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CHAPTER 8

Economic Growth

Learning Objectives

- LO8.1** List two ways that economic growth is measured.
- LO8.2** Define “modern economic growth” and explain the institutional structures needed for an economy to experience it.
- LO8.3** Identify the general supply, demand, and efficiency forces that give rise to economic growth.
- LO8.4** Describe “growth accounting” and the specific factors accounting for economic growth in the United States.
- LO8.5** Explain why the trend rate of U.S. productivity growth has increased since the earlier 1973–1995 period.
- LO8.6**

Discuss differing perspectives as to whether growth is desirable and sustainable.

People living in rich countries tend to take economic growth and rising standards of living for granted. Recessions—periods during which output declines—are normally infrequent and temporary, usually lasting less than a year. Once they pass, modern capitalistic economies return to growing, and living standards continue their seemingly inexorable rise.

But a look back at history or a look around the world today quickly dispels any confidence that economic growth and rising standards of living are automatic or routine. Historically, continually rising living standards are a recent phenomenon, seen only during the last century or two. Before that time, living standards barely rose—if at all—from one generation to the next. And a look around the world today reveals huge differences in standards of living resulting from the disturbing fact that, although some countries have enjoyed decades or even centuries of steadily rising per capita income

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levels, other countries have experienced hardly any economic growth at all. Page 173

This chapter investigates the causes of economic growth, what institutional structures appear to promote economic growth, and the controversies surrounding the benefits and costs of economic growth. As you will see, economic growth has been perhaps the most revolutionary and powerful force in history. Consequently, no study of economics is complete without a thorough understanding of the causes and consequences of economic growth.

Economic Growth

LO8.1 List two ways that economic growth is measured.

Economists define and measure **economic growth** as either:

- An increase in real GDP occurring over some time period.
- An increase in real GDP per capita occurring over some time period.

With either definition, economic growth is calculated as a percentage rate of growth per quarter (3-month period) or per year. For the first definition, for example, real GDP in the United States was \$15,052.4 billion in 2011 and \$15,470.0 in 2012. So the U.S. economic growth rate for 2012 was 2.8 percent $\{= [(15,470.0 \text{ billion} - 15,052.4 \text{ billion}) / 15,052.4 \text{ billion}] \times 100\}$. Growth rates normally are positive, but not always. In recession year 2009, for instance, the U.S. rate of economic growth was a *minus* 2.4 percent.

The second definition of economic growth in the bulleted list takes into consideration the size of the population. **Real GDP per capita** (or per capita output) is the amount of real output per person in a country. It is calculated, as follows.

$$\text{Real GDP per capita} = \frac{\text{Real GDP}}{\text{Population}}$$

For example, in 2011 the real GDP in the United States was \$15,052.4 billion and population was 311.6 million. Therefore, real GDP per capita in that year was \$48,307. In 2012 real GDP per capita increased to \$49,283. So the growth rate of real GDP per capita in 2012 was 2.0 percent $\{= [(\$49,283 - \$48,307) / \$48,307] \times 100\}$. In contrast, real GDP per capita fell by 3.3 percent in recession year 2009.

For measuring expansion of military potential or political preeminence, the growth of real GDP is more useful. Unless specified otherwise, growth rates reported in the news and by international agencies use this definition of economic growth. For comparing living standards, however, the second definition is superior. While China's GDP in 2012 was \$12,380 billion compared with Denmark's \$332 billion, Denmark's real GDP per capita was \$37,700 compared with China's hugely lower \$9,100. And in some cases growth of real GDP can be misleading. The African nation of

Eritrea had real GDP growth of 1.3 percent per year from 2000–2008. But over the same period its annual growth of population was 3.8 percent, resulting in a decline in real GDP per capita of roughly 2.5 percent per year.

Growth as a Goal

Growth is a widely held economic goal. The expansion of total output relative to population results in rising real wages and incomes and thus higher standards of living. An economy that is experiencing economic growth is better able to meet people's wants and resolve socioeconomic problems. Rising real wages and income provide richer opportunities to individuals and families—a vacation trip, a personal computer, a higher education—without sacrificing other opportunities and pleasures. A growing economy can undertake new programs to alleviate poverty, embrace diversity, cultivate the arts, and protect the environment without impairing existing levels of consumption, investment, and public goods production.

In short, *growth lessens the burden of scarcity*. A growing economy, unlike a static economy, can consume more today while increasing its capacity to produce more in the future. By easing the burden of scarcity—by relaxing society's constraints on production—economic growth enables a nation to attain its economic goals more readily and to undertake new endeavors that require the use of goods and services to be accomplished.

Arithmetic of Growth

Why do economists pay so much attention to small changes in the rate of economic growth? Because those changes really matter! For the United States, with a current nominal GDP of about \$16.2 trillion, the difference between a 3 percent

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Page 174

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and a 4 percent rate of growth is about \$162 billion of output each year. For a poor country, a difference of one-half of a percentage point in the rate of growth may mean the difference between starvation and mere hunger.

Page 174

The mathematical approximation called the **rule of 70** provides a quantitative grasp of the effect of economic growth. The rule of 70 tells us that we can find the number of years it will take for some measure to double, given its annual percentage increase, by dividing that percentage increase into the number 70. So

$$\text{Approximate number of years required to double real GDP} = \frac{70}{\text{annual percentage rate of growth}}$$



Examples: A 3 percent annual rate of growth will double real GDP in about 23 ($= 70 \div 3$) years. Growth of 8 percent per year will double real GDP in about 9 ($= 70 \div 8$) years. The rule of 70 is applicable generally. For example, it works for estimating how long it will take the price level or a savings account to double at various percentage rates of inflation or interest. When compounded over many years, an apparently small difference in the rate of growth thus becomes highly significant. Suppose China and Italy start with identical GDPs, but then China grows at an 8 percent yearly rate, while Italy grows at 2 percent. China's GDP would double in about 9 years, while Italy's GDP would double in 35 years.

Growth in the United States

Table 8.1 gives an overview of economic growth in the United States since 1950. Column 2 reveals strong growth as measured by increases in real GDP. Note that between 1950 and 2012 real GDP increased more than sevenfold. But the U.S. population also increased. Nevertheless, in column 4 we find that real GDP per capita rose more than threefold over these years.

What has been the *rate* of U.S. growth? Real GDP grew at an annual rate of about 3.2 percent between 1950 and 2012. Real GDP per capita increased at roughly 2 percent per year over that time. But we must qualify these raw numbers in several ways:

- **Improved products and services** Since the numbers in Table 8.1 do not fully account for improvements in products and services, they understate the growth of economic well-being. Such purely quantitative data do not fully compare an era of vacuum tube computers and low-efficiency V8 hot rods with an era of digital cell phone networks and fuel-sipping, hybrid-drive vehicles.

TABLE 8.1 Real GDP and Real GDP per Capita, Selected Years, 1950–2012

| (1) Year | (2) Real GDP, Billions of 2009 \$ | (3) Population, Millions | (4) Real GDP Per Capita, 2009 \$ (2) ÷ (3) |
|-------------|--|--------------------------------|--|
| 1950 | \$ 2,182 | 152 | \$14,355 |
| 1960 | 3,106 | 181 | 17,160 |
| 1970 | 4,718 | 205 | 23,015 |
| 1980 | 6,443 | 228 | 28,259 |
| 1990 | 8,945 | 250 | 35,780 |
| 2000 | 12,565 | 282 | 44,557 |
| 2012 | 15,471 | 313 | 49,428 |

Source: Data are from the Bureau of Economic Analysis, www.bea.gov, and the U.S. Census Bureau, www.census.gov. All data are subject to government revision.

- **Added leisure** The increases in real GDP and per capita GDP identified in Table 8.1 were accomplished despite increases in leisure. The average workweek, once 50 hours, is now about 35 hours (excluding overtime hours). Again the raw growth numbers understate the gain in economic well-being.
- **Other impacts** These measures of growth do not account for any effects growth may have had on the environment and the quality of life. If growth debases the physical environment, excessively warms the planet, and creates a stressful work environment, the bare growth numbers will overstate the gains in well-being that result from growth. On the other hand, if growth leads to stronger environmental protections or a more secure and stress-free lifestyle, these numbers will understate the gains in well-being.

In Chapter 6, we made two other key points about U.S. growth rates. First, they are not constant or smooth over time. Like those of other countries, U.S. growth rates vary quarterly and annually depending on a variety of factors such as the introduction of major new inventions and the economy's current position in the business cycle. Second, many countries share the U.S. experience of positive and ongoing economic growth. But sustained growth is both a historically new occurrence and also one that is not shared equally by all countries.

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Page 175

QUICK REVIEW 8.1

- Economists measure economic growth as either (a) an increase in real GDP over time or (b) an increase in real GDP per capita over time.
- Real GDP in the United States has grown at an average annual rate of about 3.2 percent since 1950; real GDP per capita has grown at roughly a 2 percent annual rate over that same period.

Modern Economic Growth

LO8.2 Define "modern economic growth" and explain the institutional structures needed for an economy to experience it.

We now live in an era of wireless high-speed Internet connections, genetic engineering, and space exploration. New inventions and new technologies drive continual economic growth and ongoing increases in living standards. But it wasn't always like this. Economic growth and sustained increases in living standards are a historically recent phenomenon that started with the Industrial Revolution of the late 1700s. Before the Industrial Revolution, living standards were basically flat over long periods of time so that, for instance, Greek peasants living in the year 300 B.C. had about the same material standard of living as Greek peasants living in the year A.D. 1500. By contrast, our current era of **modern economic growth** is characterized by sustained and ongoing increases in living standards that can cause dramatic increases in the standard of living within less than a single human lifetime.

Economic historians informally date the start of the Industrial Revolution to the year 1776, when the Scottish inventor James Watt perfected a powerful and efficient steam engine. This steam engine inaugurated the modern era since the device could be used to drive industrial factory equipment, steamships, and steam locomotives.

The new industrial factories mass-produced goods for the first time. This meant that nearly all manufacturing shifted from items produced by hand by local craftsmen to items mass-produced in distant factories. The new steamships and steam locomotives meant that resources could easily flow to factories and that the products of factories could be shipped to distant consumers at low cost. The result was a huge increase in long-distance trade and a major population shift as people left farms to go work in the towns and cities where the new industrial factories were concentrated.

Steam power would later be largely replaced by electric power, and many more inventions would follow the steam engine that started the Industrial Revolution. These included railroads, motorized vehicles, telephones, airplanes, container ships, computers, the Internet, and many more. But the key point is that the last 200 or so years of history have been fundamentally different from anything that went before.

The biggest change has been change itself. Whereas in earlier times material standards of living and the goods and services that people produced and consumed changed very little even over the course of an entire human life span, today people living in countries experiencing modern economic growth are constantly exposed to new technologies, new products, and new services.

What is more, modern economic growth has vastly affected cultural, social, and political arrangements.

- Culturally, the vast increases in wealth and living standards have allowed ordinary people for the first time in history to have significant time for leisure activities and the arts.
- Socially, countries experiencing modern economic growth have abolished feudalism, instituted universal public education, and largely eliminated ancient social norms and legal restrictions against women and minorities doing certain jobs or holding certain positions.
- Politically, countries experiencing modern economic growth have tended to move toward democracy, a form of government that was extremely rare before the start of the Industrial Revolution.

In addition, the average human lifespan has more than doubled, from an average of less than 30 years before modern economic growth began in the late 1700s to a worldwide average of over 67 years today. Thus, for the first time in world history, the average person can expect to live into old age. These and other changes speak to the truly revolutionary power of economic growth and naturally lead economists to consider the causes of economic growth and what policies could be pursued to sustain and promote it. Their desire is intensified by the reality that economic growth is distributed so unevenly around the world.

The Uneven Distribution of Growth

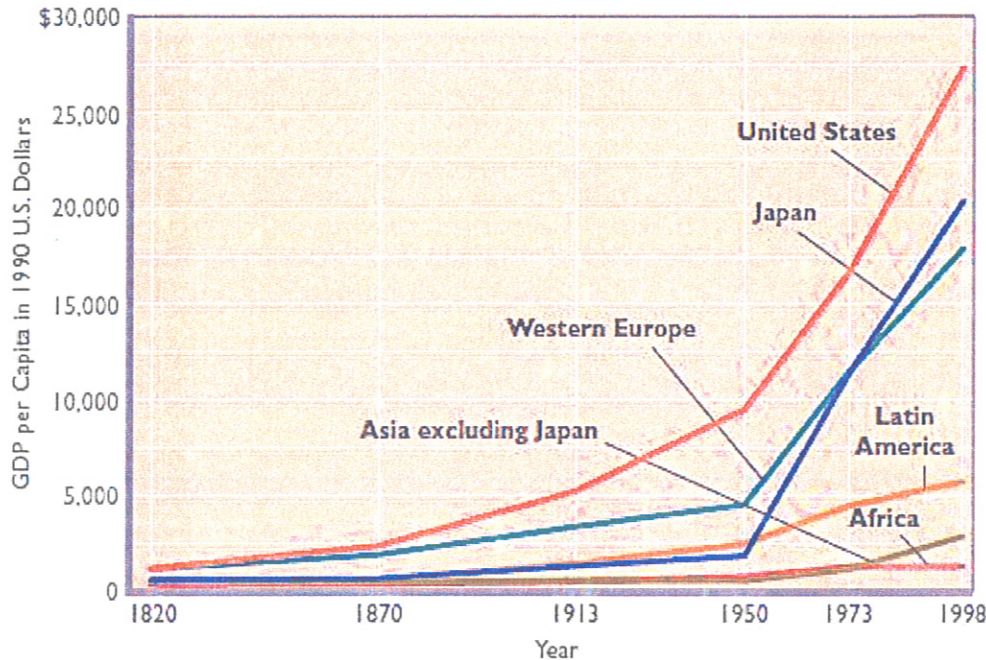
Modern economic growth has spread only slowly from its British birthplace. It first advanced to France, Germany, and other parts of western Europe in the early 1800s before spreading to the United States, Canada, and Australia by the mid 1800s. Japan began to industrialize in the 1870s, but the rest of Asia did not follow until the early to mid 1900s, at which time large parts of Central and South America as well as the Middle East also began to experience modern economic growth. Most recent has been Africa, which for the most part did not experience modern economic growth until the last few decades. Notably, some parts of the world have yet to experience modern economic growth at all.

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Page 176

FIGURE 8.1 The great divergence in standards of living. Income levels around the world were very similar in 1820. But they are now very different because certain areas, including the United States and western Europe, began experiencing modern economic growth much earlier than other areas.



Source: Angus Maddison, *The World Economy: A Millennial Perspective* (Paris: OECD, 2001), p. 264.

The different starting dates for modern economic growth in various parts of the world are the main cause of the vast differences in per capita GDP levels seen today. The current huge gaps between rich countries like the United States and Japan and poor countries like North Korea and Burundi were shown previously in Global Perspective 6.1. But the huge divergence in living standards caused by the fact that different countries started modern economic growth at different times is best seen in Figure 8.1, which shows how GDP per capita has evolved since 1820 in the United States, western Europe, Latin America, Asia, and Africa.

To make the comparison of living standards easier, income levels in all places and at all times have been converted into 1990 U.S. dollars. Using this convention, it is clear that in 1820 per capita incomes in all areas were quite similar, with the richest area in the world in 1820, western Europe, having an average per capita income of \$1,232, while the poorest area of the world at that time, Africa, had an average per capita income of \$418. Thus, in 1820, average incomes in the richest area were only about three times larger than those in the poorest area.

But because western Europe and the United States started experiencing modern economic growth earlier than other areas, they have now ended up vastly richer than other areas, despite the fact that per capita incomes in nearly all places have increased at least a bit. For instance, per capita GDP in the United States in 1998 was \$27,331 while it was only \$1,368 in Africa. Thus, because modern economic growth has occurred for nearly two centuries in the United States compared to a few decades in Africa, average living standards in the United States in 1998 were nearly 20 times higher than those in Africa.

Catching Up Is Possible

Do not get the wrong impression looking at Figure 8.1. Countries that began modern economic growth more recently are *not* doomed to be permanently poorer than the countries that began modern economic growth at an earlier date. This is true because people can adopt technology more quickly than they can invent it. Broadly speaking, the richest countries today have achieved that status because they have the most advanced technology. But because they already have the most advanced technology, they must invent new technology to get even richer. Because inventing and implementing new technology is slow and costly, real GDP per capita in the richest **leader countries** typically grows by an average annual rate of just 2 or 3 percent per year.

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Page 177

By contrast, poorer **follower countries** can grow much faster because they can simply adopt existing technologies from rich leader countries. For instance, in many places in Africa today, the first telephones most people have ever been able to use are cell phones. That is, these countries have not even bothered to install the copper wires necessary for land-line telephones, which are basically a nineteenth-century technology. Instead, they have gone directly for Internet-capable mobile phone networks, a twenty-first-century technology. By doing so, they skip past many stages of technology and development that the United States and other currently rich countries had to pass through. In effect, they jump directly to the most modern, most highly productive technology. The result is that, under the right circumstances, it is possible for poorer countries to experience extremely rapid increases in living standards. This can continue until they have caught up with the leader countries and become leader countries themselves. Once that happens, their growth rates fall down to the 2 or 3 percent rate typical of leader countries. This happens because once they are also rich and using the latest technology, their growth rates are limited by the rate at which new technology can be invented and applied.

Table 8.2 shows both how the growth rates of leader countries are constrained by the rate of technological progress as well as how certain follower countries have been able to catch up by adopting more advanced technologies and growing rapidly. Table 8.2 shows real GDP per capita in 1960 and 2010 as well as the average annual growth rate of real GDP per capita between 1960 and 2010 for three countries—the United States, the United Kingdom, and France—that were already rich leader countries in 1960 as well as for five other nations that were relatively poor follower countries at that time. To make comparisons easy, the GDPs and GDPs per capita for all countries are expressed in terms of 2005 U.S. dollars. The countries are ordered by their respective GDPs per capita in 1960, so that the richest country in the world at the time, the United States, is listed first while the poorest of the eight selected countries at the time, South Korea, is listed last.

TABLE 8.2 Real GDP per Capita in 1960 and 2010 Plus Average Annual Growth Rates of Real GDP per Capita from 1960–2010 for Selected Countries. (Figures are in 2005 dollars.)

| Country | Real GDP per Capita, 1960 | Real GDP per Capita, 2010 | Average Annual Growth Rate, 1960–2010 |
|----------------|---------------------------|---------------------------|---------------------------------------|
| United States | \$14,766 | \$41,365 | 2.1 |
| United Kingdom | 11,257 | 34,268 | 2.2 |
| France | 9,347 | 31,299 | 2.4 |
| Ireland | 6,666 | 34,877 | 3.3 |
| Japan | 5,472 | 31,477 | 3.5 |
| Singapore | 4,149 | 55,862 | 5.2 |
| Hong Kong | 3,849 | 38,865 | 4.6 |
| South Korea | 1,765 | 26,609 | 5.4 |

Note: GDP figures for all countries are measured in "international dollars" of equal value to U.S. dollars in 2005.

Source: Penn World Table version 6.3, pwt.econ.upenn.edu. Used by permission of the Center for International Comparisons at the University of Pennsylvania.

First, notice that the average annual growth rates of the three leader countries—the United States, the United Kingdom, and France—have all been between 2.1 and 2.5 percent per year because their growth rates are limited by the rate at which new technologies can be invented and applied. By contrast, the five countries that were follower countries in 1960 have been able to grow much faster, between 3.3 percent per year and 5.4 percent per year. This has had remarkable effects on their standards of living relative to the leader countries. For instance, Ireland's GDP per capita was only 60 percent that of its neighbor, the United Kingdom, in 1960. But because Ireland grew at a 3.3 percent rate for the next 50 years while the United Kingdom grew at only a 2.2 percent rate over that time period, by 2010 Ireland's GDP per capita was actually higher than the United Kingdom's GDP per capita. Ireland had become a leader country, too.

CONSIDER THIS ...

Economic Growth Rates Matter!



When compounded over many decades, small absolute differences in rates of economic growth add up to substantial differences in real GDP and standards of living. Consider three hypothetical countries—Slogo, Sumgo, and Speedo. Suppose that in 2014 these countries have identical levels of real GDP (\$6 trillion), population (200 million), and real GDP per capita (\$30,000). Also, assume that annual real GDP growth is 2 percent in Slogo, 3 percent in Sumgo, and 4 percent in Speedo.

How will these alternative growth rates affect real GDP and real GDP per capita over a long period, say, a 70-year life-span? By 2084 the 2, 3, and 4 percent growth rates would boost real GDP from \$6 trillion to:

- \$24 trillion in Slogo.
- \$47 trillion in Sumgo.
- \$93 trillion in Speedo.

For illustration, let's assume that each country experienced an average annual population growth of 1 percent over the 70 years. Then, in 2084 real GDP per capita would be about:

- \$60,000 in Slogo.
- \$118,000 in Sumgo.
- \$233,000 in Speedo.

Even small differences in growth rates matter!

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Page 178

The growth experiences of the other four nations that were poor in 1960 have been even more dramatic. Hong Kong, for instance, moved from a GDP per capita that was less than one-third of that enjoyed by the United Kingdom in 1960 to a GDP per capita 13 percent higher than that of the United Kingdom in 2010. The Consider This box on the previous page emphasizes both how quickly small differences in growth rates can change the level of real GDP per capita and how countries stand in relation to each other in terms of real GDP per capita.

Finally, you may be puzzled as to why the GDP per capita of the United States in 2011 in Table 8.2 is so much higher than that of other rich leader countries. Why, for instance, is U.S. GDP per capita 32 percent higher than French GDP per capita? One important reason is that U.S. citizens put in substantially more labor time than do the citizens of most other leader countries. First, a much larger fraction of the U.S. population is employed than in other rich leader countries. Second, U.S. employees work many more hours per year than do employees in other rich leader countries. For example, 58 percent of the working-age population of the United States was employed in 2010 compared to 51 percent in France. That's a difference of about 14 percent. And American employees worked an average of 1,778 total hours during 2010, compared to an average of 1,478 total hours for French workers. That's a difference of about 20 percent. Added together, these two differences between U.S. and French labor supply imply about a 34 percent difference in the total number of hours worked in the French and American economies. Thus, differences in labor supply help explain differences between rich leader countries in terms of their differing levels of GDP per person.

Buy why do Americans supply so much more labor than workers in France and some of the other rich leader countries? Explanations put forth by economists include cultural differences regarding the proper balance between work and leisure, stronger unions in France and other rich leader countries, and more generous unemployment and welfare programs in France and other rich leader countries. France and other rich leader countries also tend to have higher tax rates than the United States—something that may significantly discourage employment. And, finally, the legal workweek is shorter in some countries than it is in the United States.

QUICK REVIEW 8.2

- Before the advent of modern economic growth starting in England in the late 1700s, living standards showed no sustained increases over time.
- Large differences in standards of living exist today because certain areas like the United States have experienced nearly 200 years of modern economic growth while other areas have had only a few decades of economic growth.
- Poor follower countries can catch up with and even surpass the living standards of rich leader countries by adopting the cutting-edge technologies and institutions already developed by rich leader countries.
- Substantial differences in GDP per capita among technologically advanced leader countries are

often caused by differences in the amount of labor supplied.

Institutional Structures That Promote Modern Economic Growth

Table 8.2 demonstrates that poor follower countries can catch up and become rich leader countries by growing rapidly. But how does a country start that process and enter into modern economic growth? And once it has started modern economic growth, how does it keep the process going?

Economic historians have identified several institutional structures that promote and sustain modern economic growth. Some structures increase the savings and investment that are needed to fund the construction and maintenance of the huge amounts of infrastructure required to run modern economies. Other institutional structures promote the development of new technologies. And still others act to ensure that resources flow efficiently to their most productive uses. These growth-promoting institutional structures include:

- ***Strong property rights*** These appear to be absolutely necessary for rapid and sustained economic growth. People will not invest if they believe that thieves, bandits, or a rapacious and tyrannical government will steal their investments or their expected returns.
- ***Patents and copyrights*** Before patents and copyrights were first issued and enforced, inventors and authors usually saw their ideas stolen before they could profit from them. By giving inventors and authors the exclusive right to market and sell their creations, patents and copyrights give a strong financial incentive to invent and create.
- ***Efficient financial institutions*** These are needed to channel the savings generated by households toward the businesses, entrepreneurs, and inventors that do

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most of society's investing and inventing. Banks as well as stock and bond markets appear to be institutions crucial to modern economic growth.

Page 179

- **Literacy and widespread education** Without highly educated inventors, new technologies do not get developed. And without a highly educated workforce, it is impossible to implement those technologies and put them to productive use.
- **Free trade** Free trade promotes economic growth by allowing countries to specialize so that different types of output can be produced in the countries where they can be made at the lowest opportunity cost. In addition, free trade promotes the rapid spread of new ideas so that innovations made in one country quickly spread to other countries.
- **A competitive market system** Under a market system, prices and profits serve as the signals that tell firms what to make and how much of it to make. Rich leader countries vary substantially in terms of how much government regulation they impose on markets, but in all cases, firms have substantial autonomy to follow market signals in deciding on current production and in making investments to produce what they believe consumers will demand in the future.

Several other difficult-to-measure factors also influence a nation's capacity for economic growth. The overall social-cultural-political environment of the United States, for example, has encouraged economic growth. Beyond the market system that has prevailed in the United States, the United States also has had a stable political system characterized by democratic principles, internal order, the right of property ownership, the legal status of enterprise, and the enforcement of contracts. Economic freedom and political freedom have been “growth-friendly.”

In addition, and unlike some nations, there are virtually no social or moral taboos on production and material progress in the United States. The nation's social philosophy has embraced wealth creation as an attainable and desirable goal and the inventor, the innovator, and the businessperson are accorded high degrees of prestige and respect in American society. Finally, Americans have a positive attitude toward work and risk taking, resulting in an ample supply of willing workers and innovative entrepreneurs. A flow of energetic immigrants has greatly augmented that supply.

The nearby Consider This box deals with how fast-growing follower countries such as India sometimes alter their growth-related institutional structures as they grow richer. Web Chapter 21 looks at the special problems of economic growth in developing nations.

CONSIDER THIS ...

Patents and Innovation



It costs U.S. and European drug companies about \$1 billion to research, patent, and safety-test a new drug because literally thousands of candidate drugs fail for each drug that succeeds. The only way to cover these costs is by relying on patent protections that give a drug's developer the exclusive monopoly right to market and sell the new drug for 20 years following the patent application. The revenues over that time period will hopefully be enough to cover the drug's development costs and—if the drug is popular—generate a profit for the drug company.

Leader and follower countries have gotten into heated disputes over patented drugs, however, because the follower countries have often refused to recognize the patents granted to pharmaceutical companies in rich countries. India, for instance, has allowed local drug companies to copy and sell drugs that were developed by U.S. companies and are still under patent protection in the United States.

That policy benefits Indian consumers because competition among the local drug companies drives down the price to below the monopoly price that would be charged by the patent owner. But the weak patent protections in India have a side effect. They make it completely unprofitable for local drug producers to try to develop innovative new drugs. Local rivals would simply copy the new drugs and sell them at very low prices. So India has recently moved to strengthen its patent protections to try to provide financial incentives to transform its local drug companies from copycats into innovators. But note that the innovative new drugs that may result from the increased patent protections are not without a cost. As patent protections in India are improved, inexpensive local drugs copied from the leader countries will no longer be available to Indian consumers.

Determinants of Growth

LO8.3 Identify the general supply, demand, and efficiency. Price, quantity, and economic growth.

Our discussion of modern economic growth and the institutional structures that promote it has purposely been general. We now want to focus our discussion on six factors that directly affect the *rate* and quality of economic growth. These determinants of economic growth can be grouped into four supply factors, one demand factor, and one efficiency factor.

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Page 179

- **Literacy and widespread education** Without highly educated inventors, new technologies do not get developed. And without a highly educated workforce, it is impossible to implement those technologies and put them to productive use.
- **Free trade** Free trade promotes economic growth by allowing countries to specialize so that different types of output can be produced in the countries where they can be made at the lowest opportunity cost. In addition, free trade promotes the rapid spread of new ideas so that innovations made in one country quickly spread to other countries.
- **A competitive market system** Under a market system, prices and profits serve as the signals that tell firms what to make and how much of it to make. Rich leader countries vary substantially in terms of how much government regulation they impose on markets, but in all cases, firms have substantial autonomy to follow market signals in deciding on current production and in making investments to produce what they believe consumers will demand in the future.

Several other difficult-to-measure factors also influence a nation's capacity for economic growth. The overall social-cultural-political environment of the United States, for example, has encouraged economic growth. Beyond the market system that has prevailed in the United States, the United States also has had a stable political system characterized by democratic principles, internal order, the right of property ownership, the legal status of enterprise, and the enforcement of contracts. Economic freedom and political freedom have been “growth-friendly.”

In addition, and unlike some nations, there are virtually no social or moral taboos on production and material progress in the United States. The nation's social philosophy has embraced wealth creation as an attainable and desirable goal and the inventor, the innovator, and the businessperson are accorded high degrees of prestige and respect in American society. Finally, Americans have a positive attitude toward work and risk taking, resulting in an ample supply of willing workers and innovative entrepreneurs. A flow of energetic immigrants has greatly augmented that supply.

The nearby Consider This box deals with how fast-growing follower countries such as India sometimes alter their growth-related institutional structures as they grow richer. Web Chapter 21 looks at the special problems of economic growth in developing nations.

CONSIDER THIS ...

Patents and Innovation



It costs U.S. and European drug companies about \$1 billion to research, patent, and safety-test a new drug because literally thousands of candidate drugs fail for each drug that succeeds. The only way to cover these costs is by relying on patent protections that give a drug's developer the exclusive monopoly right to market and sell the new drug for 20 years following the patent application. The revenues over that time period will hopefully be enough to cover the drug's development costs and—if the drug is popular—generate a profit for the drug company.

Leader and follower countries have gotten into heated disputes over patented drugs, however, because the follower countries have often refused to recognize the patents granted to pharmaceutical companies in rich countries. India, for instance, has allowed local drug companies to copy and sell drugs that were developed by U.S. companies and are still under patent protection in the United States.

That policy benefits Indian consumers because competition among the local drug companies drives down the price to below the monopoly price that would be charged by the patent owner. But the weak patent protections in India have a side effect. They make it completely unprofitable for local drug producers to try to develop innovative new drugs. Local rivals would simply copy the new drugs and sell them at very low prices. So India has recently moved to strengthen its patent protections to try to provide financial incentives to transform its local drug companies from copycats into innovators. But note that the innovative new drugs that may result from the increased patent protections are not without a cost. As patent protections in India are improved, inexpensive local drugs copied from the leader countries will no longer be available to Indian consumers.

Determinants of Growth

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Page 180

Supply Factors

The first four determinants of economic growth relate to the physical ability of the economy to expand. They are:

- Increases in the quantity and quality of natural resources.
- Increases in the quantity and quality of human resources.
- Increases in the supply (or stock) of capital goods.
- Improvements in technology.

Any increases or improvements in these **supply factors** will increase the *potential* size of an economy's GDP. The remaining two factors are necessary for that potential to be fulfilled not just in terms of the overall quantity of output but also in terms of the quality of that output and whether it is properly directed toward producing the items most highly valued by society.

Demand Factor

The fifth determinant of economic growth is the **demand factor**:

- To actually achieve the higher production potential created when the supply factors increase or improve, households, businesses, and the government must also expand their purchases of goods and services so as to provide a market for all the new output that can potentially be produced.

If that occurs, there will be no unplanned increases in inventories and resources will remain fully employed. The demand factor acknowledges that economic growth requires that increases in total spending must occur if we are to actually realize the output gains made available by increased production capacity.

Efficiency Factor

The sixth determinant of economic growth is the **efficiency factor**:

- To reach its full production potential, an economy must achieve economic efficiency as well as full employment.

The economy must use its resources in the least costly way (productive efficiency) to produce the specific mix of goods and services that maximizes people's well-being (allocative efficiency). The ability to expand production, together with the full use of available resources, is not sufficient for achieving maximum possible growth. Also required is the efficient use of those resources.

ORIGIN OF THE IDEA

O8.1

Growth theory



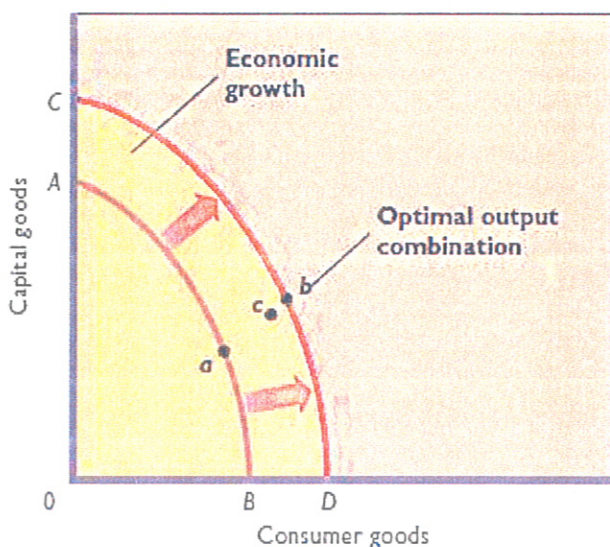
The supply, demand, and efficiency factors in economic growth are related. Unemployment caused by insufficient total spending (the demand factor) may lower the rate of new capital accumulation (a supply factor) and delay expenditures on research (also a supply factor). Conversely, low spending on investment (a supply factor) may cause insufficient spending (the demand factor) and unemployment. Widespread inefficiency in the use of resources (the efficiency factor) may translate into higher costs of goods and services and thus lower profits, which in turn may slow innovation and reduce the accumulation of capital (supply factors). Economic growth is a dynamic process in which the supply, demand, and efficiency factors all interact.

Production Possibilities Analysis

To put the six factors affecting the rate of economic growth into better perspective, let's use the production possibilities analysis introduced in Chapter 1.

Growth and Production Possibilities Recall that a curve like AB in Figure 8.2 is a production possibilities curve. It indicates the various *maximum* combinations of products an economy can produce with its fixed quantity and quality of natural, human, and capital resources and its stock of technological knowledge. An improvement in any of the supply factors will push the production possibilities curve outward, as from AB to CD .

FIGURE 8.2 Economic growth and the production possibilities curve. Economic growth is made possible by the four supply factors that shift the production possibilities curve outward, as from AB to CD . Economic growth is realized when the demand factor and the efficiency factor move the economy from points such as a and c that are inside CD to the optimal output point, which is assumed to be point b in this figure.



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SUMMARY

LO8.1 List two ways that economic growth is measured.

A nation's economic growth can be measured either as an increase in real GDP over time or as an increase in real GDP per capita over time. Real GDP in the United States has grown at an average annual rate of about 3.2 percent since 1950; real GDP per capita has grown at roughly a 2 percent annual rate over that same period.

LO8.2 Define “modern economic growth” and explain the institutional structures needed for an economy to experience it.

Sustained increases in real GDP per capita did not happen until the past two centuries, when England and then other countries began to experience modern economic growth, which is characterized by institutional structures that encourage savings, investment, and the development of new technologies. Institutional structures that promote growth include strong property rights, patents, efficient financial institutions, education, and a competitive market system.

Because some nations have experienced nearly two centuries of modern economic growth while others have only recently begun to experience modern economic growth, some countries today are much richer than other countries.

It is possible, however, for countries that are currently poor to grow faster than countries that are currently rich because the growth of real GDP per capita for rich countries is limited to about 2 percent per year. To continue growing, rich countries must invent and apply new technologies. By contrast, poor countries can grow much faster because they can simply adopt the institutions and cutting-edge technologies already developed by the rich countries.

LO8.3 Identify the general supply, demand, and efficiency forces that give rise to economic growth.

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Page 192

The determinants of economic growth to which we can attribute changes in growth rates include four supply factors (changes in the quantity and quality of natural resources, changes in the quantity and quality of human resources, changes in the stock of capital goods, and improvements in technology); one demand factor (changes in total spending); and one efficiency factor (changes in how well an economy achieves allocative and productive efficiency).

The growth of a nation's capacity to produce output can be illustrated graphically by an outward shift of its production possibilities curve.

LO8.4 Describe “growth accounting” and the specific factors accounting for economic growth in the United States.

Growth accounting attributes increases in real GDP either to increases in the amount of labor being employed or to increases in the productivity of the labor being employed. Increases in U.S. real GDP are mostly the result of increases in labor productivity. The increases in labor productivity can be attributed to technological progress, increases in the quantity of capital per worker, improvements in the education and training of workers, the exploitation of economies of scale, and improvements in the allocation of labor across different industries.

LO8.5 Explain why the trend rate of U.S. productivity growth has increased since the earlier 1973–1995 period.

Over long time periods, the growth of labor productivity underlies an economy's growth of real wages and its standard of living. U.S. productivity rose by 2.4 percent annually between 1995 and 2012, compared to 1.5 percent annually between 1973 and 1995.

This post-1995 increase in the average rate of productivity growth is based on (a) rapid technological change in the form of the microchip and information technology, (b) increasing returns and lower per-unit costs, and (c) heightened global competition that holds down prices.

The main sources of increasing returns in recent years are (a) the use of more specialized inputs as firms grow, (b) the spreading of development costs, (c) simultaneous consumption by consumers, (d) network effects, and (e) learning by doing. Increasing returns mean higher productivity and lower per-unit production costs.

LO8.6 Discuss differing perspectives as to whether growth is desirable and sustainable.

Skeptics wonder if the recent rise in the average rate of productivity growth is permanent, and suggest a wait-and-see approach. They point out that surges in productivity and real GDP growth have previously occurred but do not necessarily represent long-lived trends.

Critics of rapid growth say that it adds to environmental degradation, increases human stress, and exhausts the earth's finite supply of natural resources. Defenders of rapid growth say that it is the primary path to the rising living standards nearly universally desired by people, that it need not debase the environment, and that there are no indications that we are running out of resources. Growth is based on the expansion and application of human knowledge, which is limited only by human imagination.

TERMS AND CONCEPTS

economic growth

real GDP per capita

rule of 70

modern economic growth
leader countries
follower countries
supply factors
demand factor
efficiency factor
labor productivity
labor-force participation rate
growth accounting
infrastructure
human capital
economies of scale
information technology
start-up firms
increasing returns
network effects
learning by doing

The following and additional problems can be found in 

DISCUSSION QUESTIONS

1. How is economic growth measured? Why is economic growth important? Why could the difference between a 2.5 percent and a 3 percent annual growth rate be of great significance over several decades? **LO3.1**
2. When and where did modern economic growth first happen? What are the major institutional factors that form the foundation for modern economic growth? What do they have in common? **LO3.2**