a large segment of its population retires. This will
- affect labor productivity more than economic growth.
 - affect economic growth more than labor productivity.
 - not have a major effect on economic growth or labor productivity.
 - affect labor productivity and economic growth equally.
 - shift Japan's aggregate supply curve to the right.
14. If the standard of living increases, we can conclude that
- output must have increased.
 - population must have increased.
 - output and population must have increased.
 - population must have decreased.
 - output must have increased proportionally more than population.
15. If real GDP per capita grows at a rate of 10 percent a year, then we can expect the standard of living to double in
- 10 years.
 - 9 years.
 - 8 years.
 - 7 years.
 - 5 years.

FREE-RESPONSE REVIEW QUESTIONS

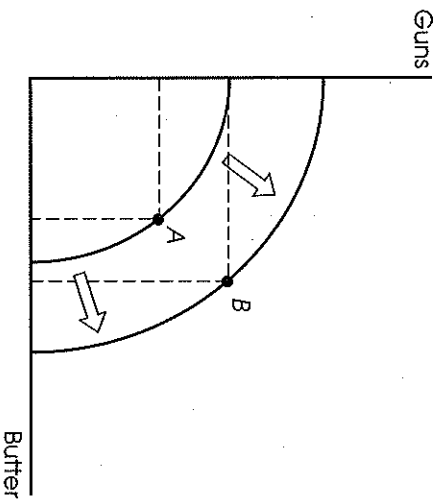
1. Use the production possibilities frontier to illustrate the effects of a very successful government policy to train the labor force so that workers became more productive. Be sure to label the axes of your diagram.
2. (a) Use the AS/AD model to show the long-run effects of a decrease in the availability of timber due to a depletion of the supply of trees. Be sure to use a long-run aggregate supply curve and label the axes of your diagram.
(b) Now suppose the government reduced taxes while the supply of timber was depleted. What effect would this have?

Multiple-Choice Review Answers

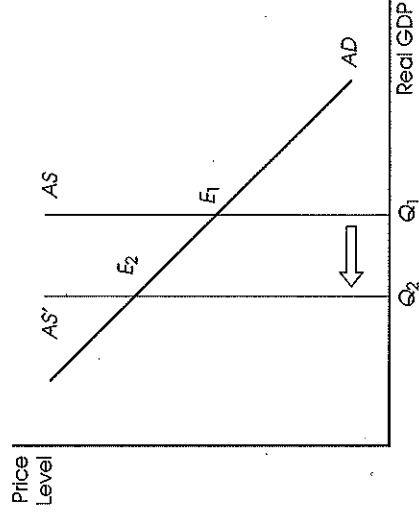
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|--------|--------|---------|---------|
| 1. (C) | 5. (A) | 9. (A) | 13. (B) |
| 2. (C) | 6. (C) | 10. (E) | 14. (E) |
| 3. (C) | 7. (B) | 11. (D) | 15. (D) |
| 4. (B) | 8. (E) | 12. (A) | |

Free-Response Review Answers

1. The effects of a more productive labor force due to training.



2. (a) A decrease in the supply of timber shifts the aggregate supply curve to the left. This will raise the equilibrium price level and lower the equilibrium quantity of output.



- (b) If the government reduced taxes while the supply of timber was depleted, this would shift the aggregate demand curve to the right. The equilibrium quantity of output would still fall to Q_2 , but the equilibrium price level would be higher than if the government did not reduce taxes.

