Chapters in This Unit

New housing starts are up . . .

Every day, news reporters tell us how well or poorly the economy is performing. Analyzing an entire economy is a challenging task. However, there are key indicators such as the number of new housing starts, unemployment rates, and inflation rates that provide clues. After listening to the financial news, you may wonder:

- How do economists measure the health of the economy?
- What impact would a recession have on workers and businesses?
- What is inflation?
- What makes the economy grow?

In this unit, you'll read about the answers to these questions as you are introduced to macroeconomics—the branch of economics that looks at an economy as a whole.

Focus Activity

Summarize one recent news article that refers in some way to the health of the economy of the United States. Then share your article with a classmate.

Chapter 12 Gross Domestic Product and Growth

Every day, businesspeople need to make decisions about how many airplanes to produce or houses to build. They wish that they could predict what the economy is going to do in six months or a year.

While economists cannot predict exactly how the economy will behave, they can make educated guesses. In this chapter you will read about how economists measure the country's economic performance and make forecasts about future economic activity.

Standards Preview

H-SS 12.5 Students analyze the aggregate economic behavior of the U.S. economy.

H-SS 12.5.1 Distinguish between nominal and real data.

H-SS 12.5.2 Define, calculate, and explain the significance of an unemployment rate, the number of new jobs created monthly, an inflation or deflation rate, and a rate of economic growth.

H-SS 12.5.3 Distinguish between short-term and long-term interest rates and explain their relative significance.

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Section 1

Gross Domestic Product

Preview

Objectives

After studying this section you will be able to:

1. **Identify** National Income and Product Accounts (NIPA).
2. **Explain** how gross domestic product (GDP) is calculated.
3. **Explain** the difference between nominal and real GDP.
4. **List** the main limitations of GDP.
5. **Describe** other income and output measures.
6. **Identify** factors that influence GDP.

Section Focus

There are several ways to evaluate a nation's economic performance. Gross domestic product (GDP) is the most important, despite its limitations. GDP changes in response to shifts in aggregate supply or aggregate demand.

Key Terms

national income accounting
gross domestic product
intermediate goods
durable goods
nondurable goods
nominal GDP
real GDP
gross national product
depreciation
price level
aggregate supply
aggregate demand

Early economists believed that a national economy would regulate itself. Periods of high unemployment and low income and output would be temporary and short-lived and would be corrected automatically.

These ideas about the economy lasted until the Great Depression, a severe economic decline that started in 1929 and lasted for over a decade. This economic avalanche, touched off by the Great Crash of the stock market in October 1929, devastated the U.S. economy. The length and depth of the Great Depression convinced many economists that they must find a way to monitor the macroeconomy's performance so that they could predict economic downturns and try to prevent them.

National Income and Product Accounts

Keeping track of the U.S. economy is an enormous task. Today, economists monitor important macroeconomic data using **national income accounting,** a system that collects statistics on production, income, investment, and savings. The data are compiled and presented in the form of National Income and Product Accounts (NIPA), which are maintained by the U.S. Department of Commerce. NIPA data are used to determine economic policies that you will read about in Chapters 15 and 16.

Gross Domestic Product

The most important of the measures in NIPA is **gross domestic product (GDP),** the dollar value of all final goods and services produced within a country's borders in a given year. This carefully worded definition conveys a lot of information that we should consider piece by piece.

Dollar value is the total of the selling prices of all goods and services produced in a country in one calendar year, which are added up to calculate GDP. *Final goods and services* are products in the form sold to consumers, as opposed to **intermediate goods,** which are used in the production of final goods. *Produced within a country's borders* is especially important to remember. For example, U.S. GDP includes cars made in Ohio by a Japanese car company.

national income accounting *a system that collects macroeconomic statistics on production, income, investment, and savings*

gross domestic product (GDP) *the dollar value of all final goods and services produced within a country's borders in a given year*

intermediate goods *goods used in the production of final goods*

durable goods *goods that last for a relatively long time, such as refrigerators, cars, and DVD players*

nondurable goods *goods that last a short period of time, such as food, light bulbs, and sneakers*

U.S. GDP does not include cars made in Brazil by an American automaker. You'll be able to see shortly why this distinction is important.

Let's look at the housing market for more examples of how GDP is compiled. Suppose that your neighbor sold his house this year. When the house was built, say in 1982, it was counted in that year's GDP. Thus, it would be inaccurate to count it again this year just because it changed hands. However, the fee paid to the real estate agent who handled the resale of the house would come from services performed this year, so that fee would be included in GDP.

Meanwhile, your neighbor has bought a newly built house. Would the lumber, nails, shingles, windows, and other items used to produce that house be included in GDP? No. Those are intermediate goods, and their value would be included in the price of the completed house. Thus, only the price of the completed house would be added to GDP.

Expenditure Approach

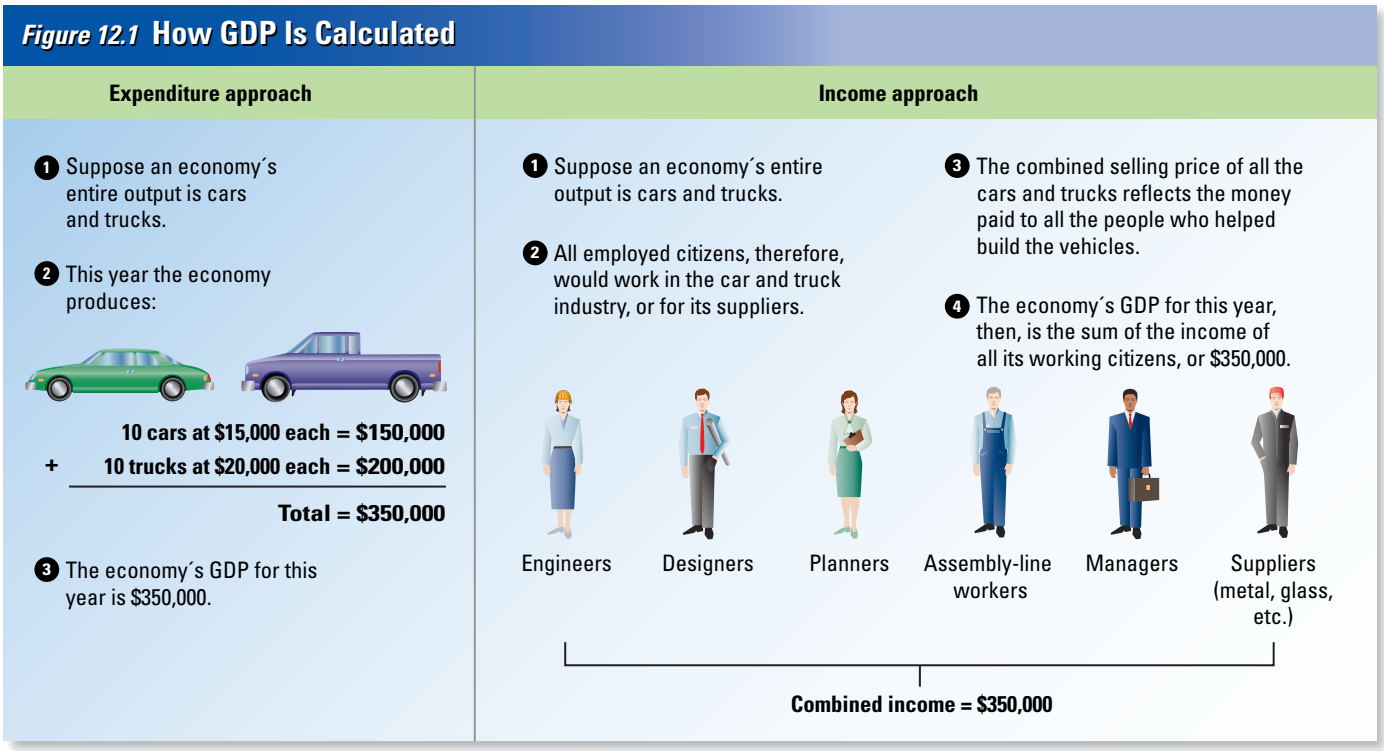
One way government economists calculate GDP is by using the expenditure approach, sometimes called the output-expenditure approach. It works this way: First, economists estimate the annual expenditures, or amounts spent, on four categories of final goods and services:

1. consumer goods and services
2. business goods and services
3. government goods and services
4. net exports or imports of goods and services

Consumer goods include **durable goods,** those goods that last for a relatively long time, such as refrigerators, cars, and DVD players. Consumer goods also include **nondurable goods,** those goods that last a short period of time, such as food, light bulbs, and sneakers.

Then, economists add together the amounts spent on all four categories to arrive at the total expenditures on goods

Figure 12.1 How GDP Is Calculated



BUILDING KEY CONCEPTS

The two ways of measuring gross domestic product are shown here. The expenditure approach is a practical way of calculating GDP. The income approach is generally more accurate.

Gross Domestic Product **Apply this example by using the expenditure approach and the income approach to explain how a new housing complex would add to GDP.** H-SS 12.5.2

and services produced during the year. This total equals GDP. Figure 12.1 provides a simplified example of calculating GDP with the expenditure approach.

Income Approach

The expenditure approach gives economists a practical way to measure GDP. If they want better accuracy, however, they use the income approach. The income approach calculates GDP by adding up all the incomes in the economy.

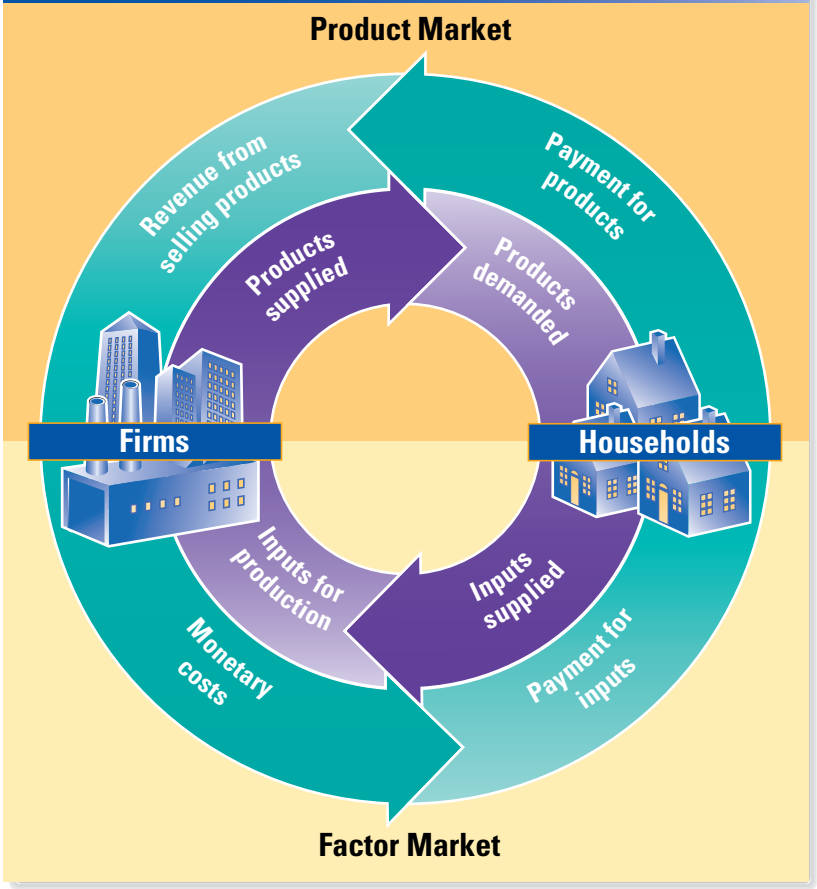
Here's how it works: When a firm sells its product, the selling price represents income for the firm's owners and employees. For instance, suppose that your neighbor's newly built house sold for $115,000. This amount is added to GDP under the expenditure approach.

However, that $115,000 is also income that was shared by all of the people who helped build the house. The contractor, the bricklayer, the roofers, the window installers, and everyone else who worked on the house received some income directly from the house's selling price. Also, let's not forget the people who supplied the lumber, the nails, and all of the other materials that went into the house. The money that they received for these goods all comes from the selling price of the house, even though they may have been paid before the house was sold.

Each of these people may get only a small share of the house's selling price. However, if we added up all the shares, we would see that $115,000 of income was generated by the sale. In other words, the house's selling price is equal to the amount of income earned by all of the people who helped, however indirectly, to build the house. This same logic holds for all goods and services produced in the economy. Thus, we may calculate GDP by adding up all income earned in the economy. This process is the income approach, shown in Figure 12.1.

In theory, we can calculate GDP with either the income approach or the expenditure approach. Both calculations should give us the same total. In fact, federal economists often determine GDP using both approaches. Then they compare the two totals and make adjustments to offset any mistakes. This gives them a better result.

Figure 12.2 **Circular Flow of Output and Income**



BUILDING KEY CONCEPTS

This circular flow diagram shows how the production of goods and services generates income for households and how households purchase goods and services produced by firms. **Gross Domestic Product** **(a) Which part of this diagram would you use to calculate GDP using the expenditure approach? (b) Which part would you use for the income approach?** **H-SS 12.5**

Nominal Versus Real GDP

Government policymakers measure gross domestic product to find out how well the economy is performing. The measurement must be as accurate as possible. Comparing the results of the expenditure and income approaches is one way to judge accuracy. To develop additional information about the economy, economists distinguish between two measures of GDP, nominal and real.

Figure 12.3 Nominal and Real GDP

Year 1 Nominal GDP	Year 2 Nominal GDP	Year 2 Real GDP
1 Suppose an economy's entire output is cars and trucks. 2 This year the economy produces: 10 cars at $15,000 each = $150,000 + 10 trucks at $20,000 each = $200,000 Total = $350,000 3 Since we have used the current year's prices to express the current year's output, the result is a nominal GDP of $350,000.	1 In the second year, the economy's output does not increase, but the prices of the cars and trucks do: 10 cars at $16,000 each = $160,000 + 10 trucks at $21,000 each = $210,000 Total = $370,000 2 This new GDP figure of $370,000 is misleading. GDP rises because of an increase in prices. Economists prefer to have a measure of GDP that is not affected by changes in prices. So they calculate real GDP.	1 To correct for an increase in prices, economists establish a set of constant prices by choosing one year as a base year. When they calculate real GDP for other years, they use the prices from the base year. So we calculate the real GDP for Year 2 using the prices from Year 1: 10 cars at $15,000 each = $150,000 + 10 trucks at $20,000 each = $200,000 Total = $350,000 2 Real GDP for Year 2, therefore, is $350,000.

This example shows the different results that come from calculating nominal GDP and real GDP. Real GDP reflects actual increases in output without the misleading effects of price increases.

Gross Domestic Product **Using Year 1 as the base year, calculate real GDP for Year 3, in which 15 cars and 14 trucks were sold.** **H-SS 12.5.1, Gr 7 MR 1.0**

nominal GDP *GDP measured in current prices*

real GDP *GDP expressed in constant, or unchanging, prices*

Nominal GDP

In Figure 12.1, we calculated **nominal GDP**—that is, GDP measured in current prices. (Sometimes it is called "current GDP.") To calculate nominal GDP, we simply use the current year's prices to calculate the value of the current year's output. Figure 12.3 shows how the definition of nominal GDP applies to the small economy that produces only cars and trucks.

Real GDP

Study how nominal GDP is calculated in Year 1 and Year 2. The diagram points out a problem with nominal GDP: A general increase in prices *appears* to make GDP rise, when in fact output has not risen. To correct for this distortion, economists determine **real GDP.** This is defined as GDP expressed in constant, or unchanging, prices.

Look again at Figure 12.3 and see how real GDP is calculated in Year 2. When real GDP rises, we can be certain whether an economy is producing more goods and services, regardless of changes in the prices of those items. In this example, we learn from calculating real GDP that output did not increase in Year 2.

Limitations of GDP

Even though economists can calculate it accurately, GDP is still not a perfect yardstick. For instance, GDP does not take into account certain economic activities, such as:

- *Nonmarket activities* GDP does not measure goods and services that people make or do themselves, such as caring for children, mowing the lawn, cooking dinner, washing the car. GDP *does* rise, however, when people pay someone else to do these things for them. When nonmarket activities are shifted to the market, GDP is pushed up somewhat, even though production has not really increased.
- *The underground economy* A large amount of production and income is never recorded or reported to the govern-

ment: for instance, transactions on the *black market,* the market for illegal goods, such as drugs, weapons, stolen cars, and exotic animals. Income from illegal gambling goes unreported. So do "under the table" wages paid by some companies to avoid paying business and income taxes.

Many legal, informal transactions are not reported, as well, such as selling your car to a friend or trading your stereo for a bike, or hiring someone to baby-sit, mow lawns, or shovel snow. Underground transactions add nothing to the GDP figure, even though goods and services were produced and income was earned.

- *Negative externalities* Unintended economic side effects, or externalities, have a monetary value that often is not reflected in GDP. (See Chapter 3, Section 3, for a discussion of externalities.) For example, if a power plant spends money to reduce damage caused by pollution, those expenditures will be added to GDP. However, the value of a clean environment is not counted in GDP, even though a cleaned-up lake or restored wetlands have considerable social value.
- *Quality of life* Although some economists and politicians interpret rising GDP as a sign of rising well-being, we should remember that additional goods and services do not necessarily make people any happier. In fact, some things that are not counted in GDP contribute greatly to most people's quality of life, such as pleasant surroundings, ample leisure time, and personal safety. GDP measures output and income within an economy, not individuals' quality of life.

All of these limitations suggest that GDP is a poor measure of people's well-being and a somewhat flawed measure of output and income. Nevertheless, while the measure itself may be imperfect, when calculated consistently over time, it helps reveal economic growth rates. For this reason, GDP is closely watched by economists and policymakers.

Other Income and Output Measures

As you have read, our system of National Income and Product Accounts provides numerous measurements of the macroeconomy's performance. While gross domestic product is the primary measure of income and output, sometimes other measures are more useful. Many of these other yardsticks are derived *from* GDP. Figure 12.4 (on the next page) shows how GDP is used to determine five other economic measures.

The first is **gross national product** (GNP), the annual income earned by U.S.-owned firms and U.S. citizens. GNP is a measure of the market value of all goods and services produced by Americans in one year. Study the diagram on the next page to see how GNP is derived from GDP.

GNP does not account for **depreciation,** the loss of the value of capital equipment that results from normal wear and tear. The cost of replacing this physical capital slightly reduces the value of what we

FAST FACT

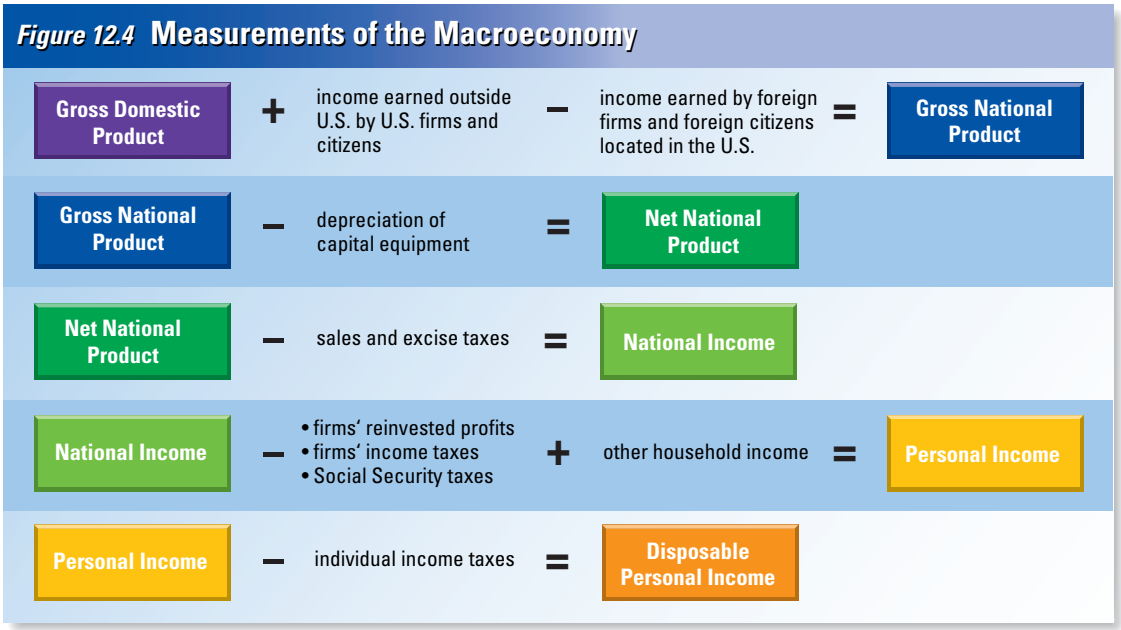
How big is the underground economy? Estimates vary from 4 to 30 percent of U.S. GDP. Perhaps 25 million Americans earn a large part of their income from the underground economy, earning more than a half trillion dollars in unreported income. Economists note that although consumers rarely pay for consumer goods with $100 bills, 60 percent of U.S. currency in circulation is in $100 bills. Where are all those Ben Franklins circulating? Quite likely, underground.

gross national product *(GNP) the annual income earned by U.S.-owned firms and U.S. citizens*

depreciation *the loss of the value of capital equipment that results from normal wear and tear*

▲ **When people go to grocery stores to buy food, their efforts are not counted in GDP; however, when they pay someone else, like this on-line grocery service, to do their shopping, the expense does get counted in GDP.**

Figure 12.4 Measurements of the Macroeconomy



BUILDING KEY CONCEPTS

These equations summarize the formulas for calculating some of the key macroeconomic measurements.

Economic Systems Why might economists track so many different indicators of the nation's economic health? H-SS 12.5

produce. GNP minus the cost of depreciation of capital equipment is called *net national product (NNP)*. NNP is a measure of the net output for one year, or the output made after the adjustment for depreciation.

NNP does not reflect another cost of doing business: taxes. After subtracting sales and excise taxes and making some other minor adjustments to NNP, we get another important statistic, called *national income (NI)*.

From NI, we can find out how much pretax income businesses actually pay to U.S. households after reinvesting some of their income and paying additional taxes. That amount, as calculated in Figure 12.4, is called *personal income (PI)*.

Finally, we want to know how much money people actually have to spend after they pay their taxes, a figure called *disposable personal income (DPI)*. To find DPI, we take personal income and subtract individual income taxes.

See how far we have come. Beginning with GDP, the value of all goods and services produced in a year—a very large number—we wind up knowing how much cash Americans have to spend or put in the bank. As you might suppose, this data is extremely valuable to economic planners, legislators, investors, and businesses.

Influences on GDP

So far, we have defined GDP, calculated it, and learned about its limitations. One important issue, however, remains: What influences GDP? That is, in a real economy, what factors can change the level of GDP? These questions go to the heart of macroeconomics.

In Chapters 4 and 5 we learned about demand and supply as they relate to individual markets. Now we will look at supply and demand on a nationwide scale to see how large-scale changes in supply and demand can affect GDP.

Aggregate Supply

As you read earlier, market supply is the amount of a particular good or service available for purchase at all possible prices in an individual market. But how do we look at supply and prices on a macroeconomic

level? Think of aggregate supply as a supply curve for the whole economy.

First, economists add up the total supply of goods and services produced for sale in the economy—in other words, GDP. Then they calculate the **price level,** the average of all prices in the economy. Now they can determine **aggregate supply,** the total amount of goods and services in the economy available at all possible price levels.

In a macroeconomy, as the prices of most goods and services change, the price level changes. Firms respond by changing their output—that is, their production, or real GDP, which is aggregate supply. For example, if the price level rises, it means that the prices of most goods and services are rising. Rising prices give firms an incentive to increase their output. After all, at higher prices, more goods and services sold means greater profits, at least until producers are forced to pay higher prices for intermediate goods. Similarly, as prices throughout the economy fall, companies' profits shrink. In response, they reduce their output.

The aggregate supply (AS) curve on a graph illustrates the relationship between prices and output supplied. Look at the aggregate supply curve in Figure 12.5. As the price level rises, real GDP, or aggregate supply, rises. As the price level falls, real GDP falls.

Aggregate Demand

Aggregate demand is the amount of goods and services in the economy that will be purchased at all possible price levels. As price levels in the macroeconomy move up and down, individuals and businesses change how much they buy.

For example, a lower price level translates into greater purchasing power for households, because the real value of money rises as price levels drop. The dollars that we hold are worth more at lower price levels than they are at higher price levels. Therefore, falling prices increase wealth and demand. This scenario is known as the wealth effect.

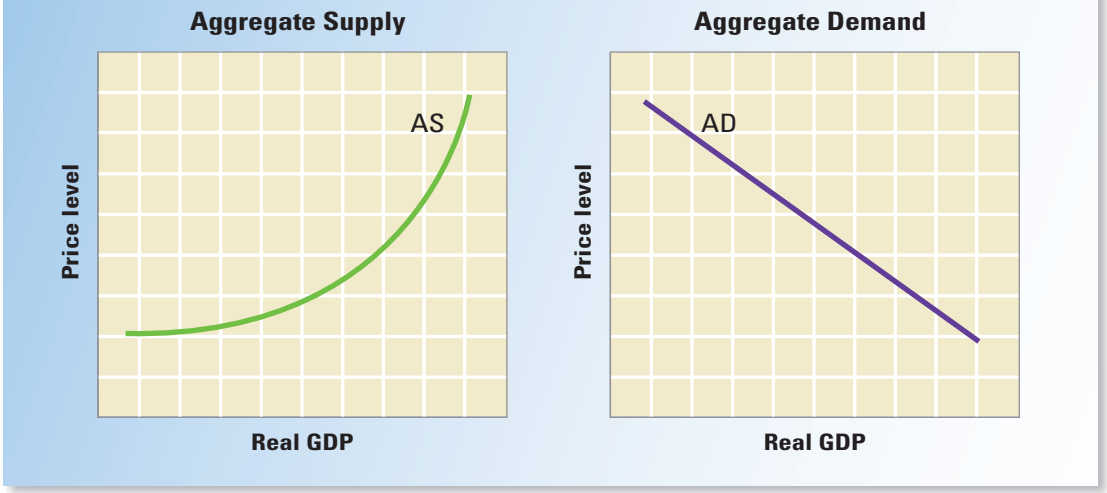
On the other hand, as the price level rises, purchasing power declines, causing a reduction in the quantity of goods and services demanded. The aggregate demand (AD) curve shows this relationship between price and real GDP demanded. As you can see from Figure 12.5, this curve (right-hand

price level *the average of all prices in the economy*

aggregate supply *the total amount of goods and services in the economy available at all possible price levels*

aggregate demand *the amount of goods and services in the economy that will be purchased at all possible price levels*

Figure 12.5 Aggregate Supply and Demand



BUILDING KEY CONCEPTS

These graphs show an aggregate supply curve and an aggregate demand curve.
Supply and Demand **Explain what the positive (upward to the right) and negative (downward to the right) slopes of these curves mean.** **H-SS 12.5, Gr 7 AF 1.0**

graph) plots the total amount of goods and services demanded in the economy at various price levels. Like all demand curves, it is negatively sloped (downward to the right).

Aggregate demand is made up of the same types of spending discussed earlier under the expenditure approach to calculating GDP. Consumers account for most of aggregate demand, but business spending on capital investment, government spending, and foreigners' demand for export goods all play roles, too.

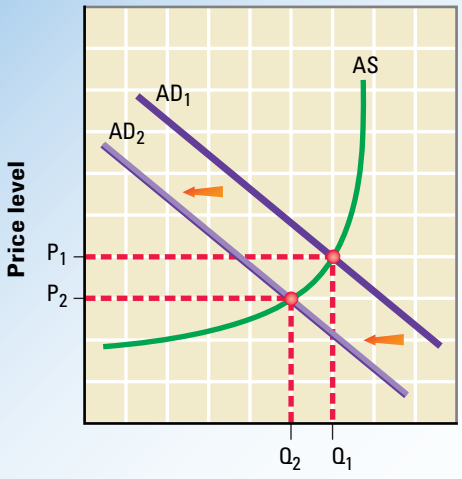
Aggregate Supply/Aggregate Demand Equilibrium

When we put together the aggregate supply (AS) and aggregate demand (AD) curves, we can find the AS/AD equilibrium in the macroeconomy. Look at Figure 12.6. The intersection of the AS and AD_1 curves indicates an equilibrium price level of P_1 and an equilibrium real GDP of Q_1.

Now consider how GDP might change. Any shift in either the AS or AD curve will cause real GDP to change. For example, the graph shows aggregate demand falling from line AD_1 to line AD_2. As a result, the equilibrium GDP (Q_2) falls, and so does the equilibrium price level (P_2).

Any shift in aggregate supply or aggregate demand will have an impact on real GDP and on the price level. In the next section we will discuss some factors that may cause such shifts.

Figure 12.6 **Equilibrium Aggregate Supply and Demand**



BUILDING KEY CONCEPTS

This graph shows AS/AD equilibrium. It also shows what happens to GDP and to the price level when aggregate demand shifts from AD_1 to AD_2.

Supply and Demand **If a country goes to war, causing an increase in government demand for durable and nondurable goods, how might real GDP and price levels be affected?**

Section 1 Assessment

Standards Monitoring *Online*
For: Self-quiz with vocabulary practice
Web Code: mna-5125

Key Terms and Main Ideas

1. What is the difference between **intermediate goods** and final goods?
2. How does **gross domestic product (GDP)** differ from **gross national product?**
3. How does **nominal GDP** differ from **real GDP?**
4. What economic activities are not included in GDP?
5. If **aggregate demand** rises, what happens to real GDP? What happens to the **price level?**

Applying Economic Concepts

6. ***Critical Thinking*** Why is GDP calculated by both the expenditure approach and the income approach?
7. ***Math Practice*** Suppose that a very small economy produces only televisions and computers. Determine nominal GDP and real GDP in Year 4, using the following information: *In Year 1, the base year, 10 computers sold at $2,000 each, and 15 televisions sold at $500 each. In Year 4, 17 computers sold at $2,200 each and 20 televisions sold at $550 each.* **Gr 7 MR 1.0**

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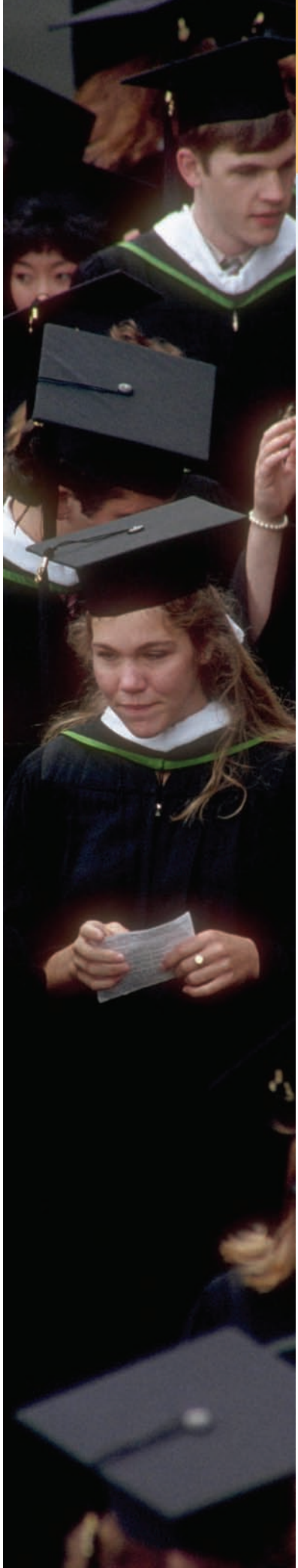


Skills for
LIFE

Cost-Benefit Analysis

A cost-benefit analysis is a useful tool for determining whether it makes sense to spend money in a particular way. The purpose of a cost-benefit analysis is to compare the money you'll be spending with what you hope to get in return from your decision. Use the information below to perform a cost-benefit analysis for getting a college degree.

Average annual tuition and fees for a four-year public college: $5,132
Average annual tuition and fees for a four-year private college: $20, 082

Median Income for Full-Time Workers	
Did not graduate high school	$20,383
Graduated high school, no college	$26,293
Attended college, did not graduate	$31,022
College graduate	$46,283

Source: Bureau of Labor Statistics

1. **Read and understand the cost information.** The numbers above are the average tuition prices, per year, for private and public colleges. (a) What does "average" mean? (b) What annual expenses, other than tuition and fees, might not be covered by this number? (c) In your opinion, what would be the total approximate cost of a four-year college education?
2. **Read and understand the benefit information.** The salary numbers represent the potential financial benefits of a college education. (a) What does "median" mean? (b) How large is the likely salary increase for graduates of four-year colleges? (c) Most full-time workers continue working until age 60 or 65. If the salary numbers here are representative of the difference in income between college and high school graduates throughout their careers, about how much more money will a college graduate earn than a high school graduate over the course of a lifetime?
3. **Look for other factors.** The cost-benefit analysis mainly looks at the financial costs and benefits, but sometimes other factors are important. (a) What are the non-financial "costs" of going to college? (b) What are the non-financial "benefits"? (c) How important are non-financial factors when making a decision like this?

Additional Practice

Perform a new cost-benefit analysis for a recent decision in your own life. Remember to pay attention to the non-financial factors as well as the purely financial ones.

Section 2 Business Cycles

Preview

Objectives

After studying this section you will be able to:

1. **Identify** the phases of the business cycle.
2. **Describe** four key factors that keep the business cycle going.
3. **Explain** how economists forecast fluctuations in the business cycle.
4. **Analyze** the impact of business cycles in U.S. history.
5. **Analyze** why U.S. business cycles may change in the future.

Section Focus

A business cycle consists of successive periods of improvement and decline in a macroeconomy. Policymakers study business cycles to try to predict declines, lessen their effects, and speed economic recovery.

Key Terms

business cycle
expansion
economic growth
peak
contraction
trough
recession
depression
stagflation
leading indicators

business cycle *a period of macroeconomic expansion followed by a period of contraction*

expansion *a period of economic growth as measured by a rise in real GDP*

economic growth *a steady, long-term increase in real GDP*

peak *the height of an economic expansion, when real GDP stops rising*

contraction *a period of economic decline marked by falling real GDP*

Many economic analysts and historians of the nineteenth century recognized economic panics and collapses. But most did not see a pattern in the occurrence of these changes.

One early economist did see a pattern, however. He attributed it to, of all things, sunspots. In a way, his theory wasn't so crazy. William Stanley Jevons, a British economist of the mid-1800s, believed that periodic sunspot activity affected crop harvests. In the 1800s, when most people worked on farms, crop surpluses and shortages would have had widespread economic effects.

Economists long ago dismissed Jevons's sunspot theory, but they embraced his notion that the economy undergoes periodic changes. A modern industrial economy repeatedly experiences cycles of good times, then bad times, and then good times again. Business cycles are of major interest to macroeconomists, who study their causes and effects. In this section we will learn about these periodic swings in economic performance: how we describe them, what might cause them, and how they have shaped the country's economy.

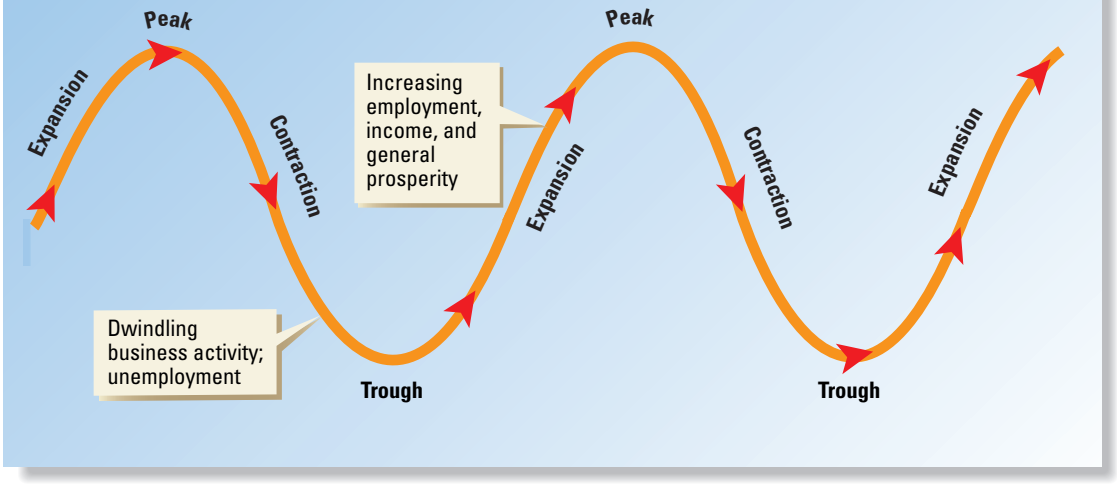
Phases of a Business Cycle

As you read in Chapter 3, a **business cycle** is a period of macroeconomic expansion followed by a period of macroeconomic contraction. Figure 12.7 illustrates the phases of a business cycle.

Business cycles are not minor ups and downs. They are major changes in real GDP above or below normal levels. The typical business cycle consists of four phases: expansion, peak, contraction, and trough.

1. *Expansion* An **expansion** is a period of economic growth as measured by a rise in real GDP. In economists' terms, **economic growth** is a steady, long-term increase in real GDP. In the expansion phase, the economy as a whole enjoys plentiful jobs, a falling unemployment rate, and business prosperity.
2. *Peak* When real GDP stops rising, the economy has reached its **peak,** the height of an economic expansion.
3. *Contraction* After reaching its peak, the economy enters a period of **contraction,** an economic decline marked by falling real GDP. Falling output generally causes unemployment to rise.

Figure 12.7 Tracking a Business Cycle



BUILDING KEY CONCEPTS

In a business cycle, a period of rising real GDP reaches a peak, then falls into a contraction. When the contraction reaches the low point, or trough, a new expansion begins. From 1854 to 1991, the United States had 31 business cycles. Excluding wartimes, the cycles averaged 48 months. **Gross Domestic Product** **In which part of a business cycle do you think the United States is right now—expansion or contraction? Give evidence to support your conclusion.** **H-SS 12.5**

4. *Trough* When the economy has "bottomed out," it has reached the **trough** (TRAWF), the lowest point in an economic contraction, when real GDP stops falling.

During the contraction phase, GDP is always falling. But other conditions, such as price levels and unemployment, may vary. Economists created terms to describe contractions with different characteristics and levels of severity. They include:

- *Recession* If real GDP falls for two consecutive quarters (at least six straight months), the economy is said to be in a recession. A **recession** is a prolonged economic contraction. Generally lasting from 6 to 18 months, recessions are typically marked by unemployment rising into the range of 6 percent to 10 percent.
- *Depression* If a recession is especially long and severe, it may be called a **depression.** The term has no precise definition but usually refers to a deep recession with features such as high unemployment and low factory output.
- *Stagflation* This term combines *stagnant*—a word meaning unmoving or decayed—and *inflation*. **Stagflation** is a decline in real GDP (output) combined with a rise in the price level (inflation).

Although economists know much about business cycles, they cannot predict any one cycle's behavior, nor can they tell exactly how long its phases will last. The only certainty is that a growing economy will eventually experience a downturn and will later bounce back.

trough *the lowest point in an economic contraction, when real GDP stops falling*

recession *a prolonged economic contraction*

depression *a recession that is especially long and severe*

stagflation *a decline in real GDP combined with a rise in the price level*

What Keeps a Business Cycle Going?

The shifts that occur during a business cycle have many causes, some more predictable than others. Often, two or more factors will combine to push the economy into the next phase of a business cycle. Typically, a sharp rise or drop in some important economic variable will set off a series of events that bring about the

next phase. Business cycles are affected by four main economic variables:

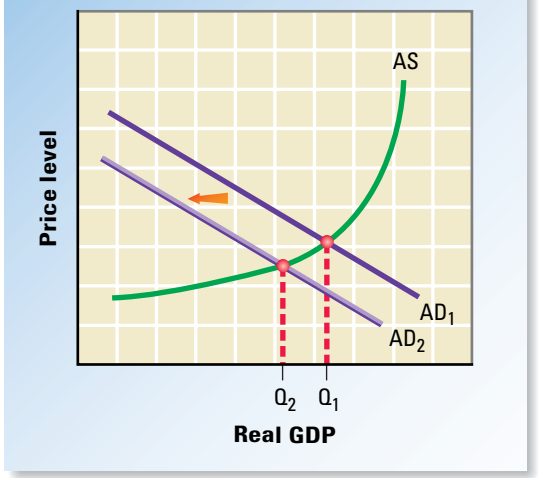
1. *business investment*
2. *interest rates and credit*
3. *consumer expectations*
4. *external shocks*

Business Investment

When the economy is expanding, firms expect sales and profits to keep rising. Therefore, they may invest heavily in new plants and equipment. Or they may invest in the expansion of old plants in order to increase the plants' productive capacity. All of this investment spending creates additional output and jobs, helping to increase GDP and maintain the expansion.

At some point, however, firms may decide that they have expanded enough or that demand for their products is dropping. They cut back on investment spending; as a result, aggregate demand falls. As Figure 12.8 shows, the result is a decline in the price level and in GDP. The drop in business spending reduces output and income in other sectors of the economy.

Figure 12.8 Declining Business Investment



BUILDING KEY CONCEPTS

This graph shows how a drop in business investment can affect the business cycle.

Supply and Demand **On this graph, when business investment declines, what happens to (a) aggregate demand? (b) real GDP? (c) the price level?**

Then industries that produce capital goods slow production down and begin to lay off workers. Other industries might follow, causing unemployment to rise. Jobless workers cannot buy new cars, eat at restaurants, or perhaps even pay their rent. The downward spiral picks up speed, and we find ourselves in a recession.

Interest Rates and Credit

In the United States economy, consumers often use credit to purchase "big ticket" items—from new cars and houses to home electronics and vacations. The cost of credit is the interest rate that financial institutions charge their customers. If the interest rate rises, consumers are less likely to buy those new cars and appliances.

Businesses, too, look to interest rates in deciding whether or not to purchase new equipment, expand their facilities, or make any other large investments that must be financed. For businesses, interest rates are a part of the opportunity cost of investments.

When interest rates are low, companies borrow money to make new investments, often adding jobs to the economy. When interest rates climb, investment dries up, as does job growth. One result of rising interest rates, then, is less output and employment in the industries producing consumer and business goods. Such actions may lead the entire economy to shrink.

Consider one example of the impact of interest rates on the business cycle. In the early 1980s, high consumer interest rates helped bring on the worst economic slump in the United States since the Great Depression. Some credit-card interest rates reached 21 percent. As a result, the cost of expensive items usually bought on credit was too high for many Americans.

As consumers reduced their spending, the economy entered a recession. The recession eventually drove up unemployment rates to over 9 percent—the highest since the Depression.

You can see, therefore, why economists watch interest rates closely. The rise and fall of borrowing rates has a great impact on the level of spending and real GDP.

Consumer Expectations

Consumer spending is determined partly by consumers' expectations. Fears of a weakening economy can cause consumer confidence to fall, meaning that a majority of people expect the economy to begin contracting. If that happens, consumers may start "saving for a rainy day," reducing their spending because they expect layoffs and lower incomes.

This reduced spending can actually help bring on a contraction, as firms respond to reduced demand for their products. Thus consumer expectations often become self-fulfilling prophecies, creating the very outcome that consumers fear. In spring 2003, expectations of war with Iraq influenced the economy as consumers and entrepreneurs postponed some purchases until the end of the conflict.

Of course, the opposite can occur. If people expect a rapidly growing economy, they will also expect abundant job opportunities and rising incomes. Thus, they will buy more goods and services, pushing up GDP. Consumers can help create the very prosperity they anticipate!

External Shocks

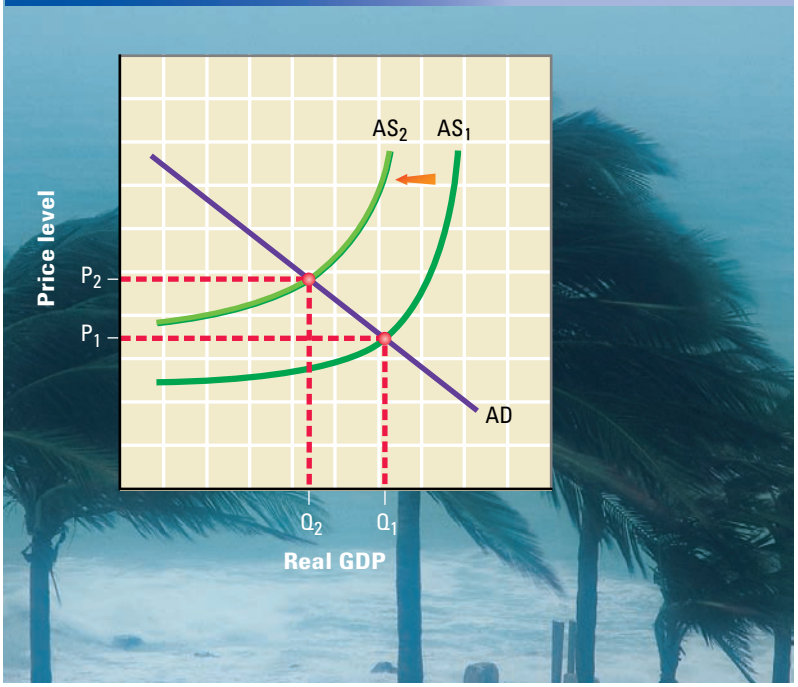
Of all of the factors that affect the business cycle, perhaps most difficult to predict are external shocks, which you read about in Chapter 6. External shocks can dramatically affect an economy's aggregate supply.

Examples of negative external shocks include disruptions of the oil supply, wars that interrupt normal trade relations, and droughts that severely reduce crop harvests.

Let's consider what might happen if a shock occurred. Suppose that the nation's oil supply were suddenly cut off. Immediately, the price of any remaining oil skyrockets.

This shock has a powerful effect on the economy. Oil is used to produce many goods, and petroleum products fuel the trucks, trains, and airplanes that transport goods from factories to stores. The oil shortage forces firms to reduce production and raise prices for their goods. In other words, GDP declines and the price level rises.

Figure 12.9 Negative External Shock



BUILDING KEY CONCEPTS

Hurricanes, drought, war, and trade disputes can cause negative external shocks to the economy. **Supply and Demand** **Compare the results of the negative shock shown on this graph with the results of declining business investment shown in Figure 12.8.** H-SS 12.5

Figure 12.9 illustrates this scenario. The negative shock raises costs of production and prices of final goods throughout the economy. The aggregate supply (AS) curve shifts to the left, reflecting higher prices and lower real GDP. This is the stagflation that you read about on page 311. It is particularly harmful to businesses and households and difficult for policymakers to fix.

Of course, an economy may also enjoy *positive* external shocks to its aggregate supply. The discovery of a large deposit of oil or minerals will contribute to a nation's wealth. A growing season with a perfect mix of sun and rain may create bountiful harvests that drive food prices down. Positive shocks tend to shift the AS curve to the right, lowering the price level and increasing real GDP.

External shocks usually come without much warning. The other key factors capable of pushing an economy from one phase of the business cycle to another are more predictable. So economists track

Global Connections

Global Economic Decline Like a deadly virus, the Great Depression quickly spread throughout much of the world. Latin America took a hard hit when U.S. markets for its goods dried up. Europeans depended on the United States for investments and loans, which became scarce. Industrial production fell by 40 percent in Germany, 14 percent in Britain, and 29 percent in France. "Hoovervilles," the makeshift shelters of the homeless named after President Hoover, sprang up in cities around the world. A photo from the era shows a British man wearing a sign that described the plight of many: "I know 3 trades / I speak 3 languages / Fought for 3 years / Have 3 children / And no work for 3 months / But I only want one job."

business investment, interest rates, and consumer expectations in order to more accurately forecast changes in the business cycle.

Business Cycle Forecasting

Predicting changes in a business cycle is difficult. To predict the next phase of a business cycle, forecasters must anticipate movements in real GDP before they occur. This is no easy task, given the large number of factors that influence the level of output in a modern economy.

Government and business decision makers need accurate economic predictions to respond to changes in a business cycle. For instance, if businesses expect a contraction, they may reduce inventories and postpone building new factories. If government policymakers expect a contraction, they may launch spending and taxation measures to try to prevent a recession.

leading indicators *key economic variables that economists use to predict a new phase of a business cycle*

Economists have many tools available for making these predictions. The **leading indicators** are a set of key economic variables that economists use to predict a new phase of a business cycle.

The stock market is one leading indicator. Typically, the stock market turns sharply downward before a recession begins. For example, the Nasdaq crash of 2000 preceded the recession of 2001. Recessions do not *always* follow downturns in the stock market, but the pattern is fairly regular.

Interest rates are another indicator. Short-term interest rates show the cost of borrowing money for a few days or months. These rates change often and reflect current events. Long-term interest rates, such as those paid on 10-year and 30-year bonds, affect housing and large business investments. Long-term rates provide clues to the future health of the economy. Low rates may mean that businesses and consumers don't want to borrow money to invest, and so the economy may contract in coming years.

The Conference Board, a private business research organization, maintains an index of ten leading economic indicators, including stock prices, interest rates, and manufacturers' new orders of capital goods. Economists and policymakers closely watch this index, which is updated monthly. However, like the other important tools used to forecast changes in the business cycle, it is not altogether reliable, since it sometimes predicts events that don't occur. (See the Economic Atlas and Databank, pages 538–539, for data relating to the Index of Leading Economic Indicators and other economic measures.)

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In the News *Read more about the effects of terrorism on the business cycle in "The Last Straw?," an article in* The Wall Street Journal Classroom Edition.

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Business Cycles in American History

Economic activity in the United States has indeed followed a cyclical pattern. Periods of GDP growth alternate with periods of GDP decline.

The Great Depression

As you read earlier, before the 1930s many economists believed that when an economy declined, it would quickly recover on its own. This explains why, when the U.S. stock market crashed in 1929, and the economy took a nosedive, President Herbert Hoover felt little need to

change his economic policies. The crisis, however, did not just go away.

One look at Figure 12.10 shows that the Great Depression did not rapidly cure itself. Rather, it was the most severe economic downturn in the history of industrial capitalism. Between 1929 and 1933, GDP fell by almost one third, and unemployment rose to about 25 percent. One out of every four workers was jobless, and those who could find work often earned very low wages.

As the effects of the Great Depression spread throughout the world, it affected economists' beliefs about the macroeconomy. The Depression, along with the publication of John Maynard Keynes's *The General Theory of Employment, Interest, and Money,* pushed economists to consider the idea that modern market economies could fall into long-lasting contractions.

In addition, many economists accepted Keynes's idea that government intervention might be needed to pull an economy out of a depression. You'll read more about Keynes and his ideas in Chapter 15.

The depression also affected American politics. Rejecting Hoover, voters in 1932 elected the Democratic governor of New York, Franklin Delano Roosevelt, to the presidency. Roosevelt soon began a series of government programs designed to get people back to work.

Programs such as the Works Progress Administration and the Civilian Conservation Corps got able-bodied workers back on the job and earning income, which they would then spend supporting their families. In this way, spending increased throughout the economy.

Not until the United States entered into World War II did the country completely recover from the Great Depression. The sudden surge in government defense spending boosted real GDP well above pre-depression levels.

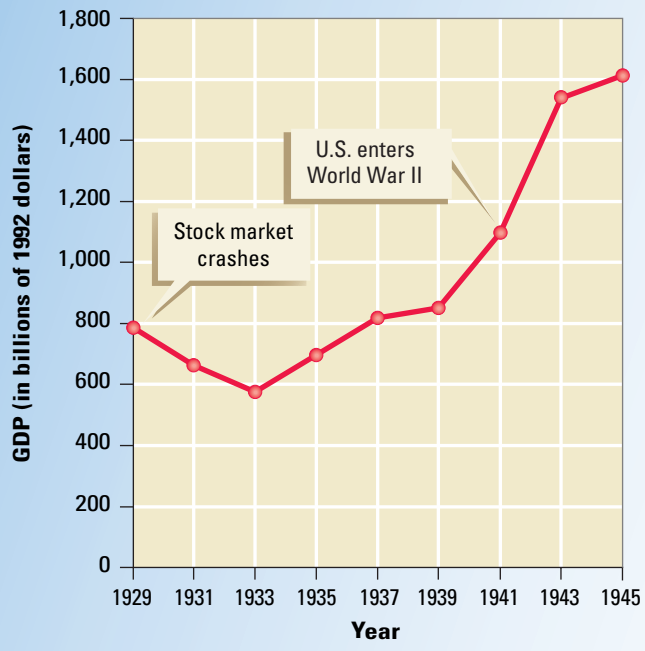
Some Later Recessions

Thankfully, no economic downturns since the 1930s have been nearly as severe as the Great Depression. We have had recessions, though.

In the 1970s, an international cartel, the Organization of Petroleum Exporting Countries (OPEC), launched an embargo on oil shipped to the United States and quadrupled the price of its oil. These actions caused external shocks in the American oil market. As oil prices skyrocketed, raw material costs rose, and the economy quickly contracted into a period of stagflation.

Reeling from higher-than-ever prices for gasoline and heating fuel prices, Americans began looking for ways to conserve energy. They turned down their heat, bought smaller, more fuel-efficient cars, and began researching energy alternatives to petroleum. When the United States and other nations developed more of their own energy resources, OPEC finally lowered its oil prices.

Figure 12.10 **U.S. Real GDP, 1929–1945**



BUILDING KEY CONCEPTS

As this graph shows, output (real GDP) dropped dramatically during the Great Depression. With factories idle, thousands of Americans lost their jobs and their homes. **Unemployment** **What accounts for the rise in real GDP in the early 1940s?** **H-SS 12.5.2**

▲ **When the supply of OPEC petroleum decreased, gasoline prices shot up. Limited supplies closed some gas stations. The green flag at this California gas station meant that only those customers with even-numbered license plates could buy rationed gas that day.**

Once again the United States had suffered an economic downturn, although not as severe as the Great Depression. There were additional problems in the late 1970s and early 1980s. High interest rates and other factors caused real GDP to fall and the unemployment rate to rise to over 9 percent in the early 1980s.

The Business Cycle Today

Following a brief recession in 1991, the U.S. economy grew steadily, with real GDP rising each year during the 1990s. The country enjoyed record growth, low unemployment, and low inflation. Some economists began to suggest that the nature of the business cycle had changed. Perhaps we had learned how to control recessions and promote long-term growth.

As the dot-com boom of the 1990s ended, however, the U.S. growth slowed. Businesses and individuals invested billions of dollars in new technology that proved to be unprofitable and, in some cases, worthless. The negative effects of the technology crash spread throughout the economy to other industries. In March 2001, the country slipped into a recession.

Economists hoped the decline would prove short-lived, but then the terrorist attacks of September 11, 2001, resulted in a sharp drop in consumer spending. The hotel, airline, and tourism industries were especially affected. Many companies blamed their performance problems on September 11.

The recession ended in November 2001 when the economy began to grow slowly. The Fed cut interest rates to historic low levels to prevent the economy from slipping back into a recession. However, unemployment continued to rise steadily over the following years as companies laid off more workers and kept spending low. The economy's growth was not strong enough to dispel the feeling of bad times even though the recession had ended. Investors looked to the future for a true turn-around and confident economic growth.

Section 2 Assessment

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Key Terms and Main Ideas

1. Which phase of a **business cycle** can lead an economy into recession?
2. How can interest rates push a business cycle into a **contraction?**
3. Why is the stock market considered to be a **leading indicator** of economic change?
4. How did the Great Depression affect economists' beliefs about the macroeconomy?

Applying Economic Concepts

5. ***Critical Thinking*** At which point in a business cycle would you prefer to be, the peak or the trough? Why?
6. ***Try This*** Draw a line graph of a business cycle in which the peak occurs when the real GDP reaches $4.9 trillion ($4,900 billion) and the trough occurs at $4.3 trillion. Label the expansion, peak, contraction, and trough. Use Figure 12.10 as a model. **Gr 7 AF 1.5**

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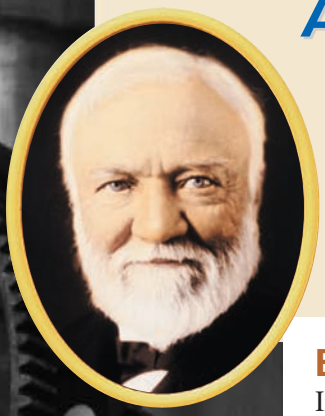
ECONOMIC

Profile

Economist

Entrepreneur

ANDREW CARNEGIE (1835–1919)



Andrew Carnegie's hard work and determination helped him rise from poverty to wealth and power. He inherited a strong commitment to workers from his father, but he also was ruthless when dealing with his own employees. He was deeply committed to charity, and is remembered today for the his huge charitable endowments.

Escape from Poverty

If you had known the Carnegie family when Andrew was born, you would never have predicted his financial success. The Carnegies lived in Dunfermline, Scotland. The town formerly produced the finest damask linens in England, but the industry had declined and Andrew's father, a weaver, did not have enough work to support his family. Hearing that conditions were better in America, the family left Scotland and arrived in Pittsburgh, Pennslyvania, in 1848.

Pittsburgh was a booming industrial city, growing rapidly but suffering the effects of pollution. Carnegie later wrote that "if you washed your face and hands they were as dirty as ever in an hour. The soot gathered in the hair and irritated the skin . . . ." Carnegie was determined to improve his life.

At first, Carnegie worked as a telegraph messenger, then as the personal telegrapher to the superintendent of the western division of the Pennsylvania Railroad. Eventually, he became superintendent himself. By 1856, he had saved enough money to begin investing in other companies, and by 1863 he was earning $40,000 a year from his investments. In 1899, he founded the company that grew into Carnegie Steel Co., Ltd.

Mixed Treatment of Workers

Carnegie often spoke out in support of working people, no doubt remembering his own humble beginnings. But he ran his own business ruthlessly. In a brutal confrontation between striking workers and management guards, three workers and seven guards were killed. Carnegie expressed horror at the bloodshed. Once the union was crushed, however, Carnegie cut wages and imposed longer workdays. He gave his steel workers only one day off during the entire year: the Fourth of July.

Charitable Commitments

In 1901, Carnegie sold Carnegie Steel to J.P. Morgan. Carnegie personally earned $250 million from the sale—or about $4.5 billion in today's dollars. He then retired from business as one of the wealthiest people in the world.

In retirement, Carnegie gave more than $350 million to a wide range of philanthropic causes—over $3 billion in current dollars. He supported education, world peace, libraries, and research. Today, he is also remembered for creating music halls (the most famous one, in New York City, bears his name) and over 3,000 public libraries.

CHECK FOR UNDERSTANDING

1. Source Reading How did Andrew Carnegie use the technological developments of the Industrial Revolution to become one of the richest people in the world?

2. Critical Thinking Are today's entrepreneurs able to make the same degree of charitable contributions as Carnegie? Why or why not?

3. Learn More Use the Internet to learn more about major Carnegie endowments such as the Carnegie Endowment for International Peace.

Section 3 Economic Growth

Preview

Objectives

After studying this section you will be able to:

1. **Analyze** how economic growth is measured.
2. **Understand** capital deepening and how it contributes to economic growth.
3. **Analyze** how saving and investment are related to economic growth.
4. **Summarize** the impact of population growth, government, and foreign trade on economic growth.
5. **Identify** the causes and impact of technological progress.

Section Focus

Economic growth is a steady, long-term increase in a nation's real GDP that tends to raise living standards. Primary contributors to long-term growth include capital deepening, saving and investing, and advances in technology. The other factors that affect economic growth are population, government, and foreign trade.

Key Terms

real GDP per capita
capital deepening
saving
savings rate
technological progress

Most of us would agree that as far as material possessions go, Americans are much better off today than they were 100 years ago. Why is this so?

Economic growth has allowed successive generations to have more and better goods and services than their parents. Long-term increases in real GDP allow an entire society to improve its quality of life, especially its standard of living. (See Chapter 3.)

A hundred years ago, most American families would have been able to own an icebox, a wood-burning stove, and a horse or bicycle. For most of us today, those necessities of life have turned into a refrigerator-freezer, a microwave oven, and a car or two. Think about the differences between these two sets of products!

BUILDING KEY CONCEPTS

Americans have been enjoying a fairly steady rise in their standard of living.
Standard of Living
By about how much did real GDP per capita increase between 1970 and 2004? H-SS 12.5.1, 12.5.2

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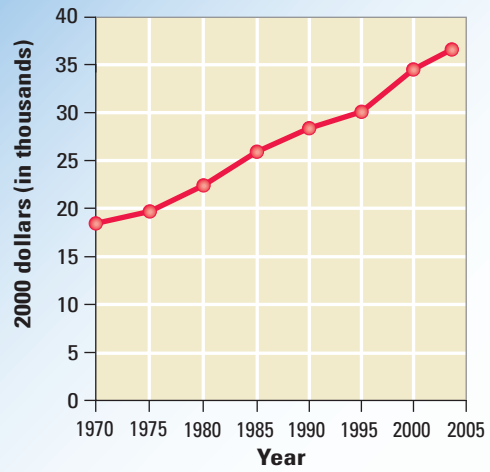
Figure 12.11 Real GDP per Capita, 1970–2004



Source: *Economic Report of the President*

Measuring Economic Growth

The basic measure of a nation's economic growth rate is the percentage change of real GDP over a given period of time. For example, the real GDP in 1994 was $7.8 billion, and in 2004, it was $10.8 billion. The economic growth rate for this decade was about 38 percent (($10.8 billion – $7.8 billion) ÷ $7.8 billion × 100).

GDP and Population Growth

Over time, a nation's population tends to grow. Real gross domestic product, if it is to satisfy the needs of a nation's growing population, must keep up with the growth

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Figure 12.12 Economic Health of Selected Countries

Country	GDP per capita (2002 dollars, in thousands)	GDP growth (average annual % change in growth, 1991–2001)	School expenditure per student, 2001 (in dollars)	Life expectancy at birth, 2002 (men /women)	Unemployment rate (% of labor force, 2003, men /women)	% change in consumer prices, 2003
U.S.	36.1	+3.4	8,144	74.4/79.8	6.3/5.7	2.2
Czech Rep.	15.1	+1.6	2,819	72.1/78.7	6.2/9.8	0.2
France	27.2	+1.9	6,783	75.8/83.0	8.5/10.5	2.1
Germany	25.9	+1.5	6,055	75.6/81.3	10.0/9.2	1.1
Japan	27.0	+1.1	6,179	78.3/85.2	5.5/4.9	–0.3
Korea	17.0	+5.5	4,406	72.8/80.0	3.8/3.3	3.6
Mexico	9.2	+3.1	1,575	72.1/77.1	2.0/2.4*	4.6
Turkey	6.4	+2.7	not available	66.2/70.9	6.6/6.5*	25.0
U.K.	27.9	+2.7	5,324	75.7/80.4	5.5/4.3	2.9

* 2000
Sources: Organization for Economic Cooperation and Development, 2005

BUILDING KEY CONCEPTS

The statistics shown here are typically used as indicators of a country's living standards.
Standard of Living (a) How does the economic health of the United States compare to that of the other countries shown here? (b) What countries seem to have the most-healthy and the least-healthy economies? H-SS 12.5.2

rate of the population. This is one reason that economists prefer a measure that takes population growth into account. For this, they rely on **real GDP per capita,** which is real GDP divided by the total population (*per capita* means "for each person").

real GDP per capita
real GDP divided by the total population

This measure is considered the best measure of a nation's standard of living. As long as real GDP is rising faster than the population, real GDP per capita will rise, and so will the standard of living. Economists can see how the standard of living has changed over time by comparing real GDP per capita from two different time periods. They can also use per capita growth rates to compare the economies of two different nations.

GDP and Quality of Life

We can use GDP to measure standard of living, which relates to material goods. We cannot use it, however, as a complete measure of people's quality of life. As you read in Section 1, GDP excludes many factors that affect the quality of life, such as the state of the environment or the level of stress that individuals feel in their daily lives. In addition, while real GDP per capita represents the average output per person in an economy, it tells us nothing about how the output is distributed. A nation may have relatively high real GDP per capita, but if most of the income goes to relatively few people while the majority earn next to nothing, the typical person will not enjoy a very high standard of living.

Despite these facts, real GDP per capita is a good starting point for measuring a nation's quality of life. Nations with greater availability of goods and services usually enjoy better nutrition, safer and more comfortable housing, longer life spans, better education, and other indicators of a favorable quality of life.

Since economic growth has an enormous impact on quality of life, economists devote significant resources to figuring out what causes the nation's real GDP to rise. They

capital deepening *process of increasing the amount of capital per worker*

saving *income not used for consumption*

savings rate *the proportion of disposable income that is saved*

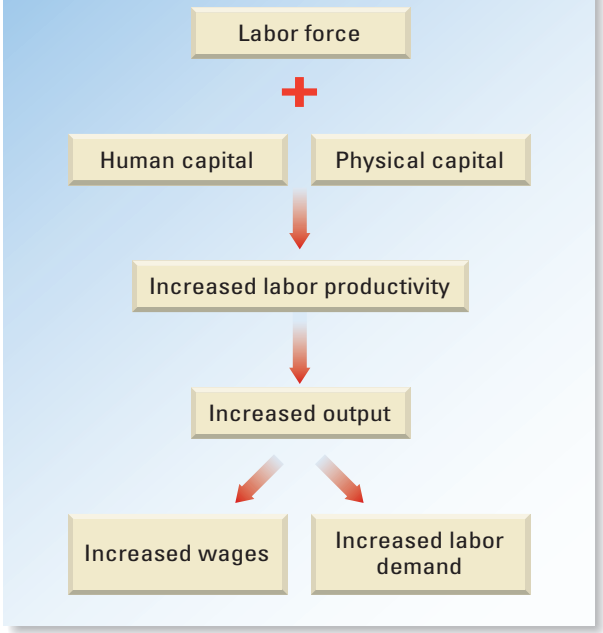
focus on the roles of capital goods, technology, and a few related factors.

Capital Deepening

Physical capital, the equipment used to produce goods and services, makes an important contribution to the output of an economy. With more physical capital, each worker can be more efficient and productive, producing more output per hour of work. Economists use the term *labor productivity* to describe the amount of output produced per worker.

With a labor force of a given size, more physical capital will lead to more output—in other words, to economic growth. This process of increasing the amount of capital per worker, called **capital deepening,** is one of the most important sources of growth in modern economies. (See Figure 12.13.)

Figure 12.13 **Effects of Capital Deepening**



BUILDING KEY CONCEPTS

This diagram shows the beneficial effects of capital deepening.

Money Suppose you own a small clothing shop. Why should buying a new line of clothes for an upcoming season and providing special training for sales staff result in capital deepening?

Human capital, the productive knowledge and skills acquired by a worker through education and experience, also contributes to output. Firms, and employees themselves, can deepen human capital through training programs and on-the-job experience. Better-trained and more-experienced workers can produce more output per hour of work. As the United States moves toward a service-oriented economy, human capital becomes another vital source of growth.

Capital deepening—whether it be physical capital or human capital—increases output per worker. It also tends to increase workers' earnings. To understand why this happens, consider the effect of greater worker productivity on the demand for workers. As you read in Chapter 9, if workers can produce more output per hour, they become more valuable to their employers. As a result, employers will demand more workers. This increase in demand will increase the equilibrium wage rate in the labor market.

So, with a labor force of a given size, capital deepening will increase output and workers' wages. But how does an economy increase its stock of capital per worker? It does so through saving and investment.

Saving and Investment

To help us understand how saving and investment are related, let's consider an economy with no government sector and no foreign trade. In this simplified economy, consumers and business firms purchase all output. In other words, output can be used for consumption (by consumers) or investment (by firms). Income that is not used for consumption is called **saving.**

Since output can only be consumed or invested, whatever is not consumed must be invested. Therefore, in this simplified economy, saving is equal to investment. The proportion of disposable income that is saved is called the **savings rate.**

To see this another way, look at an individual's decision, as shown in Figure 12.14.

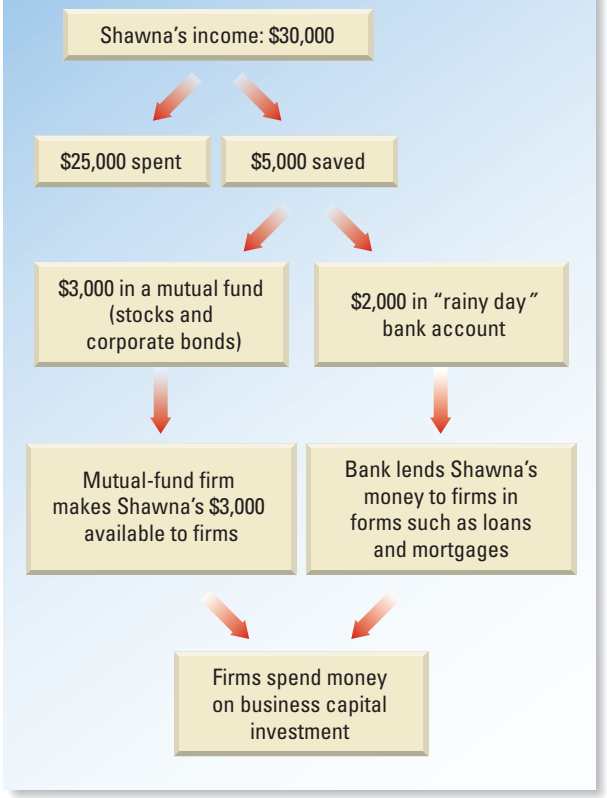
Shawna had an after-tax income of $30,000 last year, but she spent only $25,000. That left her with $5,000 available for saving. She used some of her leftover income to purchase shares in a mutual fund (stocks and bonds). She put the rest of the money into her bank account.

Through her mutual-fund firm, her bank, and other intermediaries, Shawna's $5,000 was made available to businesses. The firms used the money to invest in new plants and equipment. So, when Shawna chose not to spend her entire income but to save a share, the amount that she saved became available for business investment.

If we consider the economy as a whole, the process works the same way. If total saving rises, more investment funds become available to businesses. Those firms will use most of these funds for capital investment—for expanding the stock of capital in the business sector.

Higher saving, then, leads to higher investment, and thus to higher amounts of capital per worker. In other words, higher saving leads to capital deepening. Now we can understand why most nations promote saving. In the long run, more saving will lead to higher output and income for the population, raising GDP and the standard of living. The United States has a low saving rate, but businesses and government successfully borrow from other countries with high saving rates.

Figure 12.14 How Saving Leads to Capital Deepening



BUILDING KEY CONCEPTS

This diagram shows how saving adds to GDP by creating capital.
Money If people saved a high proportion of their incomes, how might the economy be affected? H-SS 12.5

Population, Government, and Trade

Now we will consider a slightly more realistic economy that has population growth, a government sector, and foreign trade. First, think about the effect of the population growth on capital accumulation.

Population Growth

Population growth does not necessarily preclude economic growth. However, if the population grows while the supply of capital remains constant, the amount of capital per worker will shrink. This process, the opposite of capital deepening, will lead to lower living standards. In fact, some relatively poor countries, such as India, have large labor forces but small capital stocks.

The result is that output per worker—and earnings per worker—are relatively low. Conversely, a nation with low population growth and expanding capital stock will enjoy significant capital deepening.

Government

Government can affect the process of capital deepening in several ways. If government raises tax rates to pay for additional services or to finance a war, households will have less money. People will reduce their saving, thus reducing investment. In these cases, the government is taxing households in order to pay for

technological progress *an increase in efficiency gained by producing more output without using more inputs*

consumption spending, and the net effect is reduced investment.

On the other hand, if government invests the extra tax revenues in public goods, such as roads, telecommunications, and other infrastructure, investment will increase. To see why, consider what share of income the average household saves. Suppose that, on average, households save 10 percent of their income. In this case, for every extra dollar in tax revenue the government collects, household saving (and investment) drops by 10 cents. However, government investment in infrastructure rises by $1. The net result is an increase in total investment of 90 cents. This would promote capital deepening, since the government is taxing its citizens to provide investment goods.

Foreign Trade

Foreign trade can result in a trade deficit, a situation in which the value of goods a country *imports* is higher than the value of goods it *exports*. (You will read more about trade deficits in Chapter 17.) Running a trade deficit may not seem like a wise practice, but if the imports consist of investment goods, the practice can foster capital deepening. *Investment goods* are the structures and equipment purchased by businesses.

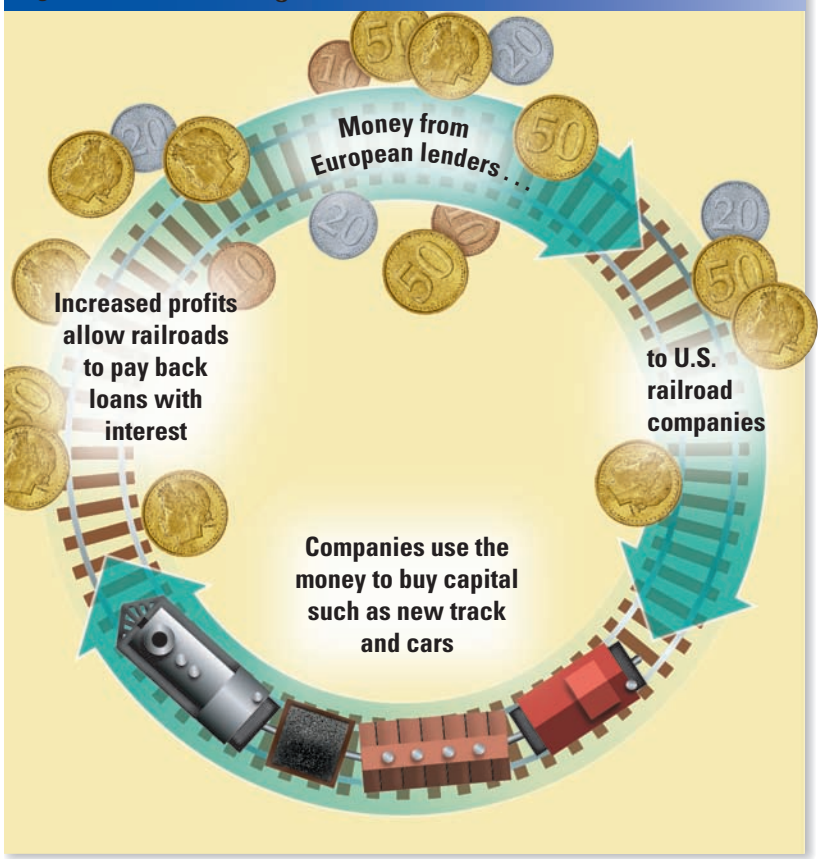
Capital deepening can help a country pay back its creditors because it is a source of economic growth. In the mid-1800s, for example, the United States financed the building of the transcontinental railroad in part by borrowing funds from investors in other countries. (See Figure 12.15.) The borrowing created a trade deficit, but it also helped create a much higher rate of economic growth than would have occurred without the borrowing. The railroad opened up vast areas to farming, which over time helped increase the nation's agricultural output by a huge amount.

Of course, not all trade deficits promote capital deepening. In this regard, trade deficits are similar to government taxation. Whether they encourage capital deepening and economic growth depends on how the funds are used. If they are used for short-term consumption, the economy will not grow any faster, and it will not have any additional GDP to pay back the debts. If the funds are used for long-term investment, however, they will foster capital deepening. The resulting economic growth will bring the country prosperity in the future.

Technological Progress

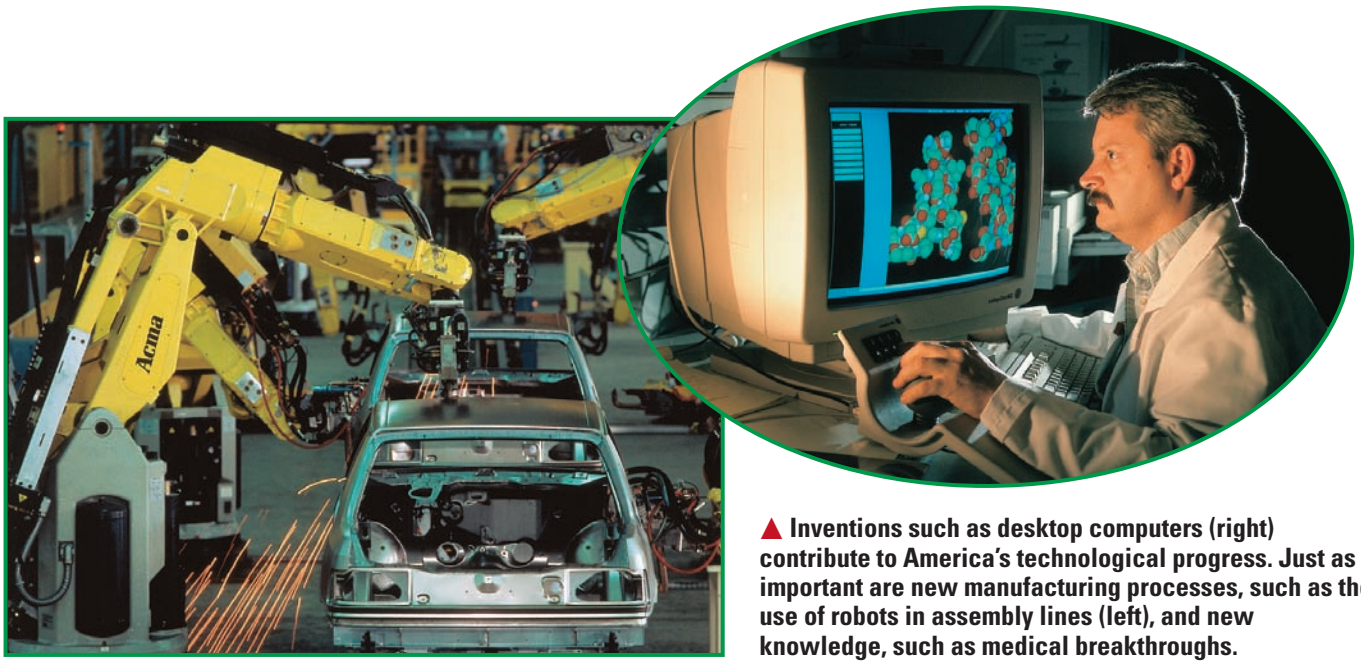
Another key source of economic growth is technological progress. This term usually brings to mind new inventions or new ways of performing a task, but in economics, it has a more precise definition. **Technological progress** is an increase in efficiency gained

Figure 12.15 Financing the Transcontinental Railroad



BUILDING KEY CONCEPTS

In the mid-1800s, railroad companies, eager to build a transcontinental line, borrowed money from foreign investors. The railroad, which was completed in 1869, made enough money to pay off the loans and return a profit.
Money **How is the scenario shown here an example of capital deepening?**



▲ **Inventions such as desktop computers (right) contribute to America's technological progress. Just as important are new manufacturing processes, such as the use of robots in assembly lines (left), and new knowledge, such as medical breakthroughs.**

by producing more output without using more inputs.

Technological progress occurs in many ways, as illustrated in the photographs above. It can come as new scientific knowledge that has practical uses. It can be a new machine that allows goods to be produced more efficiently. It may be a new method for organizing production. All of these advances raise a nation's productivity. Increased productivity means that we can produce more output with the same amounts of land, labor, and capital. With technological progress, a society can enjoy higher real GDP per capita, which leads to a higher standard of living.

Measuring Technological Progress

In most modern economies, the amount of physical and human capital changes all the time. So does the quantity and quality of labor and the technology used to produce goods and services. These interconnected variables work together to produce economic growth. How then can we isolate and measure the effects of technological progress?

Robert Solow, a 1987 Nobel Prize-winning economist from the Massachusetts Institute of Technology, developed a method for measuring the impact of technological progress on economic growth. Solow's method was to determine how much growth in output comes from increases in capital and how much comes from increases in labor. He concluded that any remaining growth in output must then come from technological progress.

Between 1929 and 1982, the average annual growth rate of real GDP was 2.92 percent. Using Solow's method, economist Edward Denison has estimated that technological progress boosted the real GDP 1.02 percent per year, on average. Increases in capital and labor were responsible for 0.56 percent and 1.34 percent of the average annual growth, respectively (2.92 – 0.56 – 1.34 = 1.02).

Causes of Technological Progress

Since technological progress is such an important source of economic growth, economists have looked for its causes. They have found a variety of factors that influence technological progress.

FAST FACT

Innovations in communication and transportation have revolutionized business efficiency in recent decades. Suppose a Michigan manufacturer needs a part from Japan to repair an essential tool on his automobile assembly line. He can contact the parts factory in Japan instantly through phone, fax, or email. Then, instead of waiting a week or more for the new part to arrive, he can receive the part in the morning through an overnight airline express service and have his assembly line up and running by afternoon.

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1. *Scientific research* Scientific research can generate new or improved production techniques, improve physical capital, and result in better goods and services.
2. *Innovation* When new products and ideas are successfully brought to the market, output goes up, boosting GDP and business profits. Yet innovation often requires costly research. For companies to carry out research, they need some assurance that they will make a profit on the sale of a product.

That's why the government issues patents. A patent is an exclusive right to produce and sell a product for a given period, currently 20 years. A patent helps companies recover the cost of research by earning profits before its competitors are allowed to copy new products.

Government can aid innovation in several other ways as well. Through organizations such as the National Science Foundation and the National Institutes of Health, the United States government sponsors so-called basic research. Basic research is a term that describes theoretical research that is often expensive and might not bring a new product to market in a timely way.

3. *Scale of the market* Larger markets provide more incentives for innovation, since the potential profits are greater. For this reason, larger economies will come up with more technological advances.
4. *Education and experience* As you read earlier, firms can develop their human capital by providing education and on-the-job experience for workers. Human capital makes workers more productive and thus accelerates economic growth. It can also stimulate growth in another way. A more educated and experienced work force can more easily handle technological advances and may well create some new advances, too.
5. *Natural resource use* Increased natural resource use can create a need for new technology. For example, new technology can turn previously useless raw materials into usable resources. It can also allow us to obtain and use resources more efficiently, develop substitute new resources, and discover new resource reserves. Because price is based on the cost of obtaining a resource (and not necessarily on its scarcity), new technology can also lead to lower prices.

Section 3 Assessment

Standards Monitoring *Online*
For: Self-quiz with vocabulary practice
Web Code: mna-5127

Key Terms and Main Ideas

1. **(a)** Why do economists measure **real GDP per capita?** **(b)** Why does real GDP per capita provide a better way to compare the economies of two different nations than does real GDP alone?
2. What is **capital deepening,** and how does it contribute to economic growth?
3. What role does **saving** play in the process of economic growth?
4. How do patents encourage **technological progress?**

Applying Economic Concepts

5. ***Critical Thinking*** You have read about the economic effects of the transcontinental railroad. What other communication and transportation systems might have similar effects? Write a paragraph analyzing these effects.
6. ***Using the Databank*** Turn to the graph "Personal Savings as a Percentage of Disposable Income" on page 540. What was the trend in savings between 1990 and 2004? How might this trend have affected capital deepening? Explain. **Gr 7 AF 1.0**

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Real-life Case Study

Analysis Skill CS2

How Has Technology Affected Productivity?

Technology, according to Peter Zentz, "is the cornerstone of all the products we make." Zentz is an executive with Benthos, Inc., a manufacturer of underwater equipment such as cameras that operate on the ocean floor. Benthos cameras took the first underwater pictures of the RMS *Titanic* after its discovery.

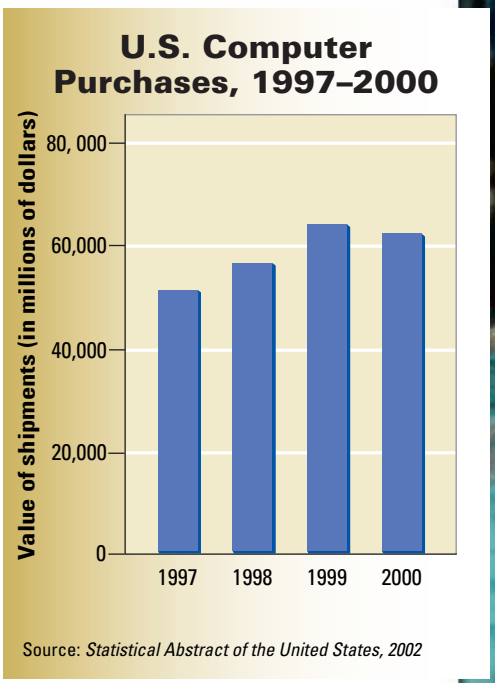
"The technology that continues to be developed in our industry," says Zentz, "is truly remarkable. But what strikes me every day is the way in which other types of technology have enabled us . . . to efficiently serve our customers, communicate effectively with them and our workers . . . and keep precise records."

▲ High-tech underwater cameras help researchers study the ocean floor.

Teleconferencing Rick Gifford, a Benthos sales executive, believes that one of the greatest advancements for business is the technology that makes teleconferencing possible. "We used to spend hours, even days, bringing our sales representatives, customers, and field workers into our office for important meetings," he explains. "Through teleconferencing we get it done just as effectively, eliminate enormous expense, and no one has to be uprooted."

Photocopiers Zentz and Gifford, however, both agree that the computer is not their most indispensable technological device. "Believe it or not," says Zentz, "we've found that the copy machine is our most important piece of equipment. The thought of hand-copying the thousands of designs, research reports, written correspondence, and other documents that we generate every year boggles my mind."

Zentz is not alone in his opinion. In a recent survey, most office workers indicated that the photocopier is important to their productivity. But whatever the ranking, one thing is certain. Technology has changed the business world forever.



Applying Economic Ideas

1. How has technology affected office productivity?
2. The graph on the right shows the value of computers sold in the United States. What might this graph indicate about the growth of GDP in the late 1990s and early 2000s?

Chapter 12 Assessment

Standards Review

H-SS 12.5 Students analyze the aggregate economic behavior of the U.S. economy.

H-SS 12.5.1 Distinguish between nominal and real data.

H-SS 12.5.2 Define, calculate, and explain the significance of an unemployment rate, the number of new jobs created monthly, an inflation or deflation rate, and a rate of economic growth.

H-SS 12.5.3 Distinguish between short-term and long-term interest rates and explain their relative significance.

Chapter Summary

Section 1 Gross Domestic Product (pp. 301–308)

Gross domestic product (GDP) is the most important measure of a nation's economic performance. GDP changes in response to shifts in **aggregate supply** and **aggregate demand.** GDP does have its limitations, however. Other measures are often used in addition to GDP when evaluating a nation's economy. **National income accounting** is a system that collects macroeconomic statistics.

Section 2 Business Cycles (pp. 310–316)

A business cycle includes four phases: **expansion, peak, contraction,** and **trough.** Policymakers study business cycles to try to predict downturns in the economy and take steps to lessen their effects and speed economic recovery. **Leading indicators** help economists take the pulse of the macroeconomy.

Section 3 Economic Growth (pp. 318–324)

Economic growth is a steady, long-term increase in real GDP and often results in higher living standards. **Capital deepening, saving** and investment, population growth, government, foreign trade, and **technological progress** affect economic growth. **Real GDP per capita** is considered the best measure of a nation's standard of living.

Key Terms

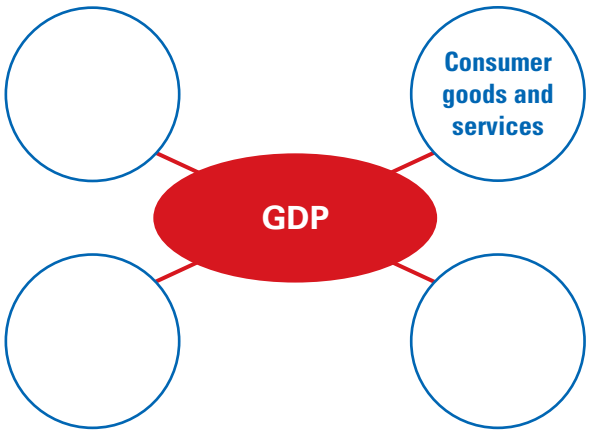
Complete each sentence by choosing the correct answer from the list of terms below. You will not use all of the terms.

gross domestic product
price level
capital deepening
aggregate supply
intermediate goods
recession
leading indicators
business cycle
gross national product

1. _____ are goods used in the production of final goods.
2. A _____ can be described as a period of macroeconomic expansion followed by a period of contraction.
3. Economists use the term _____ to describe the dollar value of all final goods and services produced within a country's borders in a given year.
4. _____ occurs when the amount of capital per worker increases.
5. The _____ is the average of all prices in the economy.
6. A prolonged economic contraction is known as a _____.

Using Graphic Organizers

7. On a separate sheet of paper, copy the web map below. Complete the web map by filling in the circles with components of GDP. You may add more circles.



Reviewing Main Ideas

8. List three limitations of using GDP as a measure of the nation's economy.
9. Identify four factors that keep the business cycle going.
10. Summarize the ways in which economists measure economic growth.
11. What is the difference between nominal GDP and real GDP?

Critical Thinking

Analysis Skills CS2, HR4

12. **Making Comparisons** Compare the factors that propel the business cycle in peak periods. Which factor affects you most? Which is the most uncontrollable factor?
13. **Drawing Inferences** Why is real per capita GDP used to measure economic growth? In which ways is this measure more effective than other measures?
14. **Synthesizing Information** Explain why GDP is an accepted way of measuring the economy, despite its known drawbacks.
15. **Making Comparisons** Collect articles from the newspaper that present forecasts of the economy's performance in the next three months or year. What evidence is provided to support the claims? Compare the forecasts you collected. How are they similar? How do they differ? On what indicator does each article base its forecast? Which forecast is considered most reliable?

Problem-Solving Activity

16. A group of consumers claims that drug companies earn excessive profits because of the patents they have on drugs. They recommend cutting the length of time that a drug company can hold a patent to five years. They argue that this will lead to lower prices for drugs because competitors will enter the market after the five-year period. Are there any drawbacks to this proposal?

Skills for Life

Analysis Skill HI6

Cost-Benefit Analysis Review the steps shown on page 309. Then answer the following questions using the table below describing two transportation plans for a town that would like to reduce car traffic and pollution.

17. (a) What are the two possible solutions the town is considering? (b) Does each of these solutions address the town's problems?
18. (a) What are the financial costs of each system? (b) What other non-financial costs does each system include?
19. (a) What quantitative data can you find about the benefits of each system? (b) What other, non-financial benefits does each system provide?
20. What is the cost for each system as measured by the additional dollar cost per new rider?
21. Consider the answer to the question above. Should the town choose the system which costs less, in dollars, per new rider? Why or why not?

Transportation Choices

Catagory	New Bus Routes	Light Rail Line
Cost	$10,000,000	$85,000,000
New riders served	2,000	6,000
Advantages	Reduces traffic, routes can change easily for market needs	Less pollution, reduces traffic, regular schedule
Disadvantages	More local air pollution, buses get caught in traffic	Route cannot change, expensive to run

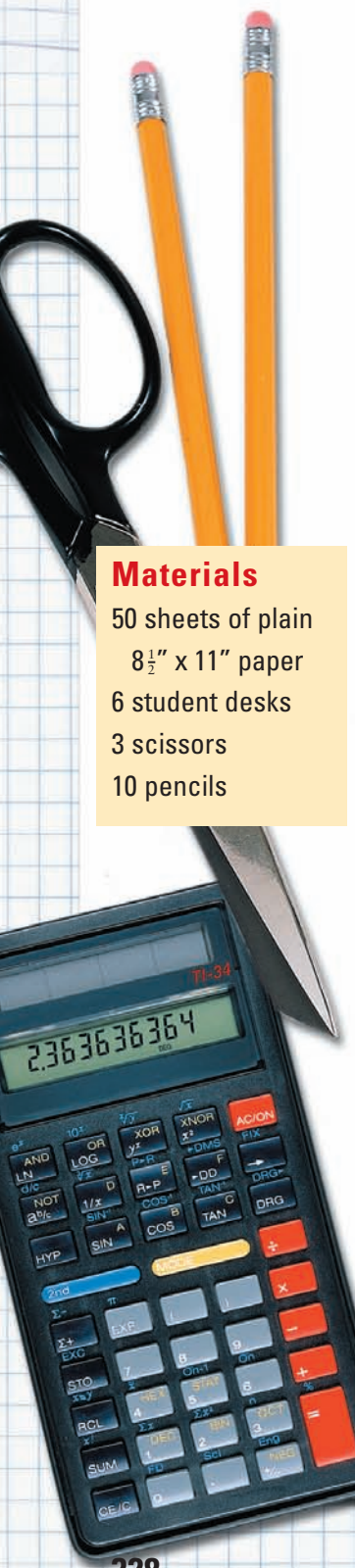
Standards Monitoring *Online*

For: Chapter 12 Self-Test **Visit:** PHSchool.com
Web Code: mna-5121

As a final review, take the Economics Chapter 12 Self-Test and receive immediate feedback on your answers. The test consists of 20 multiple-choice questions designed to test your understanding of the chapter content.

Economics Simulation

Increasing Productivity



Materials

50 sheets of plain $8\frac{1}{2}$" x 11" paper
6 student desks
3 scissors
10 pencils

Resources are limited, and people's wants and needs often exceed what is available. As a result of scarcity, people "economize" by trying to get the greatest benefits from their limited resources. In other words, they try to get as much as possible from those resources by increasing productivity. Productivity is usually measured by the amount of output per worker. In this lab you will explore how businesses try to obtain the greatest possible benefits from the fewest possible resources.

▲ **Specialization at this assembly line can lead to increased productivity.**

Preparing the Simulation

One way that producers attempt to increase productivity is by dividing production into steps and assigning a step to each worker. Your task in this lab is to determine the impact this specialization, or division of labor, has on productivity.

Step 1: With a group of six of your classmates, form a "company" that builds paper airplanes. As a group, experiment and agree on a simple design for your company's airplane using only one half of an $8\frac{1}{2}$" x 11" piece of paper ($8\frac{1}{2}$" x $5\frac{1}{2}$"). Next, choose a company name, and print the name on both sides of the plane's fuselage. Each member of the company should practice making an airplane before beginning the lab activity.

Step 2: Gather your company's production resources as shown in the Materials box above. You already have one factor of production—your group's labor. Select one member to be quality control manager. The other members will be production workers. The quality control manager should inspect each worker's "practice" airplane using the following criteria: The plane must be made from the correct size paper, it must be properly folded, and the company name should be printed correctly on both sides.

Step 3: As the "workers" assemble the factors of production, the quality control manager should prepare a chart by copying, on a separate sheet of paper, the Productivity Chart shown at right.

Conducting the Simulation

This simulation will consist of three four-minute "shifts," each of which is described on the next page. During each shift the group's six workers will "manufacture" airplanes. All workers must cease work immediately at the end of each shift.

Shift 1

Materials:
1 pair of scissors
1 pencil
2 desks

Procedure: Each worker must work alone to make his or her airplanes. The materials must be shared. After the four minutes is up, the quality control manager should inspect the airplanes and record the number of acceptable airplanes completed in the Shift 1 column on the Productivity Chart.

Shift 2

Materials:
1 pair of scissors
1 pencil
2 desks

Procedure: Before this shift begins, work as a group to break the production process into a series of steps. Include cutting the paper, folding, and writing the company name. Before the shift begins, assign group members to one of the steps and organize the new assembly line. When the shift ends, the quality control manager should record the number of acceptable airplanes completed in the Shift 2 column on the Productivity Chart.

Shift 3

Materials:
Using the costs listed on the Productivity Chart, decide as a group whether to purchase additional desks, scissors, or pencils for the purposes of increasing productivity or of adding a second assembly line. You may acquire a maximum of 6 desks, 3 scissors, and 10 pencils.

Procedure: Before the shift begins, record the costs of any new capital in the Shift 3 column on the chart and reorganize the new assembly line or lines. At the end of the shift, record the number of airplanes completed in the Shift 3 column on the chart.

Productivity Chart

	Shift 1	Shift 2	Shift 3
a number of acceptable airplanes completed			
b number of workers			
c cost of materials (25¢ per plane)			
d wages ($1.00 per worker)			
e factory rent ($1.00 per desk)	2.00	2.00	
f investment in equipment (50¢ per scissors) (25¢ per pencil)	.75	.75	
g total cost (c + d + e + f)			
h cost per airplane (g + a)			
i total time worked (b x 4 minutes)			
j output per minute (a + i)			
k productivity per worker (a + b)			

Simulation Analysis

Complete the productivity chart as a group; then discuss the following questions.

1. What effect did the division of labor in Shift 2 have on productivity?
2. What effect did investing in additional capital goods for Shift 3 have on productivity?
3. For which shift was the cost per airplane the lowest? The highest?
4. **Identifying Alternatives** If instead of making an additional capital investment in Shift 3, the company had laid off one or two workers, how might total production, costs, and productivity per worker (rows a, g, h, j, and k on the productivity chart) have been affected?