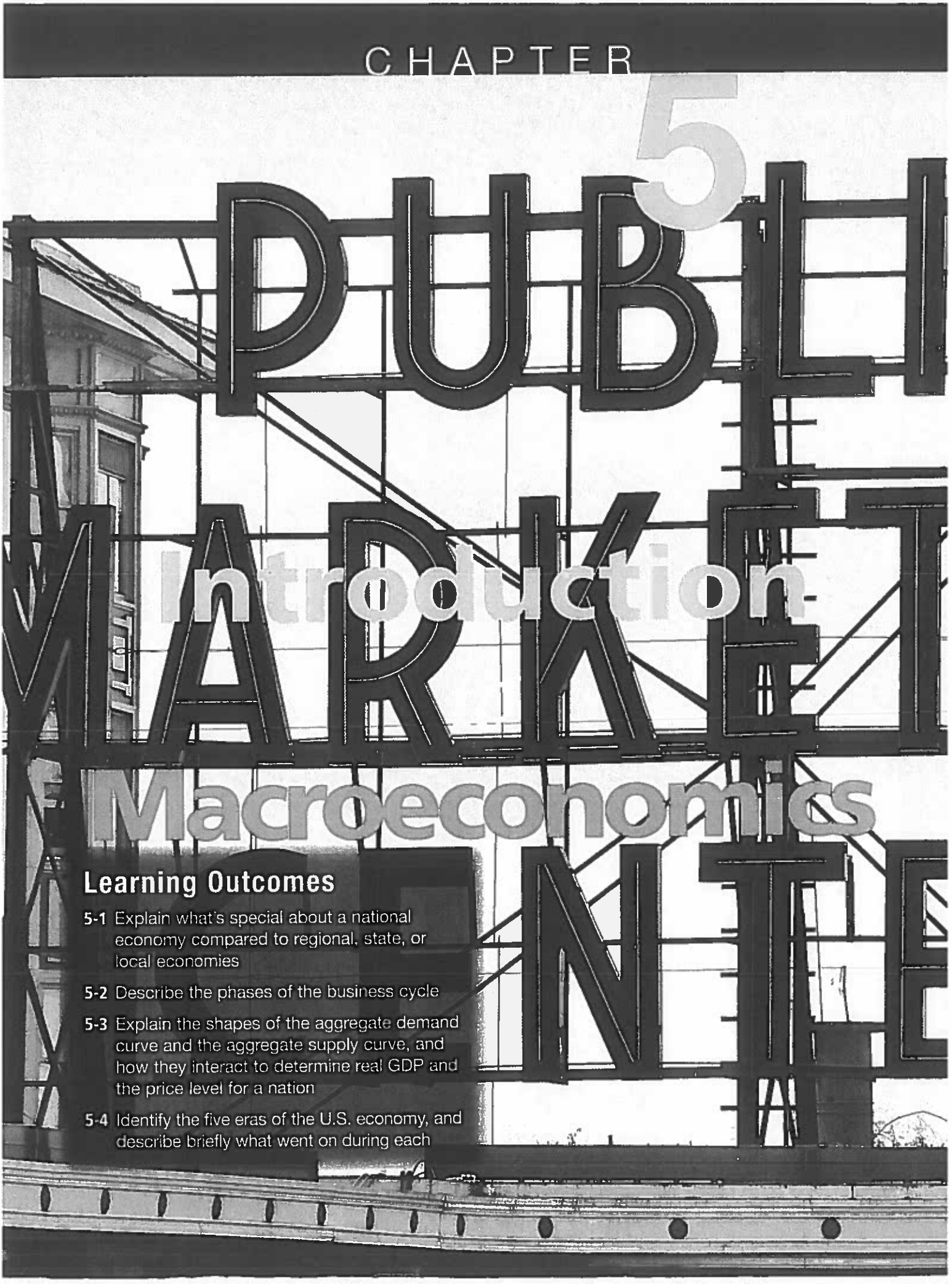


CHAPTER 5

Introduction to Macroeconomics

Learning Outcomes

5-1 Explain what's special about a national economy compared to regional, state, or local economies

5-2 Describe the phases of the business cycle

5-3 Explain the shapes of the aggregate demand curve and the aggregate supply curve, and how they interact to determine real GDP and the price level for a nation

5-4 Identify the five eras of the U.S. economy, and describe briefly what went on during each

DOCBOMBAY/DREAMSTIME.COM

"Which has more impact on your standard of living, the economy's short-term ups-and-downs or its long-term growth trend?"

What's the big idea in macroeconomics? Why is its focus the national economy? How do we measure the economy's performance over time? Which has more impact on your standard of living, the economy's short-term ups and downs or its long-term growth trend? What's the difference between demand-side economics and supply-side economics? How has the economic role of government evolved during the last century? Why is learning about the macroeconomy like learning about the weather? Answers to these and other questions are addressed in this chapter, which introduces macroeconomics.

What do think?

Keynes economic theory is more applicable to our present economic state than Smith's.

Strongly Disagree 1 2 3 4 5 6 7 *Strongly Agree*

Macroeconomics looks at the big picture—not the demand for iPads but the demand for everything produced in the economy; not the price of gasoline but the average price of all goods and services produced in the economy; not consumption by the Martinez household but consumption by all households; not investment by Google but investment by all firms in the economy.

Macroeconomists develop and test theories about how the economy as a whole works—theories that can help predict the impact of economic policies and events. Macroeconomists are concerned not only with what determines such big-picture indicators as production, employment, and the price level but also with understanding how and why they change over time. Macroeconomists are especially interested in what makes an economy grow, because a growing economy creates more jobs and more goods and services—in short, more growth means a rising standard of living. What determines the economy's ability to use resources productively, to adapt, to grow? This chapter begins exploring such questions.

Topics discussed in Chapter 5 include

- The national economy
- Economic fluctuations
- Aggregate demand
- Aggregate supply
- Equilibrium price level and aggregate output
- A brief history of the U.S. economy
- Demand-side economics
- Stagflation
- Supply-side economics
- The Great Recession of 2007–2009

5-1 The National Economy

Macroeconomics concerns the overall performance of the *economy*. The term **economy** describes the structure of economic activity, in a community, a region, a country, a group of countries, or the world. We could talk about the Chicago economy, the Illinois economy, the Midwest economy, the U.S. economy, the North American economy, or the world economy. We measure an economy in different ways, such as the amount produced, the number of people working, or their total income. The most common yardstick is *gross product*, which measures the market value of all final goods and services produced in a particular geographical region during a given period, usually one year.

> "We can use the gross domestic product to compare different economies at the same time or to track the same economy over time."

If the focus is the Illinois economy, we consider the *gross state product*. If the focus is the U.S. economy, we consider the **gross domestic product**, or **GDP**, which measures the market value of all final goods and services produced in the United States during a given period, usually a year. GDP adds up production of the economy's incredible variety of goods and services, from trail bikes to pedicures. We can use the gross domestic product to compare different economies at the same time or to track the same economy over time. We could also consider the **gross world product**, which measures the value of all final goods and services produced in the world during a given period, usually a year. Just as a point of reference, the gross world product was estimated to be about $83 trillion in 2012, up 3.3 percent from the year before.[1] U.S. production accounts for nearly 20 percent of gross world product. The focus of macroeconomics is usually the national economy.

economy
The structure of economic activity in a community, a region, a country, a group of countries, or the world

gross domestic product (GDP)
The market value of all final goods and services produced in the nation during a particular period, usually a year

gross world product
The market value of all final goods and services produced in the world during a given period, usually a year

5-1a What's Special About the National Economy?

The national economy deserves special attention. Here's why: If you were to drive west on Interstate 10 in Texas, you would hardly notice the crossing into New Mexico. But if, instead, you took the Juarez exit south into Mexico, you would be stopped at the border and asked for identification, and you and your vehicle could be searched. You would become quite aware of crossing an international border. Like most countries, the United States and Mexico usually allow people and goods to move more freely *within* their borders than *across* their borders.

The differences between the United States and Mexico are far greater than the differences between Texas and New Mexico. For example, each country has its own standard of living and currency, its own culture and language, its own communication and transportation system, its own system of government, and its own "rules of the game"—that is, its own laws, regulations, customs, manners, and ways of doing business both within and across its borders.

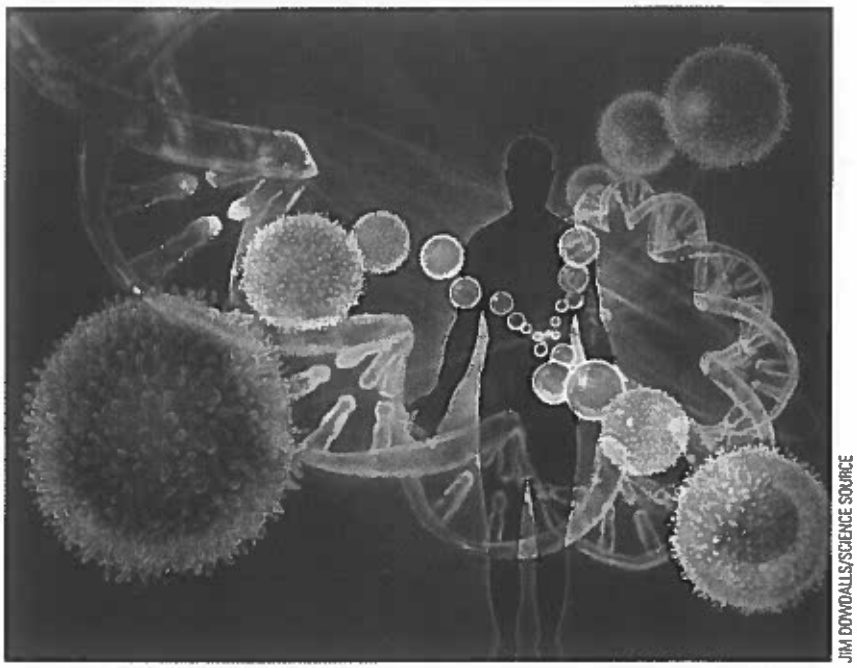
Macroeconomics typically focuses on the performance of the national economy, including how the national economy interacts with other national economies around the world. The U.S. economy is the largest and most complex in world history, with about 120 million households, more than 30 million for-profit businesses, and 89,055 government jurisdictions. The world economy includes about 200 sovereign nations, ranging in population from Liechtenstein, with only 37,000 people, to China, with 1.4 billion, or about 38,000 times more. These numbers offer snapshots, but the economy is a motion picture, a work in progress—too complex to capture in snapshots. That's why we use theoretical

STEPHEN SAKS PHOTOGRAPHY/ALAMY

The United States and Mexico usually allow people and goods to move more freely within their borders than across their borders.

1. Central Intelligence Agency, *World Factbook*, at https://www.cia.gov/library/publications/the-world-factbook/.

models to focus on key relationships. To help you get your mind around the economy, let's begin with a simple analogy.


JIM DOWDALLS/SCIENCE SOURCE

5-1b The Human Body and the U.S. Economy

Consider the similarities and differences between the human body and the economy. The body consists of millions of cells, each performing particular functions yet each linked to the entire body. Similarly, the U.S. economy is composed of millions of decision makers, each acting with some independence yet each connected with the economy as a whole. The economy, like the body, is continually renewing itself, with new households, new businesses, a changing cast of public officials, and new foreign competitors and customers. Blood circulates throughout the body, facilitating the exchange of oxygen and vital nutrients among cells. Similarly, *money* circulates throughout the economy, facilitating the exchange of resources and products among individual economic units. In fact, blood and money are each called a *medium of exchange*. In Chapter 1, we saw that the movement of money, products, and resources throughout the economy follows a *circular flow*, as does the movement of blood, oxygen, and nutrients throughout the body.

Flow and Stock Variables

Just as the same blood recirculates as a medium of exchange in the body, the same dollars recirculate as a medium of exchange in the economy to finance transactions. The dollars you spend on bagels are spent by the baker on butter and then spent by the dairy farmer on work boots. Dollars *flow* through the economy. To measure a flow, we use a **flow variable**, which is an amount per unit of time, such as your average spending per week or your heartbeats per minute. In contrast, a **stock variable** is an amount measured at a particular point in time, such as the amount of money you have with you right now or your weight this morning.

Testing New Theories

Physicians and other natural scientists test their theories using controlled experiments. Macroeconomists, however, have no laboratories and little ability to run economy-wide experiments of any kind. Granted, they can study different economies around the world, but each economy is unique, so comparisons are tricky. Controlled experiments also provide the natural sciences with something seldom available to economists—the chance, or serendipitous, discovery (such as penicillin). Macroeconomists studying the U.S. economy have only one patient, so they can't introduce particular policies in a variety of alternative settings. You can't squeeze economies into a test tube. Cries of "Eureka!" are seldom heard from macroeconomists. An economy consisting of hundreds of millions of individual actors is a complicated thing. As Nobel Prize-winning physicist Murray Gell-Mann once observed, "Think how hard physics would be if particles could think."

5-1c Knowledge and Performance

Throughout much of history, little was known about the human body, yet many people still enjoyed good health. For example, the fact that blood circulates in the body was not established until 1638; it took scientists another 150 years to figure out why. Similarly, over the millennia, various complex economies developed and flourished, although at the time there was little understanding about how an economy worked.

flow variable
A measure of something over an interval of time, such as your spending per week

stock variable
A measure of something at a particular point in time, such as the amount of money you have with you right now

The economy is much like the body: As long as it functions smoothly, policy

makers need not understand how it works. But if a problem develops—severe unemployment, high inflation, or sluggish growth, for example—we must know how a healthy economy works before we can consider whether anything can be done. We need not know every detail of the economy, just as we need not know every detail of the body. But we must understand essential relationships among key variables. For example, does the economy work well on its own, or does it often perform poorly? If it performs poorly, are there public-policy remedies? Can we be sure that a proposed remedy would not do more harm than good? When doctors didn't understand how the human body worked, their attempted "cures" were often worse than the diseases. Much of the history of medicine describes misguided efforts to deal with disease. Even today, medical care is based on less scientific evidence than you might think. According to one study, only one in seven medical interventions is supported by reliable scientific evidence.[2] For example, acetaminophen (e.g., Tylenol) is a popular pain reliever, but nobody really knows how it works. According to an old saying, "Nature heals and the doctor collects the fee." Or as Voltaire wrote, "The art of medicine consists of amusing the patient while nature cures the disease."

mercantilism
The incorrect theory that a nation's economic objective should be to accumulate precious metals in the public treasury; this theory prompted trade barriers, which cut imports, but other countries retaliated, reducing trade and the gains from specialization

expansion
A period during which the economy grows as reflected by rising output, employment, income, and other aggregate measures

contraction
A period during which the economy declines as reflected by falling output, employment, income, and other aggregate measures

depression
A severe and prolonged reduction in economic activity, as occurred during the 1930s

recession
A period of decline in economic activity lasting more than a few months, as reflected by falling output, employment, income, and other aggregate measures

Likewise, policy makers may adopt the wrong prescription because of a flawed theory about how the economy works. At one time, for example, a nation's economic vitality was thought to spring from the stock of precious metals accumulated in the public treasury. This theory spawned a policy called **mercantilism**, which held that, as a way of accumulating gold and silver, a nation should try to export more than it imports. To achieve this, nations restricted imports by such barriers as tariffs and quotas. But these restrictions led to retaliations by other countries, reducing international trade and the gains from specialization. Another flawed economic theory prompted President Herbert Hoover to introduce a major tax *increase* during the Great Depression. Economists have since learned that such a policy does more harm than good. Debates about the effectiveness of government policies were widespread as officials reacted to the crushing recession of 2007–2009.

We turn now to the performance of the U.S. economy.

2. As reported by Sherwin Nuland, "Medical Fads: Bran, Midwives and Leeches," *New York Times*, 25 January 1995.

5-2 Economic Fluctuations and Growth

The U.S. economy and other industrial market economies historically have experienced alternating periods of expansion and contraction in economic activity. As noted in Chapter 1, *economic fluctuations* are the rise and fall of economic activity relative to the long-term growth trend of the economy. These fluctuations, or *business cycles*, vary in length and intensity, yet some features appear common to all. The ups and downs usually involve the entire nation and often many other economies around the world, and they affect nearly all dimensions of economic activity, not just production and employment.

5-2a U.S. Economic Fluctuations

Perhaps the easiest way to understand the business cycle is to examine its components. During the 1920s and 1930s, Wesley C. Mitchell, director of the National Bureau of Economic Research (NBER), analyzed business cycles, noting that the economy has two phases: *expansions* and *contractions*. During an **expansion**, the economy grows as reflected by rising output, employment, income, and other aggregate measures. During a **contraction**, the economy declines as reflected by falling output, employment, income, and other aggregate measures. A contraction might be so sharp as to be called a **depression**, which is a severe and prolonged reduction in the nation's economic activity, as occurred during the 1930s. A milder contraction is called a **recession**, which is a period of decline in economic activity lasting more than a few months, as reflected by falling output employment, income, and other aggregate measures. The U.S. economy experienced both recessions and depressions before World War II. Since then, there have been recessions but no depressions, so things have improved.

Despite these ups and downs, the U.S. economy has grown dramatically over the long term. Although

economic activity is measured in a variety of ways, if we had to settle on a single indicator, output best captures what's going on. The economy nowproduces over 14 times more output than it did in 1929. Output is measured by real GDP, the value of final goods and services after stripping away changes due to inflation, which is an increase in the economy's average price level. Production increased because of (1) increases in the amount and quality of resources, especially labor and capital; (2) better technology; and (3) improvements in the *rules of the game* that facilitate production and exchange, such as property rights, patent laws, the legal system, and market practices.

Exhibit 1 shows the long-term growth trend in economic activity as an upward-sloping straight line. Economic fluctuations reflect movements around this growth trend. A contraction begins after the previous expansion has reached a *peak*, or high point, and continues until the economy reaches a *trough*, or low point. The period between a peak and trough is a *contraction*, and the period between a trough and subsequent peak is an *expansion*. Note that expansions last longer than contractions, but the length of the full cycle varies.

Analysts at NBER have tracked the U.S. economy back to 1854. Since then, the nation has experienced 33 peak-to-trough-to-peak cycles. No two have been exactly alike. During the 22 business cycles prior to 1945, expansions averaged 29 months and contractions 21 months. During the 11 cycles since 1945, expansions stretched twice as long to 57 months, and recessions fell by nearly half to 11 months—so expansions averaged nearly five years and recessions nearly one year. Thus, since 1945 expansions are longer and recessions are shorter. Both developments have been hugely beneficial for economic growth and the U.S. standard of living. The longest expansion on record lasted ten years, from March 1991 to March 2001. The longest contraction lasted five and a half years, from 1873 to 1879.

> "Because of seasonal fluctuations and random disturbances, the economy does not move smoothly through phases of the business cycle."

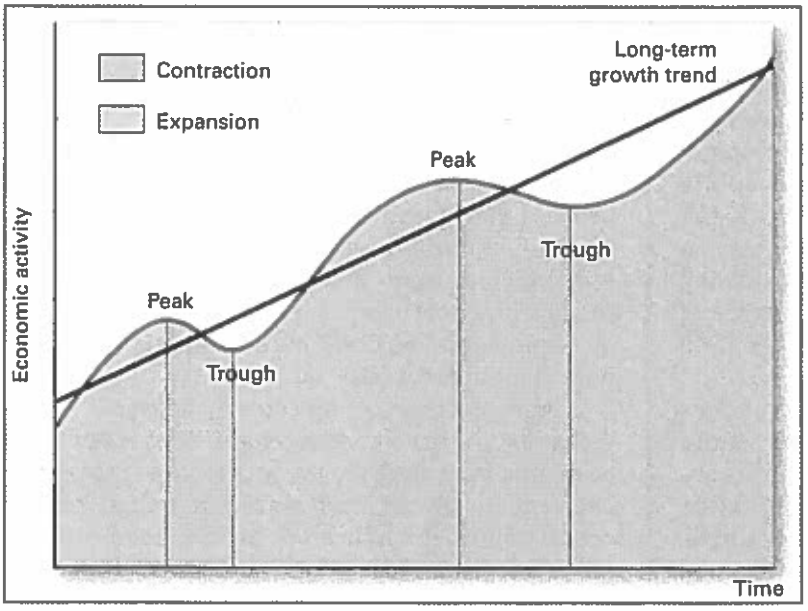
Exhibit 2 shows annual percentage changes in real GDP since 1929. Years of declining real GDP are shown as red bars and years of increasing real GDP as blue bars. The big decline during the Great Depression of the early 1930s and the sharp jump during World War II stand in stark contrast. Growth since 1929 has averaged 3.3 percent a year.

The intensity of U.S. economic fluctuations varies across regions. A recession hits hardest those regions that produce more capital goods, such as heavy machinery, and durable goods, such as appliances, furniture, and automobiles. The demand for these goods falls more during hard times than does the demand for other goods and services, such as breakfast cereal, gasoline, and haircuts. Recessions also hit hardest those states that rely on housing construction such as Arizona, California, Florida, and Nevada.

Because of seasonal fluctuations and random disturbances, the economy does not move smoothly

Exhibit 1

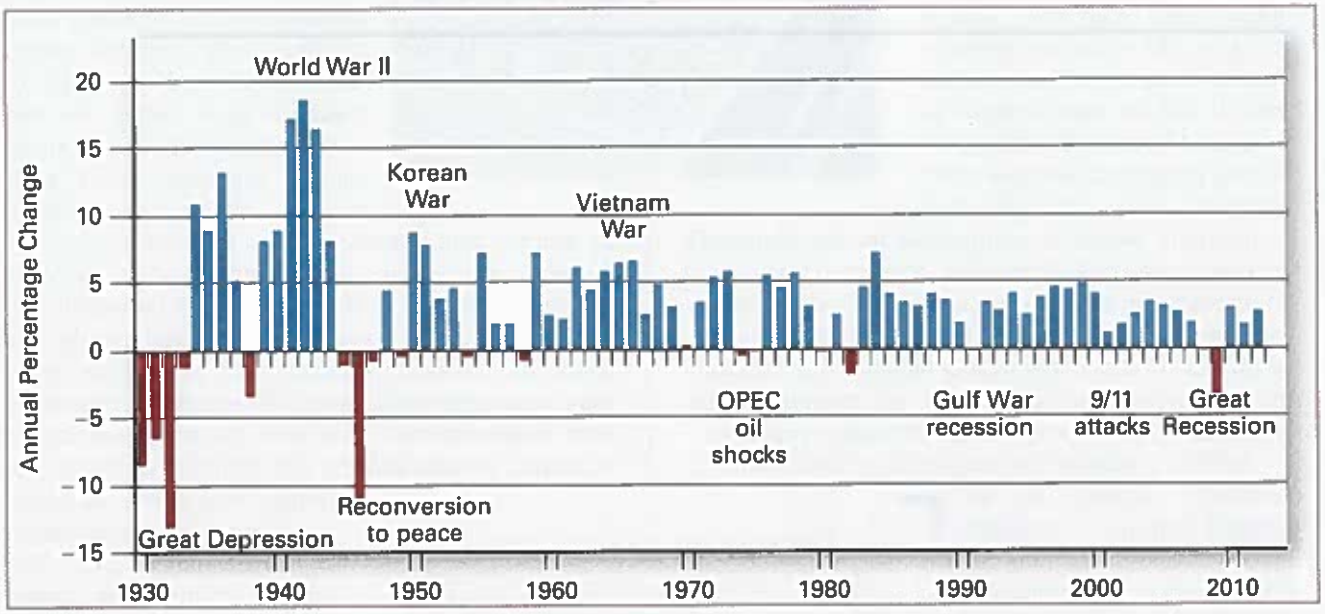
Hypothetical Business Cycles



inflation
An increase in the economy's average price level

Exhibit 2

Annual Percentage Change in U.S. Real GDP Since 1929



SOURCE: Bureau of Economic Analysis, U.S. Dept. of Commerce. For the latest data, go to http://bea.gov/national/index.htm#gdp.

through phases of the business cycle. Economists can't always distinguish a temporary drop in economic activity from the beginning of a downturn. A drop in economic activity may result from a temporary slowdown, such as a snowstorm or a poor growing season. Turning points—peaks and troughs—are thus identified by the NBER only after the fact. Because a recession means economic activity declines for more than a few months (two quarters, or six months, is sometimes used as a rule of thumb), and because the official announcement that a recession has begun is not made until months after that, we sometimes don't know for sure when a recession starts until a year later (as was the case with the recession that began in December 2007). Likewise, a recession's end is sometimes not announced until a year or more after it's over (for example, the Great Recession ended in June 2009, but the official announcement of that fact did not come until 15 months later).

leading economic indicators
Variables that predict or *lead to* a recession or recovery; examples include consumer confidence, stock market prices, business investment, and big-ticket purchases, such as automobiles and homes

coincident economic indicators
Variables that reflect peaks and troughs in economic activity as they occur; examples include employment, personal income, and industrial production

As noted, fluctuations usually involve the entire nation. Indeed, major economies around the world often move together. For example, the Great Depression was a worldwide calamity. The unemployment rate in Germany reached 34 percent, which helped Adolf Hitler's rise to power. Recession also spanned most of the globe as a result of the financial crisis of 2008.

5-2b Leading Economic Indicators

Certain events foreshadow a turning point in economic activity. Months before a recession is fully under way, changes in leading economic indicators point to the coming storm. In the early stages of a recession, business slows down, orders for machinery and computers slip, and the stock market, anticipating lower profits, turns down. Consumer confidence in the economy also begins to sag, so households spend less, especially on big-ticket items like homes and automobiles. Unsold goods start piling up. All these signs are called leading economic indicators because they usually predict, or *lead to*, a downturn. Likewise, upturns in leading indicators point to an economic recovery. But leading indicators cannot predict precisely *when* a turning point will occur, or even *whether* one will occur. Sometimes leading indicators sound a false alarm.

Some economic indicators measure what's going on in the economy right now. Coincident economic indicators are those measures that reflect expansions, contractions, peaks, and troughs as they occur. Coincident indicators include total employment, personal income, and industrial production. And some economic indicators measure what has

already happened. **Lagging economic indicators** follow, or trail, changes in overall economic activity. Lagging indicators, which look at the economy through the rearview mirror, include interest rates, the unemployment rate, and how long people remain unemployed.

Our introduction to business cycles has been largely mechanical, focusing on the history and measurement of these fluctuations. We have not discussed why economies fluctuate, in part because such a discussion requires firmer footing in macroeconomic theory and in part because the causes remain in dispute. In the next section, we begin to build a macroeconomic framework by introducing a key model of analysis.

5-3 Aggregate Demand and Aggregate Supply

The economy is so complex that we need to simplify matters, or to abstract from the millions of relationships to isolate the important ones. We must step back from all the individual economic transactions to survey the resulting mosaic.

5-3a Aggregate Output and the Price Level

Let's begin with something you already know. Picture a pizza. Now picture food more generally. Food, of course, includes not just pizza but thousands of other items. Although food is more general than pizza, you probably have no difficulty picturing food. Now make the leap from food to all goods and services produced in the economy—food, housing, clothing, entertainment, transportation, health care, and so on. Economists call this **aggregate output**. Because *aggregate* means total, aggregate output is the total amount of goods and services produced in the economy during a given period. Because output is measured per period, it's a flow measure. The best measure of aggregate output is *real GDP*, which you'll soon learn more about.

Just as we can talk about the demand for pizza, or the demand for food, we can talk about the demand for aggregate output. **Aggregate demand** is the relationship between the average price of aggregate output in the economy and the quantity of aggregate output demanded. The average price of aggregate output is called the economy's **price level**. You are more familiar than you may think with these aggregate measures. Headlines refer to the growth of aggregate output—as in "Growth Slows in Second Quarter." News accounts also report on changes in the "cost of living," reflecting movements in the economy's price level—as in "Prices Jump in June."

In a later chapter, you learn how the economy's price level is computed. All you need to know now is that the price level in any year is an *index number*, or a reference number, comparing average prices that year with average prices in some base, or reference, year. If we say that the price level is higher, we mean compared with where it was. In Chapter 4, we talked about the price of a particular product, such as pizza, *relative to the prices of other products*. Now we talk about the *average price* of all goods and services produced in the economy *relative to the price level in some base year*.

The price level in the *base year* is standardized to a benchmark value of 100, and price levels in other years are expressed relative to the base-year price level. For example, in 2012, the U.S. price level, or price index, was 105, indicating that the price level that year was 5 percent higher than its value of 100 in the base year of 2009. The price level, or price index, is used not only to compare prices over time but also to compare real aggregate output over time. Economists use the *price index* to eliminate year-to-year changes in GDP due solely to changes in the price level. What's left is the change in real output—the change in the amount of goods and services produced. After adjusting GDP for price level changes, we end up with what is called the **real gross domestic product**, or **real GDP**. So the price index (1) shows how the economy's price level changes over time and (2) is used to figure out real GDP each year. You'll get a better idea of these two roles as we discuss the U.S. economy.

lagging economic indicators
Variables that follow, or trail, changes in overall economic activity; examples include the interest rate and the average duration of unemployment

aggregate output
A composite measure of all final goods and services produced in an economy during a given period; real GDP

aggregate demand
The relationship between the economy's price level and aggregate output demanded, with other things constant

price level
A composite measure reflecting the prices of all goods and services in the economy relative to prices in a base year

real gross domestic product (real GDP)
The economy's aggregate output measured in dollars of constant purchasing power

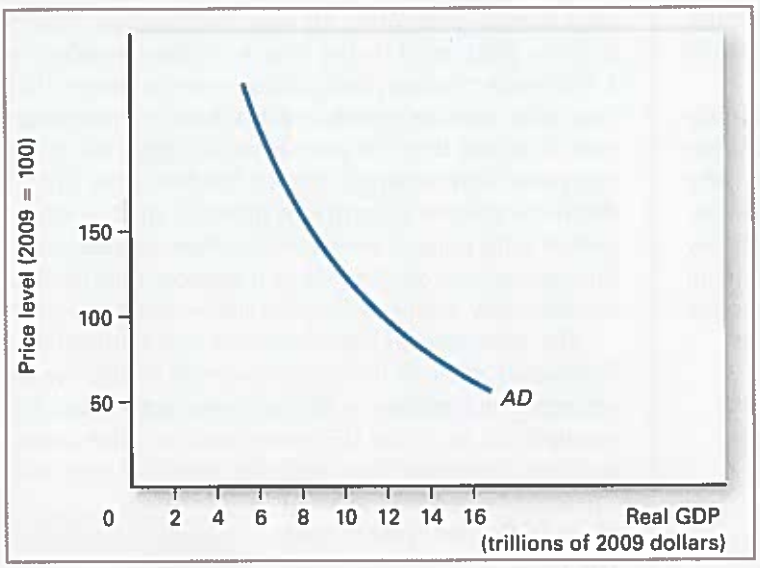
aggregate demand curve
A curve representing the relationship between the economy's price level and real GDP demanded per period, with other things constant

5-3b Aggregate Demand Curve

In Chapter 4, you learned about the demand for a particular product, such as pizza. Now let's talk about the demand for our composite measure of output—aggregate output, or real GDP. The aggregate demand curve

Exhibit 3

Aggregate Demand Curve



shows the relationship between the price level in the economy and real GDP demanded, other things constant. Exhibit 3 shows a hypothetical aggregate demand curve, *AD*. The vertical axis measures an index of the economy's price level relative to a 2009 base-year price level of 100. The horizontal axis shows real GDP, which measures output in dollars of constant purchasing power (here we use 2009 prices).

The aggregate demand curve in Exhibit 3 reflects an inverse relationship between the price level in the economy and real GDP demanded. Aggregate demand sums demands of the four economic decision makers: households, firms, governments, and the rest of the world. As the price level increases, other things constant, households demand less housing and furniture, firms demand fewer trucks and tools, governments demand less computer software and military hardware, and the rest of the world demands less U.S. grain and U.S. aircraft.

The reasons behind this inverse relationship get a closer look in later chapters, but here's a quick summary. Real GDP demanded depends in part on household *wealth*. Some wealth is usually held in bank accounts and in currency. An increase in the price level, other things constant, decreases the purchasing power of bank accounts and currency. Households are therefore poorer when the price level increases, so the quantity of real GDP they demand decreases. Conversely, a reduction in the price level increases the purchasing power of bank accounts and currency. Because households are richer as the price level decreases, the quantity of real GDP they demand increases.

Factors held constant along a given aggregate demand curve include the price levels in other countries as well as the exchange rates between the U.S. dollar and foreign currencies. When the U.S. price level increases, U.S. products become more expensive relative to foreign products. Consequently, households, firms, and governments both here and abroad decrease the quantity of U.S. products demanded. On the other hand, a lower U.S. price level makes U.S. products cheaper relative to foreign products, so the quantity of U.S. products demanded increases.

Consider the demand for a particular product versus aggregate demand. If the price of a particular product, such as pizza, increases, quantity demanded declines in part because pizza becomes more costly compared to substitutes. If the U.S. economy's price level increases, the quantity of U.S. real GDP demanded declines in part because U.S. products become more costly compared to foreign products.

> "Aggregate demand sums demands of the four economic decision makers: households, firms, governments, and the rest of the world."

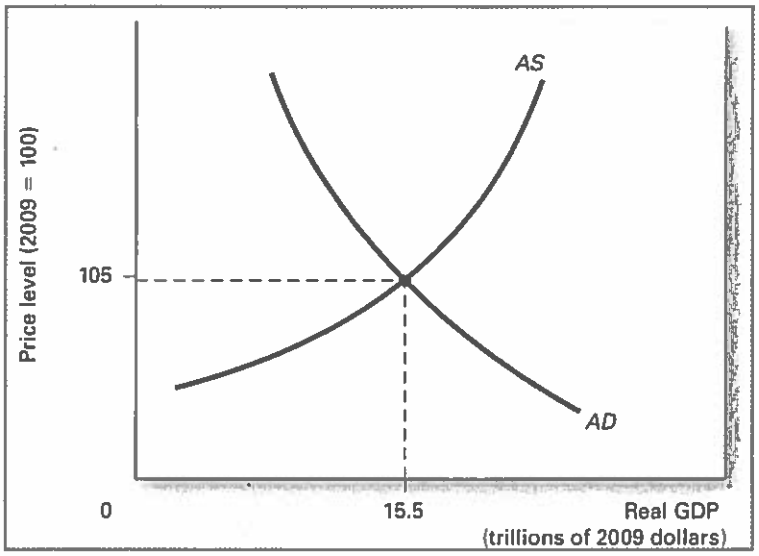
aggregate supply curve
A curve representing the relationship between the economy's price level and real GDP supplied per period, with other things constant

5-3c Aggregate Supply Curve

The aggregate supply curve shows how much U.S. producers are willing and able to supply at each price level, other things constant. How does quantity supplied respond to changes in the price level? The upward-sloping aggregate supply curve, AS, in Exhibit 4 shows a positive relationship between the price level and the quantity of real GDP supplied. Assumed constant along an aggregate supply curve are (1) resource prices, (2) the state of technology, and (3) the rules of the game that provide production incentives, such as patents, tax rates, and business practices. With regard to resource prices, wage rates are typically assumed to be constant along the aggregate supply curve. With wages constant, firms find a higher price level more profitable, so they increase real GDP supplied. As long as the prices firms receive

Exhibit 4

Aggregate Demand and Aggregate Supply in 2012



for their products rise faster than their cost of production, firms find it profitable to expand output, so real GDP supplied varies directly with the economy's price level.

5-3d Equilibrium

The aggregate demand curve intersects the aggregate supply curve to determine the equilibrium levels of price and real GDP in the economy. Exhibit 4 offers a rough depiction of aggregate demand and aggregate supply in 2012. Equilibrium real GDP that year was about $15.5 trillion (measured in dollars of 2009 purchasing power). The equilibrium price level was 105 (compared with a price level of 100 in the base year of 2009). At any other price level, quantity demanded would not match quantity supplied.

Incidentally, although employment is not measured directly along the horizontal axis, firms usually must hire more workers to produce more output. So higher levels of real GDP can be beneficial because (1) more goods and services become available in the economy, and (2) more people are usually employed. Perhaps the best way to understand aggregate demand and aggregate supply is to apply these tools to the U.S. economy. The following section simplifies U.S. economic history to review changes in the price and output levels over time.

"As long as the prices firms receive for their products rise faster than their cost of production, firms find it profitable to expand output, so real GDP supplied varies directly with the economy's price level."

5-4 Brief History of the U.S. Economy

The history of the U.S. economy can be divided roughly into five economic eras: (a) before and during the Great Depression, (b) after the Great Depression to the early 1970s, (c) from the early 1970s to the early 1980s, (d) from the early 1980s to 2007, and (e) the Great Recession of 2007–2009 and beyond. The first era suffered from recessions and depressions, culminating in the Great Depression of the 1930s. These depressions were often accompanied by a falling price level. The second era was one of generally strong economic growth, with only moderate increases in the price level. The third era saw both high unemployment and high inflation at the same time, a troubling combination. The fourth era was more like the second, with good economic growth on average and only moderate increases in the price level. And the fifth era brought us the worst recession since the Great Depression. It remains to be seen whether the recession turns out to be just a temporary setback or has long-term consequences for the United States and the world.

5-4a The Great Depression and Before

Before World War II, the U.S. economy alternated between hard times and prosperity. As noted earlier, the longest contraction on record occurred between 1873 and 1879, when 80 railroads went bankrupt and most of the nation's steel mills shut down. During the 1890s, the economy contracted about half the time, and the unemployment rate topped 18 percent. In October 1929, the stock market crash began what was to become the deepest, though not the longest, economic contraction in our nation's history, the Great Depression of the 1930s.

In terms of aggregate demand and aggregate supply, the Great Depression can be viewed as a shift to the left of the aggregate demand curve, as shown in Exhibit 5. AD_{1929} depicts the aggregate demand curve in 1929, before the onset of the depression. Real GDP in 1929 was $1,056 billion (measured in dollars

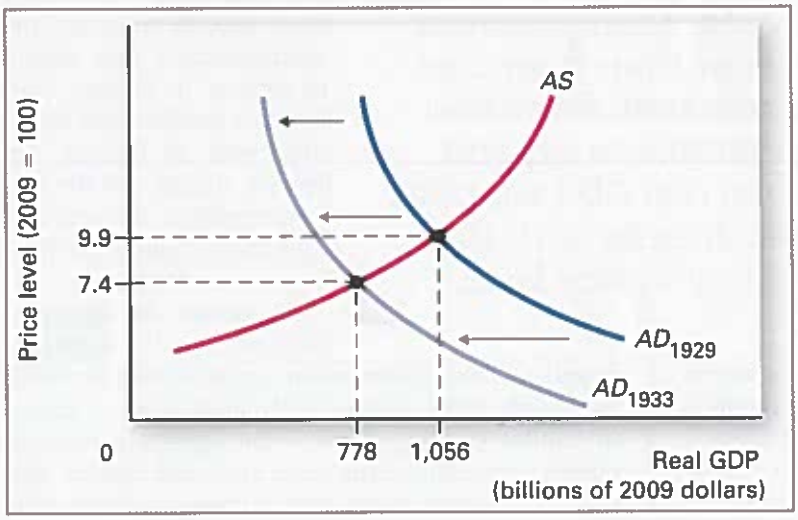
MPI/GETTY IMAGES

of 2009 purchasing power), and the price level was 9.9 (relative to a 2009 base-year price level of 100). By 1933, aggregate demand shifted leftward, decreasing to AD_{1933}. Why did aggregate demand decline? Though economists still debate the exact causes, most agree that the stock market crash of 1929 was the trigger. From there, grim business expectations cut investment, consumer spending fell, banks failed, the nation's money supply dropped by one-third, and world trade was severely restricted by high tariffs. All this contributed to a big decline in aggregate demand. The aggregate supply curve probably also shifted somewhat during this period, but the drop in aggregate demand was the dominant force.

Because of the decline in aggregate demand, both the price level and real GDP dropped. Real GDP fell 26 percent, from $1,056 billion in 1929 to $778 billion in 1933, and the price level fell 26 percent, from 9.9 to 7.4. As real GDP declined, unemployment soared

Exhibit 5

The Decrease in Aggregate Demand From 1929 to 1933



> "Higher levels of real GDP can be beneficial because (1) more goods and services become available in the economy, and (2) more people are usually employed."

from only 3 percent of the labor force in 1929 to 25 percent in 1933, the highest U.S. rate ever recorded.

Before the Great Depression, macroeconomic policy was based primarily on the *laissez-faire* philosophy of Adam Smith. Smith, you may recall, argued in his famous book, *The Wealth of Nations*, that if people are allowed to pursue their self-interest in free markets, resources would be guided as if by an "invisible hand" to produce the most efficient and most valued level of aggregate output. Although the U.S. economy suffered many sharp contractions even before the Great Depression, most economists of the day viewed these as a natural phase of the economy—unfortunate for those who lost jobs and savings but ultimately therapeutic and self-correcting.

5-4b The Age of Keynes: After the Great Depression to the Early 1970s

The Great Depression was so deep that it stimulated new thinking about how the economy worked (or didn't work). In 1936, John Maynard Keynes (1883–1946) published *The General Theory of Employment, Interest, and Money*, the most famous economics book of the 20th century. In it, he argued that aggregate demand was inherently unstable, in part because investment decisions were often guided by the unpredictable "animal spirits" of business expectations. If businesses grew pessimistic about the economy, they would invest less, which would reduce aggregate demand, output, and employment. For example, investment spending dropped more than 80 percent between 1929 and 1933. Keynes saw no natural market forces operating to ensure that the economy, even if allowed a reasonable time to adjust, would get output and employment growing again.

Keynes proposed that the government jolt the economy out of its depression by increasing

aggregate demand. He recommended an expansionary fiscal policy to help offset contractions. The government could achieve this stimulus either directly by increasing its own spending, or indirectly by cutting taxes to stimulate consumption and investment. But either action would likely create a federal budget deficit. A **federal budget deficit** is a flow variable that measures, for a particular period, the amount by which federal outlays exceed federal revenues.

To understand what Keynes had in mind, imagine federal budget policies that would increase the aggregate demand shown in Exhibit 5, shifting the aggregate demand curve to the right, back to its original position. Such a shift would raise real GDP, which would increase employment. According to the Keynesian prescription, the miracle drug of fiscal policy—changes in government spending and taxes—could compensate for what he viewed as the instability of private-sector spending, especially investment. If demand in the private sector declined, Keynes said the government should pick up the slack. We can think of the Keynesian approach as **demand-side economics** because it focused on how changes in aggregate demand might promote full employment. Keynes argued that government stimulus could shock the economy out of its depression. Once investment returned to normal levels, and the economy started growing on its own, the government's shock treatment would no longer be necessary.

The U.S. economy bounced back beginning in 1933, growing four years in a row (see Exhibit 2 again). The outbreak of World War II boosted employment to fight for the country and to make tanks, ships, aircraft, and the like. Federal government spending increased from 7 percent of GDP in 1940 to 46 percent in 1944. The explosion of output and sharp drop in unemployment seemed to confirm the powerful role government spending could play in the economy. But the increase in government spending, with no significant increase in tax rates, created large federal deficits during the war.

Immediately after the war, memories of the Great Depression were still vivid. Trying to avoid another depression, Congress approved the *Employment Act of 1946*, which imposed a clear responsibility on the federal government to promote "maximum employment, production, and purchasing power." The act also required the president to appoint a *Council of Economic Advisers*, a three-member team of economists to provide economic advice and report on the economy.

The economy seemed to prosper during the 1950s largely without added stimulus from fiscal policy. The 1960s, however, proved to be the *golden age of Keynesian economics*, a period when fiscal policy makers thought they could "fine-tune" the economy for top performance—just as a mechanic fine-tunes a racecar. During the early 1960s, nearly all advanced economies around the world enjoyed low unemployment and healthy growth with only modest inflation.

The U.S. economy was on such a roll that toward the end of the 1960s some economists believed the business cycle was history. As a sign of the times, the name of a federal publication, *Business Cycle Developments*, was changed to *Business Conditions Digest*. In the early 1970s, however, the business cycle returned with a fury. Worse yet, the problems of recession were compounded by higher inflation, which increased during the recessions of 1973–1975 and 1980. Prior to that, high inflation had been limited primarily to periods of expansion—that is, to boom times. Confidence in demand-side policies was shaken, and the expression "fine-tuning" dropped from the economic vocabulary. What ended the golden age of Keynesian economics?

5-4c Stagflation: 1973–1975 and 1979–1980

During the late 1960s, federal spending increased on both the war in Vietnam and social programs at home. This combined stimulus increased aggregate demand enough that in 1968 the *inflation rate*, the annual percentage increase in the price level, rose to 4.4 percent, after averaging only 2.0 percent during the previous decade. Inflation climbed to 4.9 percent in 1969 and to 5.3 percent in 1970. These rates were so alarming at the time that in 1971, President Richard Nixon imposed ceilings on prices and wages. Those ceilings were eliminated in 1973, about the time that crop failures around the world caused grain prices to soar. To compound these problems, Organization of the Petroleum Exporting Countries (OPEC) cut its supply of oil to world markets, so oil prices jumped. Crop failures plus the OPEC action reduced aggregate supply, shown in Exhibit 6 by the leftward shift of the aggregate supply curve from AS_{1973} to AS_{1975}. This resulted in **stagflation**, meaning a *stagnation*, or a contraction, in the economy's aggregate output and *inflation*, or increase, in the economy's price level. Real GDP declined between 1973 and 1975, and unemployment climbed from 4.9 percent to

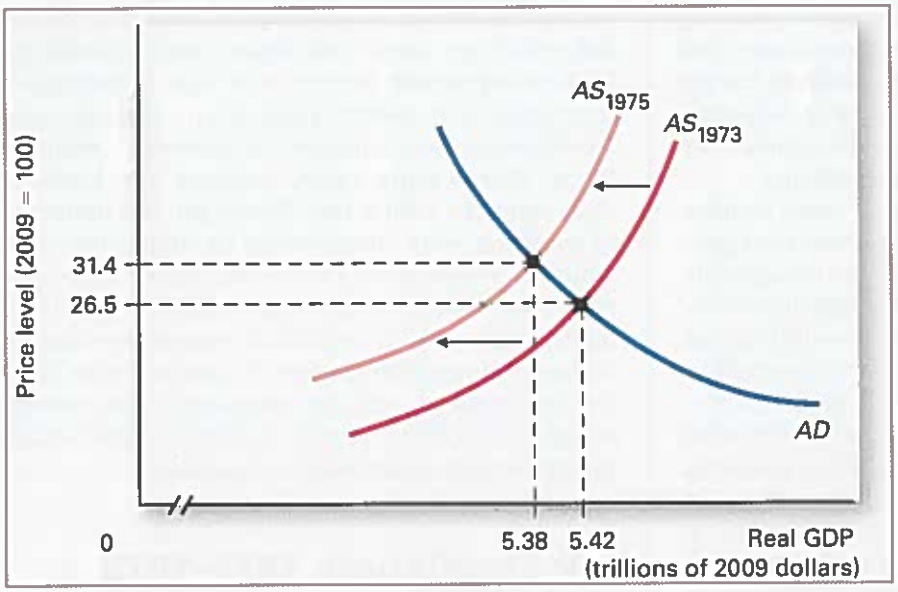
federal budget deficit
A flow variable measuring the amount by which federal government outlays exceed federal government revenues in a particular period, usually a year

demand-side economics
Macroeconomic policy that focuses on shifting the aggregate demand curve as a way of promoting full employment and price stability

stagflation
A contraction, or *stagnation*, of a nation's output accompanied by *inflation* in the price level

Exhibit 6

Stagflation From 1973 to 1975



8.5 percent. During the same two-year period, the price level jumped by 19 percent.

Stagflation hit again five years later, stoked again by more OPEC cutbacks. Between 1979 and 1980, real GDP declined but the price level increased by 9.1 percent. Macroeconomics has not been the same since. Because stagflation was on the supply side, not on the demand side, the demand-management prescriptions of Keynes seemed ineffective. Increasing aggregate demand might reduce unemployment but would worsen inflation.

5-4d Relatively Normal Times: 1980 to 2007

Increasing aggregate supply seemed an appropriate way to combat stagflation, for such a move would both lower the price level and increase output and employment. Attention thus turned from aggregate demand to aggregate supply. A key idea behind supply-side economics was that the federal government, by lowering tax rates, would increase after-tax wages, which would provide incentives to increase the supply of labor and other resources. According to advocates of the supply-side approach, the resulting increase in aggregate supply would achieve the happy result of expanding real GDP and reducing the price level. You can get the idea behind supply-side economics in Exhibit 6 by picturing the aggregate supply curve as shifting back to the right from AS_{1975} to AS_{1973}. Such a move would increase real GDP while lowering the price level. But this was easier said than done.

supply-side economics
Macroeconomic policy that focuses on a rightward shift of the aggregate supply curve through tax cuts or other changes to increase production incentives

federal debt
A stock variable that measures the net accumulation of annual federal deficits

In 1981, to provide economic incentives to increase aggregate supply, President Ronald Reagan and Congress cut personal income tax rates by an average of 23 percent to be phased in over three years. They believed that lower tax rates would increase aggregate supply, thereby expanding output and employment. They hoped that higher tax revenue from a larger economy would more than make up for the revenue lost by the cut in tax rates. In other words, the tax cutters hoped that the government's smaller share of a bigger pie would exceed what had been its larger share of a smaller pie.

But even before the tax cut took effect, recession hit, contracting output and pushing the unemployment rate up to 10 percent. Once the recession ended in late 1982, the economy began to grow, and this growth continued for the rest of the decade. Between 1982 and 1990 employment grew 19 percent and real GDP grew 38 percent, an indication that each worker was producing more. But the growth in federal spending exceeded the growth in federal tax revenues during this period, so federal budget deficits increased. Deficits worsened with the onset of a recession in 1990–1991, which was brought on by the first war in the Persian Gulf. Annual deficits accumulated as a growing federal debt. The federal debt is a stock variable that measures the net accumulation of prior federal deficits. But robust economic growth during the 1990s boosted employment by 15 percent and real GDP by 40 percent, again an indication that output per worker was growing nicely. The expanding economy combined with a booming stock market to increase tax revenue enough to yield a federal budget surplus by the end of the 1990s.

By early 2001, the U.S. economic expansion had lasted ten years to become the longest on record. Then the economy slipped into a short recession aggravated by the terrorist attacks of September 2001. The

recession lasted only eight months, but the recovery was slow and uneven. President George W. Bush pushed through tax cuts "to get the economy moving again." But the tax cuts and spending programs increased the federal budget deficit, which exceeded $400 billion in 2004. Still, employment grew 7 percent between 2000 and 2007, and real GDP grew 18 percent. That growth helped cut the budget deficit to $161 billion by 2007. In fact, during the quarter century between 1982 and 2007, employment grew 47 percent and real GDP grew 129 percent, quite an impressive performance and the envy of the world. Then things went bad.

5-4e The Great Recession of 2007–2009 and Beyond

By late 2007, the expansion that began in late 2001 had lasted six years, about average for expansions since World War II. So it was not that surprising when the expansion peaked in December 2007; then the recession began, this time precipitated by declining home prices and rising foreclosures, as more borrowers failed to make their mortgage payments. With home prices falling, fewer were getting built, meaning fewer jobs in residential construction, furnishings, and other industries that rely on the housing sector. During the first eight months of the recession, U.S. job losses averaged 151,000 a month, in line with monthly losses during the prior two recessions. In early 2008, Washington tried to stimulate aggregate demand with a $117 billion tax rebate, but the result was disappointing. The softer economy and tax cuts nearly tripled the federal deficit from $161 billion in 2007 to $459 billion in 2008; at the time this deficit seemed huge.

Fears about the effect of rising home foreclosures on the banking system fed into a full-scale global financial panic in September 2008, triggered by the collapse of Lehman Brothers, a Wall Street investment bank. An *investment bank* is a financial institution that helps businesses raise financial capital. Because Lehman Brothers was the largest bankruptcy in U.S. history, financial institutions grew reluctant to lend, so credit dried up—a major problem for an economy that relies a lot on credit. Businesses cut investments sharply. Consumers cut their spending in the face of sliding home prices, mounting job losses, and a collapsing stock market. You could picture all this as a leftward shift of the aggregate demand curve. These events unfolded against the backdrop of a presidential election. Is it any wonder that voters in 2008 went for "hope and change?"

After the collapse of Lehman Brothers and the freezing up of financial flows around the world, policy makers were emboldened to enact some

extraordinary measures to shore up confidence in financial institutions, open up the flow of credit, and stimulate consumer spending. These included two huge programs: (1) the $700 billion Troubled Asset Relief Program, or TARP, aimed at stabilizing financial institutions, and (2) the $787 billion American Recovery and Reinvestment Act, or the stimulus bill, aimed at increasing aggregate demand (the estimated cost would rise to $831 billion). The effects of these programs are still being debated today and will be discussed in later chapters. One point to underscore now is just how extraordinary these measures were. What we know for sure is that these rescue programs tripled the federal deficit from $459 billion in 2008 to $1.4 trillion in 2009.

We also know that during the 12 months following the failure of Lehman Brothers, job losses averaged 565,000 a month, nearly four times the average during the two prior recessions and during the first eight months of 2008. Job losses on that scale had not been experienced since the Great Depression. Altogether, employment fell by 8.4 million between December 2007 and December 2009, a drop of 6.1 percent. Despite the sizable job losses, real GDP didn't fall that much. Because those who still had jobs were more productive, output dropped only about 2 percent between 2007 and 2009, and the price level hardly budged. The recession ended in June 2009. By the third quarter of 2009, real GDP was growing again, though the unemployment rate remained stubbornly high deep into 2012. Events during the recession of 2007–2009 traumatized the economy. Lasting 18 months, what has come to be called the Great Recession was the longest of the 11 recessions since World War II. This recession will be discussed in the course of the following chapters.

Focusing on the ups and downs of the economy can miss the point that the U.S. economy over the long run has been an incredible creator of jobs and output—the most productive economy in the world. To underscore that point, we close with a look at U.S. economic growth since 1929.

5-4f U.S. Economic Growth Since 1929

Points in Exhibit 7 trace the U.S. real GDP and price level for each year since 1929. Aggregate demand and aggregate supply curves are shown for 2012, but all points in the series reflect such intersections. Years of growing GDP are indicated as blue points and years of declining GDP as red ones. Despite the Great Depression of the 1930s and the 11 recessions since World War II, the long-term growth in output is unmistakable. Real GDP, measured along the horizontal axis in 2009 constant dollars, grew from $1,056 billion in 1929 to $15.5 trillion in 2012—more than a fourteen fold increase and an average annual growth rate of 3.3 percent. The price index also rose, but not quite as fast, rising from 9.9 in 1929 to 105 in 2012—almost an elevenfold increase and an average inflation rate of 2.9 percent per year. Note that what matters here is the growth in real GDP, because that nets out the effects of inflation (inflation is mostly troublesome noise in the economy). Since 1982, annual output declined only three times—in 1991, in 2008, and in 2009.

> "Focusing on the ups and downs of the economy can miss the point that the U.S. economy over the long run has been an incredible creator of jobs and output—the most productive economy in the world."

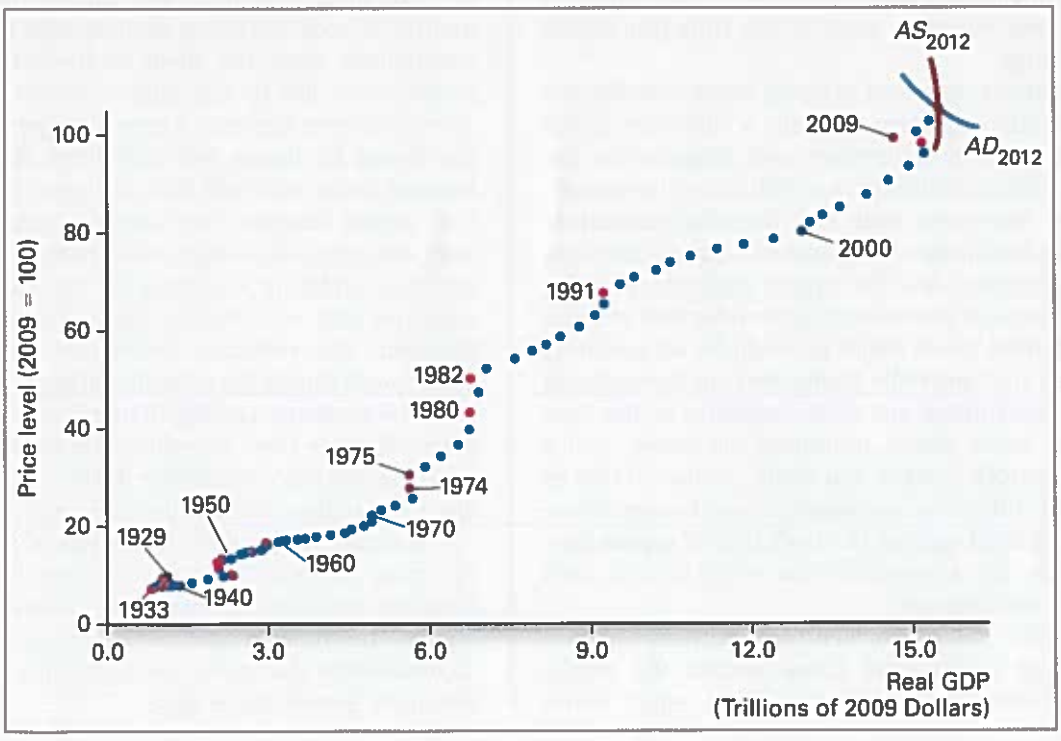
Because the U.S. population is growing all the time, the economy must create more jobs just to employ the additional people entering the workforce. For example, the U.S. population grew from 122 million in 1929 to 313 million in 2012, a rise of 157 percent. Fortunately, employment grew even faster, from 47 million in 1929 to 143 million in 2012, for a growth of 204 percent. So, since 1929, employment grew more than enough to keep up with a rising population. Despite the recessions, the United States has been an impressive job machine over the long run.

Not only did the number employed triple since 1929, the average education of workers increased as well. Other resources, especially capital, also rose sharply. What's more, the level of technology improved steadily, thanks to breakthroughs such as the personal computer and the Internet. The availability of more and higher-quality human capital and physical capital increased the productivity of each worker, contributing to the thirteenfold jump in real GDP since 1929.

Real GDP is important, but the best measure of the average standard of living is an economy's

Exhibit 7

Tracking U.S. Real GDP and Price Level Since 1929



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real GDP per capita, which tells us how much an economy produces on average per resident. Because real GDP grew much faster than the population, real GDP *per capita* jumped sixfold between 1929 and 2012. The United States is the largest economy in the world and a leader among major economies in output per capita.[3]

3. "GDP and the Economy," *Survey of Current Business* 93 (August 2013); *Economic Report of the President*, February 2013; *Economic Report of the President*, January 1980; and *OECD Economic Outlook* 93 (September 2013). For the latest real GDP and price level data, go to http://bea.gov/. For the latest population data, go to http://www.census.gov. For the latest employment data, go to http://www.bls.gov.

5-5 Final Word

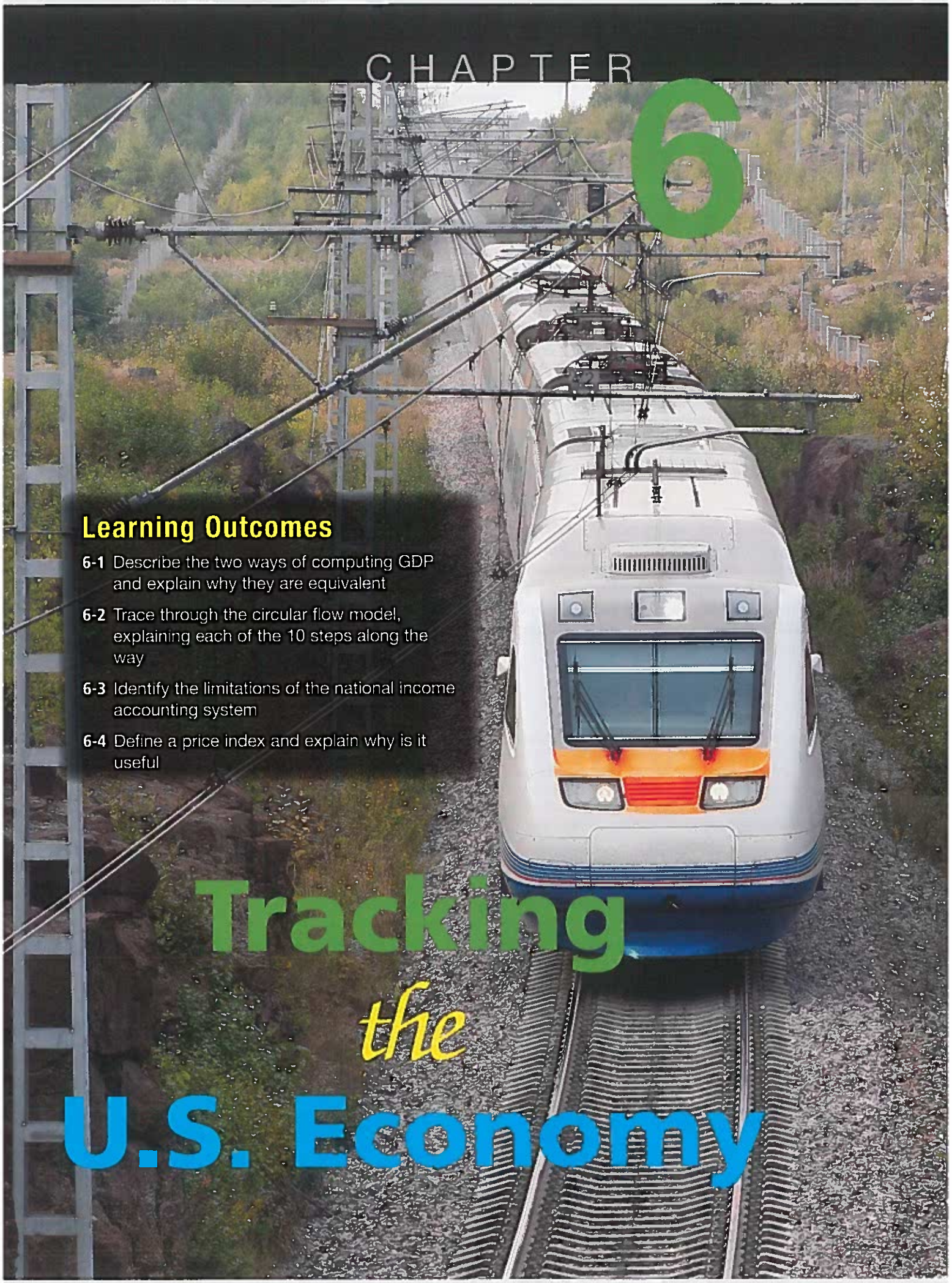
Because macroeconomists have no test subjects and cannot rely on luck, they hone their craft by developing models of the economy and then searching for evidence to support or reject these models. In this sense, macroeconomics is retrospective, always looking at recent developments for hints about which model works best. The macroeconomist is like a traveler who can see only the road behind and must find the way ahead using a collection of poorly drawn maps. The traveler must continually check each map (or model) against the landmarks to see whether one map is more consistent with the terrain than the others. Each new batch of information about the economy causes macroeconomists to shuffle through their "maps" to check their models.

Macroeconomics often emphasizes what can go wrong with the economy. Sagging output, high unemployment, and rising inflation capture much of the attention, and we'll examine those problems in the next two chapters. But perhaps the most important performance measure is economic growth, and we'll devote a chapter to that after you learn more about real GDP, unemployment, and inflation.

real GDP per capita
Real GDP divided by the population; the best measure of an economy's standard of living

11 months	< Average durations of U.S. recessions since World War II	18 months	< Duration of 2007–2009 recession
Decline in U.S. real GDP between 1929 and 1933 >	26%	25%	< U.S. unemployment rate in 1933
Average annual growth rate in U.S. real GDP from 1929 to 2012 >	3.3%	2.9%	< Average annual inflation rate from 1929 to 2012

CHAPTER 6



Learning Outcomes

6-1 Describe the two ways of computing GDP and explain why they are equivalent

6-2 Trace through the circular flow model, explaining each of the 10 steps along the way

6-3 Identify the limitations of the national income accounting system

6-4 Define a price index and explain why is it useful

Tracking *the* U.S. Economy

"How do we keep track of the most complex economy in world history?"

How do we keep track of the most complex economy in world history? What's gross about the gross domestic product? What's domestic about it? If you make yourself a tuna sandwich, how much does your effort add to the gross domestic product? Because prices change over time, how can we compare the economy's production in one year with that in other years? Answers to these and other questions are addressed in this chapter, which introduces an economic scorecard for the largest national economy in world history. That scorecard is the national income accounting system, which reduces a huge network of economic activity to a few aggregate measures.

What do think?

I should spend as much as I can, because consumer spending keeps the economy healthy.

Strongly Disagree 1 2 3 4 5 6 7 *Strongly Agree*

As you will see, aggregate output is measured either by the spending on that output or by the income derived from producing it. In this chapter, we examine each approach and learn why they are equivalent. The major components and important equalities built into the national income accounts are offered here as another way of understanding how the economy works—not as a foreign language to be mastered before the next exam. The emphasis is more on economic intuition than on accounting precision.

Topics discussed in Chapter 6 include

- National income accounts
- Expenditure approach to GDP
- Income approach to GDP
- Circular flow of income and expenditure
- Leakages and injections
- Limitations of national income accounting
- Consumer price index
- GDP price index

6-1 The Product of a Nation

How do we measure the economy's performance? During much of the 17th and 18th centuries, when the dominant economic policy was mercantilism, many thought that economic prosperity was best measured by the stock of precious metals a nation accumulated in the public treasury. Mercantilism led to restrictions on international trade, with the

unintended consequence of reducing the gains from comparative advantage. In the latter half of the 18th century, François Quesnay became the first to measure economic activity as a *flow*. In 1758, he published his *Tableau Économique*, which described the *circular flow* of output and income through different sectors of the economy. His insight was likely inspired by his knowledge of blood's circular flow in the body—Quesnay was court physician to King Louis XV of France.

Rough measures of national income were developed in England two centuries ago, but detailed calculations built up from microeconomic data were refined in the United States during the Great Depression. The resulting *national income accounting system* organizes huge quantities of data collected from a variety of sources across America. These data are summarized, assembled into a coherent framework, and reported by the federal government. The conception and implementation of these accounts has been hailed as one of the greatest achievements of the 20th century. The U.S. national income accounts are the most widely copied and most highly regarded in the world and earned their developer, Simon Kuznets, the Nobel Prize in 1971 for "giving quantitative precision to economic entities."

expenditure approach to GDP
Calculating GDP by adding up spending on all final goods and services produced in the nation during the year

income approach to GDP
Calculating GDP by adding up all earnings from resources used to produce output in the nation during the year

final goods and services
Goods and services sold to final, or end, users

intermediate goods and services
Goods and services purchased by firms for further reprocessing and resale

double counting
The mistake of including both the value of intermediate products and the value of final products in calculating gross domestic product; counting the same production more than once

6-1a National Income Accounts

How do the national income accounts keep track of the economy's incredible variety of goods and services, from hiking boots to Pilates classes? The *gross domestic product*, or GDP, measures the market value of all final goods and services produced during a year by resources located in the United States, regardless of who owns the resources. For example, GDP includes production in the United States by foreign firms, such as a Toyota plant in Kentucky, but excludes foreign production by U.S. firms, such as a Ford plant in Mexico.

GDP estimates are computed each quarter by the Bureau of Economic Analysis in Washington, D.C. On computation day, staff members follow a process that dates back half a century. The office is in "lockup." Communications with the outside are shut down—no cell phones or land lines can be used. Office drapes are drawn. Only certain people are allowed in and out. To estimate GDP, the staff draws on more than 10,000 streams of data describing economic activity. Nobody speaks the final GDP estimate aloud for fear that it could be overheard and exploited in securities markets. Once they estimate GDP and its components, they write a press release, make hundreds of copies, then lock all but one in a safe for distribution to the media the next morning at 8:30 A.M. Eastern Time. The single copy not locked away is delivered to the head of the president's Council of Economic Advisers, so he or she can give the president a heads-up.

> "GDP can be measured either by total spending on U.S. production or by total income received from that production."

The national income accounts are based on the simple fact that *one person's spending is another person's income*. GDP can be measured either by total spending on U.S. production or by total income received from that production. The expenditure approach adds up spending on all final goods and services produced during the year. The income approach adds up earnings during the year by those who produce all that output. In the *double-entry bookkeeping system* used to track the economy, spending on aggregate output is recorded on one side of the ledger and income from producing that aggregate output is recorded on the other side.

Gross domestic product includes only final goods and services, which are goods and services sold to the final, or end, user. A toothbrush, a pair of contact lenses, and a bus ride are examples of final goods and services. Whether a sale is to the final user depends on who buys the product. When you buy chicken for dinner, that's reflected in GDP. When KFC buys chicken, however, that's not counted in GDP because KFC is not the final consumer. Only after the chicken is cooked and sold by KFC is the transaction counted in GDP.

Intermediate goods and services are those purchased for additional processing and resale, like KFC's chicken. This change may be imperceptible, as when a grocer buys canned goods to restock shelves. Or the intermediate goods can be dramatically altered, as when an artist transforms a $100 canvas and $30 in oil paints into a work of art that sells for $5,000. Sales of intermediate goods and services are excluded from GDP to avoid the problem of double counting, which is counting an

ERIC THAYER/REUTERS

item's value more than once. For example, suppose the grocer buys a can of tuna for $1.00 and sells it for $1.50. If GDP counted both the intermediate transaction of $1.00 and the final transaction of $1.50, the recorded value of $2.50 would exceed its final value by $1.00. Hence, GDP counts only the market value of the final sale. As another example, in a recent year Walmart paid $287 billion for products it sold for $375 billion. If GDP counted both Walmart's intermediate transactions and final transactions, Walmart's impact on GDP would be $287 billion too high. GDP also ignores most of the second-hand value of used goods, such as existing homes, used cars, and used textbooks. These goods were counted in GDP when they were produced. But just as the services provided by the grocer and by Walmart are captured in GDP, so are the services provided by real estate agents, used-car dealers, and used-book sellers.

6-1b GDP Based on the Expenditure Approach

As noted already, one way to measure GDP is to add up spending on all final goods and services produced in the economy during the year. The easiest way to understand the spending approach is to sort aggregate expenditure into its components: consumption, investment, government purchases, and net exports. **Consumption**, or more specifically, *personal consumption expenditures*, consists of purchases of final goods and services by households during the year. Consumption is the largest spending category, averaging 70 percent of U.S. GDP during the past decade. Along with *services* like dry cleaning, haircuts, and air travel, consumption includes *nondurable goods*, like soap and soup, and *durable goods*, like furniture and kitchen appliances. Durable goods are expected to last at least three years.

Investment, or more specifically, *gross private domestic investment*, consists of spending on new capital goods and on net additions to inventories. The most important investment is **physical capital**, such as new buildings and new machinery. Investment also includes new **residential construction**. Although it fluctuates a lot from year to year, investment averaged 15 percent of U.S. GDP this past decade. More generally, investment consists of spending on current production that is not used for current consumption. A net increase in inventories also counts as investment because it represents current production not used for current consumption. **Inventories** are stocks of goods in process, such as computer parts, and stocks of finished goods, such as new computers awaiting sale. Inventories help manufacturers cope with unexpected changes in the supply of their resources or in the demand for their products.

Although investment includes purchasing a new residence, it excludes purchases of *existing* buildings and machines and purchases of financial assets, such as stocks and bonds. Existing buildings and machines were counted in GDP when they were produced. Stocks and bonds are not investments themselves but simply indications of ownership.

Government purchases, or more specifically, *government consumption and gross investment*, include government spending for goods and services—from clearing snowy roads to clearing court dockets, from buying library books to paying librarians. Government purchases averaged 19 percent of U.S. GDP during the last decade. Government purchases, and therefore GDP, exclude transfer payments, such as Social Security, welfare benefits, and unemployment insurance. Such payments are not true purchases by the government or true earnings by the recipients.

consumption
Household purchases of final goods and services, except for new residences, which count as investment

investment
The purchase of new plants, new equipment, new buildings, and new residences, plus net additions to inventories

physical capital
Manufactured items used to produce goods and services; includes new plants and new equipment

residential construction
Building new homes or dwelling places

inventories
Producers' stocks of finished and in-process goods

government purchases
Spending for goods and services by all levels of government; government outlays minus transfer payments

The final spending component, net exports, reflects international trade in goods and services. Goods, or *merchandise*, include physical items such as bananas and HDTVs (stuff you can load on a ship). Services, or so-called *invisibles*, include intangible items, such as European tours and online customer service from India. Foreign purchases of U.S. goods and services are counted as part of U.S. GDP. But U.S. purchases of foreign goods and services are subtracted from U.S. GDP. Net exports equal the value of U.S. exports of goods and services minus the value of U.S. imports of goods and services. U.S. imports have exceeded U.S. exports nearly every year since the 1960s, meaning U.S. net exports have been negative. During the last decade, net exports averaged a negative 4 percent of GDP.

With the expenditure approach, the nation's aggregate expenditure sums consumption, C; investment, I; government purchases, G; and net exports, which is the value of exports, X, minus the value of imports, M, or $(X - M)$. Summing these yields aggregate expenditure, or GDP:

$$C + I + G + (X - M) = \text{Aggregate expenditure} = \text{GDP}$$

6-1c Composition of Aggregate Expenditure

Now that we have introduced each component of aggregate spending, let's get a better idea of spending over time. Exhibit 1 shows the composition of spending in the United States since 1959. As you can see, consumption's share of GDP appears stable from year to year, but the long-term trend shows an increase from an average of 62 percent during the 1960s to 70 percent during the most recent decade. Investment fluctuates more year to year but with no long-term trend up or down; investment averaged 15 percent of GDP during the 1960s and during the most recent decade. But, as you can see in the exhibit, investment's share of GDP dropped sharply during the recession of 2007–2009.

Government purchases declined from an average of 22 percent of GDP during the 1960s to an average of 19 percent during the last decade, due primarily to decreases in defense spending since the 1960s. Remember, government purchases do not include transfer payments, which have grown more than government purchases. Net exports averaged a surplus of 1 percent in the 1960s but were in deficit nearly every year since then, averaging a minus 4 percent of GDP during the last decade. Negative net exports mean that the sum of consumption, investment, and government purchases exceeds GDP, the amount produced in the U.S. economy. Americans are spending more than they make, and they are covering the difference by borrowing from abroad. U.S. spending exceeds U.S. GDP by the amount shown as negative net exports. Because the spending components must sum to GDP, *negative* net exports are expressed in Exhibit 1 by the red portion of spending that exceeds 100 percent of GDP. Thus, during the last five decades, consumption's share of total spending increased and government purchases decreased. Investment's share bounced around and net exports' share turned negative, meaning that imports exceeded exports.

net exports
The value of a country's exports minus the value of its imports

aggregate expenditure
Total spending on final goods and services in an economy during a given period, usually a year

aggregate income
All earnings of resource suppliers in an economy during a given period, usually a year

value added
At each stage of production, the selling price of a product minus the cost of intermediate goods purchased from other firms

6-1d GDP Based on the Income Approach

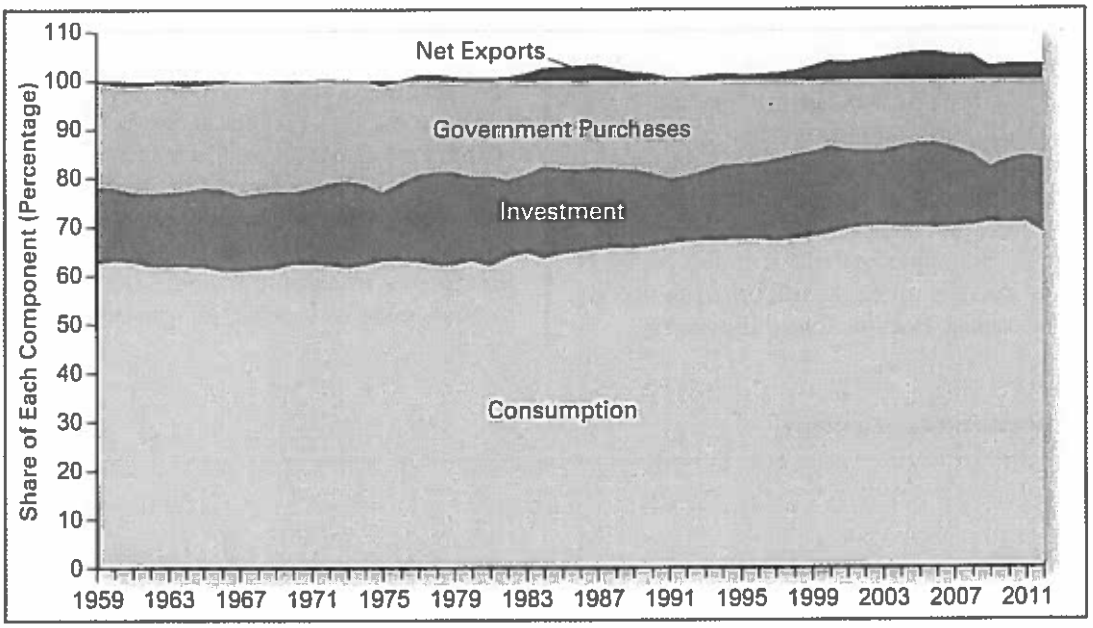
The expenditure approach sums, or aggregates, spending on production. The income approach sums, or aggregates, income arising from that production. Again, double-entry bookkeeping ensures that the value of aggregate output equals the aggregate income paid for resources used to produce that output: the wages, interest, rent, and profit arising from production. The price of a Hershey Bar reflects the income earned by resource suppliers along the way. Aggregate income equals the sum of all the income earned by resource suppliers in the economy. Thus, we can say that

$$\text{Aggregate expenditure} = \text{GDP} = \text{Aggregate income}$$

A product usually goes through several stages involving different firms on its way to the consumer. A wooden desk, for example, starts as raw timber, which is typically cut by one firm, milled by another, made into a desk by a third, and retailed by a fourth. We avoid double counting either by including only the market value of the desk when sold to the final user or by *summing the value added at each stage of production*. The value added by each firm equals that firm's selling price minus payments for inputs from other firms. The value added at each stage is the income earned by resource suppliers at that stage. *The value added at all stages sums to*

Exhibit 1

U.S. Spending Components as Percent of GDP Since 1959



SOURCE: Bureau of Economic Analysis, U.S. Department of Commerce. For the latest data, go to http://www.bea.gov/national/pdf/dpga.pdf and select Table 1.1.5.

the market value of the final good, and the value added for all final goods sums to GDP based on the income approach. For example, suppose you buy a wooden desk for $200. This final market value gets added directly into GDP. Consider the history of that desk. Suppose the tree that gave its life for your studies was cut into a log and sold to a miller for $20, who converted the log to lumber that sold for $50 to a desk maker, who made the desk and sold it for $120 to a retailer, who sold it to you for $200.

> "The value added at all stages sums to the market value of the final good, and the value added for all final goods sums to GDP based on the income approach."

Column (1) of Exhibit 2 lists the selling price at each stage of production. If all these transactions were added up, the sum of $390 would exceed the $200 market value of the desk. To avoid double counting, we include only the value added at each stage, listed in column (3) as the difference between the purchase price and the selling price at that stage. Again, *the value added at each stage equals the income earned by those who supply their resources at that stage.* For example, the $80 in value added by the retailer consists of income to resource suppliers at that stage, from the salesperson to the janitor who cleaned the showroom to the trucker who provided "free delivery" of your desk. The value added at all stages totals $200, which is both the final market value of the desk and the total income earned by all resource suppliers along the way.

To reinforce your understanding of the equality of income and spending, let's return to something introduced in the first chapter, the circular-flow model.

Exhibit 2

Computing Value Added for a New Desk

Stage of Production	(1) Sale Value	(2) Cost of Intermediate Goods	(3) Value Added (3) = (1) − (2)
Logger	$ 20	—	$20
Miller	50	$ 20	30
Manufacturer	120	50	70
Retailer	200	120	80
		Market value of final good	$200

6-2 Circular Flow of Income and Expenditure

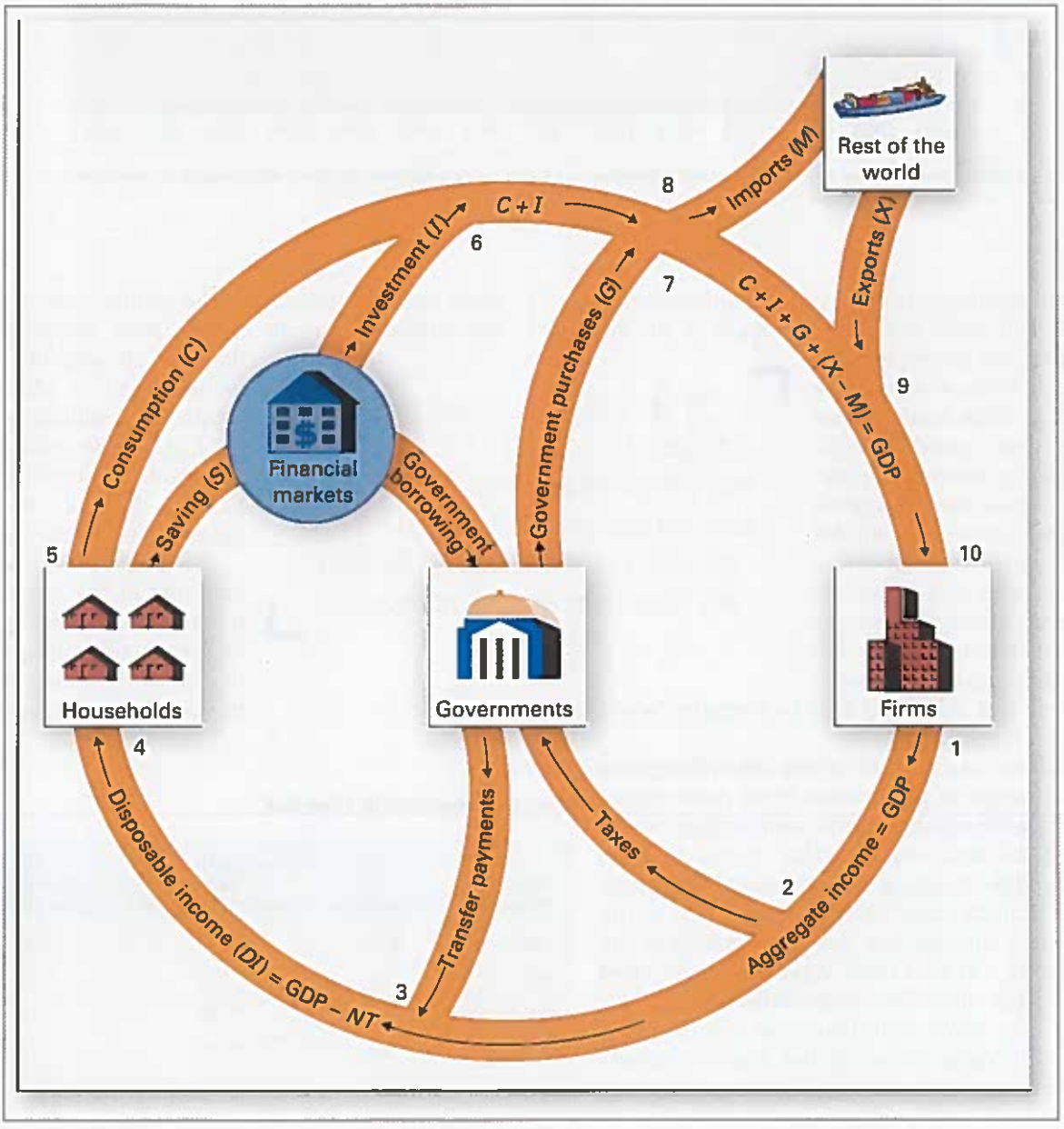
The model in Exhibit 3 outlines the circular flow of income and spending in the economy for not only households and firms, as was the case in Chapter 1, but also for governments and the rest of the world. The main stream flows clockwise around the circle, first as income from firms to households (in the lower half of the circle), and then as spending from households back to firms (in the upper half of the circle). For each flow of money, there is an equal and opposite flow of products or resources. Here we follow the money.

6-2a Income Half of the Circular Flow

To develop a circular flow of income and spending, we must make some simplifying assumptions. Specifically, by assuming that physical capital does not wear out (i.e., no capital depreciation occurs) and that firms pay out all profits to firm owners (i.e., firms retain no earnings), we can say that *GDP equals aggregate income*. The circular flow is a continuous process, but the logic of the model is clearest if we begin at juncture (1) in Exhibit 3, where U.S. firms make production decisions. After all, production must occur

Exhibit 3

Circular Flow of Income and Expenditure



before output can be sold and income earned. As Henry Ford explained, "It is not the employer who pays the wages—the employer only handles the money. It is the product that pays wages." Households supply their labor, capital, natural resources, and entrepreneurial ability to make products that firms sell to pay wages, interest, rent, and profit. Production of aggregate output, or GDP, gives rise to an equal amount of aggregate income.

Thus, at juncture (1), aggregate output equals aggregate income. But not all that income is available to spend. At juncture (2), governments collect taxes. Some of these tax dollars return as transfer payments to the income stream at juncture (3). By subtracting taxes and adding transfers, we transform aggregate income into **disposable income**, *DI*, which flows to households at juncture (4). Disposable income is take-home pay, which households can spend or save.

The bottom half of this circular flow is the *income half* because it focuses on the income arising from production. Aggregate income is the total income from producing GDP, and disposable income is the income remaining after taxes are subtracted and transfers added. To simplify the discussion, we define **net taxes**, *NT*, as taxes minus transfer payments. So *disposable income equals GDP minus net taxes*. Put another way, we can say that aggregate income equals disposable income plus net taxes:

$$\text{GDP} = \text{Aggregate income} = DI + NT$$

At juncture (4), firms have produced output and have paid resource suppliers, and governments have collected taxes and made transfer payments. With the resulting disposable income in hand, households now decide how much to spend and how much to save. Because firms have already produced the output and have paid resource suppliers, firms wait to see how much consumers want to spend. Any unsold production gets added to firm inventories.

6-2b Expenditure Half of the Circular Flow

Disposable income splits at juncture (5). Part is spent on consumption, *C*, and the rest is saved, *S*. Thus,

$$DI = C + S$$

Consumption remains in the circular flow and is the biggest aggregate expenditure, about 70 percent of the total. Household saving flows to **financial markets**, which consist of banks and other financial institutions that link savers to borrowers. For simplicity, Exhibit 3 shows households as the only savers, though governments, firms, and the rest of the world could save as well (e.g., savings from China finance U.S. borrowers). The primary borrowers are firms and governments, but households borrow too, particularly for new homes, and the rest of the world also borrows. In reality, financial markets should be connected to all four economic decision makers, but we have simplified the flows to keep the model from looking like a plate of spaghetti.

In our simplified model, firms pay resource suppliers an amount equal to the entire value of output. With nothing left for investment—that is, with no retained earnings—firms must borrow to finance purchases of physical capital plus any increases in their inventories. Households also borrow to purchase new homes. Therefore, investment, *I*, consists of spending on new capital by firms, including inventory changes, plus spending on residential construction. Investment enters the circular flow at juncture (6), so aggregate spending at that point totals $C + I$.

Governments must also borrow whenever they incur deficits, that is, whenever their total *outlays*—transfer payments plus purchases of goods and services—exceed their revenues. Government purchases of goods and services, represented by *G*, enter the spending stream in the upper half of the circular flow at juncture (7). Remember that *G excludes* transfer payments, which already entered the stream as income at juncture (3).

Some spending by households, firms, and governments goes for imports. Because spending on imports flows to foreign producers, spending on imports, *M*, leaks from the circular flow at juncture (8). But the rest of the world buys U.S. products, so foreign spending on U.S. exports, *X*, enters the spending flow at juncture (9). Net exports, the impact of the *rest of the world* on aggregate expenditure, equal exports minus imports, $X - M$, which can be positive, negative, or zero. In recent decades, net exports have been negative.

The upper half of the circular flow, the *expenditure half*, tracks the four components of aggregate expenditure: consumption, *C*; investment, *I*; government purchases, *G*; and net exports, $X - M$. Aggregate expenditure flows into firms at juncture (10). Aggregate expenditure equals the market value of aggregate output, or GDP. In short,

$$C + I + G + (X - M) = \text{Aggregate expenditure} = \text{GDP}$$

disposable income (*DI*)
The income households have available to spend or to save after paying taxes and receiving transfer payments

net taxes (*NT*)
Taxes minus transfer payments

financial markets
Banks and other financial institutions that facilitate the flow of funds from savers to borrowers

6-2c Leakages Equal Injections

Let's step back now to view the big picture. In the upper half of the circular flow, aggregate expenditure is total spending on U.S. output. In the lower half, aggregate income is the income arising from that spending. This is the first accounting identity. Aggregate expenditure (spending by each sector) equals aggregate income (disposable income plus net taxes), or

$$C + I + G + (X - M) = DI + NT$$

Because disposable income equals consumption plus saving, we can substitute $C + S$ for DI in the above equation to yield

$$C + I + G + (X - M) = C + S + NT$$

After subtracting C from both sides and adding M to both sides, the equation reduces to

$$I + G + X = S + NT + M$$

Note that **injections** into the main stream occur at various points around the circular flow. Investment, *I*, government purchases, *G*, and exports, *X*, are *injections* of spending into the circular flow. At the same time, some of the circular flow leaks from the main stream. Saving, *S*, net taxes, *NT*, and imports, *M*, are **leakages** from the circular flow. As you can see from the equation, *injections into the circular flow equal leakages from the flow*. This injections-leakages equality demonstrates a second accounting identity based on double-entry bookkeeping.

"Injections into the circular flow equal leakages from the flow."

injection
Any spending other than by households or any income other than from resource earnings; includes investment, government purchases, exports, and transfer payments

leakage
Any diversion of income from the domestic spending stream; includes saving, taxes, and imports

underground economy
Market transactions that go unreported either because they are illegal or because people involved want to evade taxes

6-3 Limitations of National Income Accounting

Imagine the difficulty of developing an accounting system that must capture such a complex and dynamic economy. In the interest of clarity and simplicity, certain features get neglected. In this section, we examine some limitations of the national income accounting system, beginning with production not captured by GDP.

6-3a Some Production Is Not Counted in GDP

With some minor exceptions, the official measure of GDP includes only those products that are sold in markets. This ignores all do-it-yourself production—child care, meal preparation, house-cleaning, family laundry, and home maintenance and repair. Thus, an economy in which householders are largely self-sufficient has a lower GDP than an otherwise similar economy in which households specialize and sell products to one another. During the 1950s, more than 80 percent of American mothers with small children remained at home caring for the family, but all this care added not one cent to GDP. Today most mothers with small children are in the workforce, where their labor gets counted in GDP. Meals, child care, and the like are now often purchased in markets and thus get reflected in GDP. In less developed economies, more economic activity is do-it-yourself.

GDP also ignores off-the-books production. The term **underground economy** describes market activity that goes unreported because either it's illegal or because people want to evade taxes on otherwise legal activity. Although there is no official measure of the underground economy, most economists agree that it is substantial. A federal study suggests the equivalent of 15 percent of U.S. GDP is underground production; this amounted to about $2 trillion in 2012.

MARCY MALOY/LIFESIZE/GETTY IMAGES

The labor of mother who is employed is reflected in GDP; the labor of a mother who stays at home is not.

For some economic activity, income must be *imputed*, or assigned a value, because market exchange does not occur. For example, included in GDP is an *imputed rental income* from home ownership, even though no rent is actually paid or received. Also included in GDP is an imputed dollar amount for (1) wages paid *in kind*, such as an employer's payment for employees' medical insurance, and (2) food produced by a farm family for its own consumption. *GDP therefore includes some economic production that does not involve market exchange.*

6-3b Leisure, Quality, and Variety

The average U.S. workweek is much shorter now than it was a century ago, so people work less to produce today's output. People also retire earlier and live longer after retirement. As a result of a shorter work week and earlier retirement, more leisure is available. But leisure is not reflected in GDP because it is not directly bought and sold in a market. The quality and variety of products available have also improved on average over the years because of technological advances and greater competition. For example, the magazine *Consumer Reports* has found a consistent improvement in the quality of the automobile over time. Yet most of these improvements are not reflected in GDP. Recording systems, computers, tires, running shoes, cell phones, and hundreds of other products have gotten better over the years. Also, new products are being introduced all the time, such as smart phones, e-readers, social networks, and energy drinks. *The gross domestic product fails to capture changes in the availability of leisure time and often fails to reflect changes in the quality of products or in the availability of new products.*

> "The gross domestic product fails to capture changes in the availability of leisure time and often fails to reflect changes in the quality of products or in the availability of new products."

6-3c What's Gross About Gross Domestic Product?

Again, a nation's physical capital consists of its buildings, machines, vehicles, computers, and all the other equipment used to produce GDP. In the course of producing GDP, some capital wears out, such as the delivery truck that finally dies, and some capital becomes obsolete, such as an aging computer that can't run the latest software. A new truck that logs 100,000 miles its first year has been subject to wear and tear, and therefore has a diminished value as a resource. A truer picture of the *net* production that actually occurs during a year is found by subtracting this capital *depreciation* from GDP. Depreciation measures the value of the capital stock that is used up or becomes obsolete in the production process. Gross domestic product is called "gross" because it fails to take into account this depreciation. Net domestic product equals gross domestic product minus depreciation, the capital stock used up in the production process.

We now have two measures of investment. *Gross investment* is the value of all investment during a year and is used in computing GDP. *Net investment* equals gross investment minus depreciation. The economy's production possibilities depend on what happens to net investment. If net investment is positive—that is, if gross investment exceeds depreciation—the economy's capital stock increases, so its contribution to output increases as well. If net investment is zero, the capital stock remains constant, as does its contribution to output. And if net investment is negative, the capital stock declines, as does its contribution to output.

As the names imply, *gross* domestic product reflects gross investment and *net* domestic product reflects net investment. But estimating depreciation involves some guesswork. For example, what is the appropriate measure of depreciation for the roller coasters at Six Flags, the metal display shelves at Target, or the parking lots at the Mall of America in Minnesota?

6-3d GDP Does Not Reflect All Costs

Some production and consumption degrades the quality of our environment. Trucks and automobiles pump pollution into the atmosphere, which could contribute to climate change. Housing developments displace scenic open space and forests. Paper mills foul the lungs and burn the eyes. Oil spills foul the coastline. Coal-fired electric plants pollute the air. These negative externalities—costs that fall on those not directly involved in the transactions—are mostly ignored in GDP

depreciation
The value of capital stock used up to produce GDP or that becomes obsolete during the year

net domestic product
Gross domestic product minus depreciation

DAVID WOODFALL/STONE/GETTY IMAGES

calculations, even though they diminish the quality of life now and in the future. Recent research suggests that the external costs of some production, such as oil- and coal-fired electricity generation, could exceed the value added by these firms.[1] To the extent that growth in GDP generates negative externalities, a rising GDP may not be as attractive as it would first appear.

Although the national income accounts reflect the depreciation of buildings, machinery, vehicles, and other manufactured capital, this accounting ignores the depletion of natural resources, such as standing timber, oil reserves, fish stocks, and soil fertility. So national income accounts reflect depreciation of the physical capital stock but not the natural capital stock. For example, intensive farming may raise productivity and boost GDP temporarily, but this depletes soil fertility. Worse still, some production may speed the extinction of certain plants and animals. The U.S. Commerce Department is now in the process of developing so-called *green accounting*, or *green GDP*, trying to register the impact of production on air pollution, water pollution, soil depletion, and the loss of other natural resources.

nominal GDP
GDP based on prices prevailing at the time of production

1. Nicholas Muller, Robert Mendelsohn, and William Nordhaus, "Environmental Accounting for Pollution in the United States Economy," *American Economic Review*, 101 (August 2011): 1649–1675.

6-3e GDP and Economic Welfare

In computing GDP, the market price of output is the measure of its value. Therefore, each dollar spent on handguns or cigarettes is counted in GDP the same as each dollar spent on baby formula or preventive health care. Positive economic analysis tries to avoid making value judgments about *how* people spend their money. Because GDP, as a number, provides no information about its composition, some economists question whether GDP is the best measure of the nation's economic welfare.

Despite the limitations of official GDP estimates, GDP offers a useful snapshot of the U.S. economy at a point in time. Inflation, however, clouds comparability over time. In the next section, we discuss how to adjust GDP for changes in the economy's price level.

6-4 Accounting for Price Changes

As noted earlier, the national income accounts are based on the market values of final goods and services produced in a particular year. Initially, gross domestic product measures the value of output in *nominal dollars*—that is, in the dollar values at the time production occurs. When GDP is based on nominal dollars, the national income accounts measure the *nominal value* of national output. Thus, **nominal GDP** is based on the prices prevailing when production takes place. National income accounts based on nominal dollars allow for comparisons among income or expenditure components in a particular year. Because the economy's average price level changes over time, however, nominal-dollar comparisons across years can be misleading. For example, between 1979 and 1980, nominal GDP increased by about 9 percent. That sounds impressive, but the economy's average price level rose more than 9 percent. So the growth in nominal GDP came entirely from inflation. Real GDP, or GDP measured in terms of the goods and services produced, in fact declined. If nominal GDP increases in a given year, part of this increase may simply reflect inflation—pure hot air. To make meaningful comparisons of GDP across years, we must take out the hot air, or *deflate* nominal GDP. We focus on *real* changes in production by eliminating changes due solely to inflation.

Exhibit 4

Hypothetical Example of a Price Index (base year = 2012)

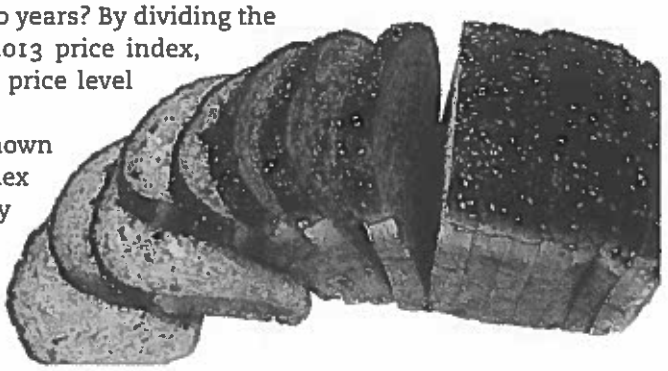
Year	(1) Price of Bread in Current Year	(2) Price of Bread in Base Year	(3) Price Index (3) = [(1)/(2)] × 100
2012	$1.25	$1.25	100
2013	1.30	1.25	104
2014	1.40	1.25	112

6-4a Price Indexes

To compare the price level over time, let's first establish a point of reference, a base year to which prices in other years can be compared. An *index number* compares the value of some variable in a particular year to its value in a base year, or reference year. Think about the simplest of index numbers. Suppose bread is the only good produced in an economy. As a reference point, let's look at its price in some specific year. The year selected is called the **base year**; prices in other years are expressed relative to the base-year price.

Suppose the base year is 2012, when a loaf of bread in our simple economy sold for $1.25. Let's say the price of bread increased to $1.30 in 2013 and to $1.40 in 2014. We construct a **price index** by dividing each year's price by the price in the base year and then multiplying by 100, as shown in Exhibit 4. For 2012, the base year, we divide the base price of bread by itself, $1.25/$1.25, or 1, so the price index in 2012 equals 1 × 100 = 100. *The price index in the base period is always 100.* The price index in 2013 is $1.30/$1.25, or 1.04, which when multiplied by 100 equals 104. In 2014, the index is $1.40/$1.25, or 1.12, which when multiplied by 100 equals 112. Thus, the index is 4 percent higher in 2013 than in the base year and 12 percent higher in 2014 than in the base year. The price index permits comparisons across years. For example, what if you were provided the indexes for 2013 and 2014 and asked what happened to the price level between the two years? By dividing the 2014 price index by the 2013 price index, 112/104, you find that the price level rose 7.7 percent.

This section has shown how to develop a price index assuming we already know the price level each year. Determining the price level is a bit more involved, as we'll now see.



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6-4b Consumer Price Index

The price index most familiar to you is the **consumer price index, or CPI**, which measures changes over time in the cost of buying a "market basket" of goods and services purchased by a typical family. For simplicity, suppose a typical family's market basket for the year includes 365 packages of Twinkies, 500 gallons of heating oil, and 12 months of cable TV. Prices in the base year are listed in column (2) of Exhibit 5. The total cost of each product in the base year is found by multiplying price by quantity, as shown in column (3). The cost of the market basket in the base year is shown at the bottom of column (3) to be $1,184.85.

Prices in the current year are listed in column (4). Notice that not all prices changed by the same percentage since the base year. The price of fuel oil increased by 50 percent, but the price of Twinkies declined. The cost of that same basket in the current year is $1,398.35, shown as the sum of column (5). To compute the consumer price index for the current year, we simply divide the cost in the current year by the cost of that same basket in the base year, $1,398.35/$1,184.85, and then multiply by 100. This yields a price index of 118. We could say that between the base period and the current year, the "cost of living" increased by 18 percent.

The federal government uses the 36 months of 1982, 1983, and 1984 as the base period for calculating the CPI for a market basket consisting of hundreds of goods and services. The CPI is reported monthly based on prices collected from about 23,000 sellers across the country in 87 metropolitan areas. In reality, each household consumes a unique market basket, so we could theoretically develop about 120 million CPIs—one for each household.

base year
The year with which other years are compared when constructing an index; the index equals 100 in the base year

price index
A number that shows the average price of products; changes in a price index over time show changes in the economy's average price level

consumer price index, or CPI
A measure of inflation based on the cost of a fixed market basket of goods and services

Exhibit 5

Hypothetical Market Basket Used to Develop the Consumer Price Index

Product	(1) Quantity in Market Basket	(2) Prices in Base Year	(3) Cost of Basket in Base Year (3) = (1) × (2)	(4) Prices in Current Year	(5) Cost of Basket in Current Year (5) = (1) × (4)
Twinkies	365 packages	$ 0.89/ package	$324.85	$ 0.79	$288.35
Fuel Oil	500 gallons	1.00/gallon	500.00	1.50	750.00
Cable TV	12 months	30.00/month	360.00	30.00	360.00
			$1,184.85		$1,398.35

6-4c Problems With the CPI

There is no perfect way to measure changes in the price level. As we have already seen, the quality and variety of some products are improving all the time, so some price increases may be as much a reflection of improved quality as of inflation. The CPI does not account very well for new products that have more and better features than the products they replace. A price index that properly accounts for product upgrades could shave an average of 0.8 percentage points from the current CPI measure.[2] Thus, there is a *quality bias* in the CPI, because it assumes that the quality of the market basket remains relatively constant over time. *To the extent that the CPI ignores quality improvements, it overstates the true extent of inflation.* Those who come up with the CPI each month try to make some quality adjustments.

> "To the extent that the CPI ignores quality improvements, it overstates the true extent of inflation."

But the CPI tends to overstate inflation for another reason. Recall that the CPI holds constant over time the kind and amount of goods and services in the typical market basket. Because not all items in the basket experience the same rate of price change, relative prices change over time. A rational household would respond to changes in relative prices by buying less of the more expensive products and more of the cheaper products. The CPI allows for some substitution within narrow categories (e.g., shoppers in Chicago can switch among choices of ground beef based on price), but consumers can't easily switch across categories because the point of the CPI is to look at price changes over time for a given market basket. Because the CPI holds the market basket constant for long periods, the CPI is slow to incorporate consumer responses to changes in relative prices. *The CPI calculations, by not allowing households to shift away from goods that have become more costly, overestimates the true extent of inflation experienced by the typical household.*

The CPI has also failed to keep up with the consumer shift toward discount stores such as Walmart, Costco, and Home Depot. Government statisticians consider goods sold by discounters as different from goods sold by regular retailers. Hence, the discounter's lower price does not necessarily translate into a reduction in the cost of living, but simply as a different consumer purchase decision.

Finally, the CPI overstates inflation because it includes an item in the market basket only after the product becomes widely used. By that time, the major price drops have already occurred. For example, the first portable video recorder and camera, the Ampex VR-3000 Backpack, weighed over 40 pounds and sold for $65,000 when it was introduced in 1967 (this equals $350,000 in 2012 dollars). Now, for less than $100, you can buy a high definition video camera that fits in a vest pocket. The CPI captured few of the major price drops. The same is

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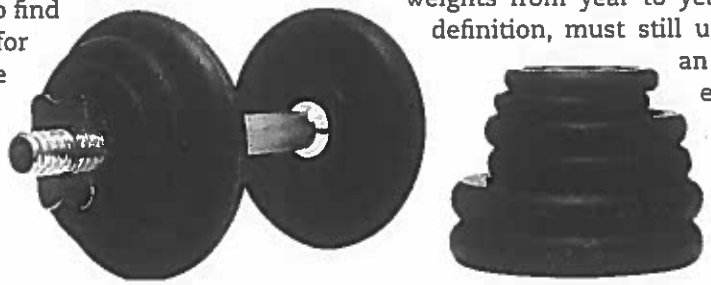
Home Depot's lower prices do not necessarily mean a reduction in the cost of living.

2. Christian Broda and David Weinstein, "Product Creation and Destruction: Evidence and Price Implications," *American Economic Review*, 100 (June 2010): 691–723.

true for all kinds of new products, such as the cell phone, which began as big as a brick and priced north of $1,000. Only after the price of cell phones fell far enough for wide adoption did they make it into the CPI basket.

Experts conclude the CPI has overestimated inflation by more than 1 percentage point per year. This problem is of more than academic concern because changes in the CPI determine changes in tax brackets and in an array of payments, including wage agreements that include a cost-of-living adjustment, Social Security benefits totaling about $800 billion annually, welfare benefits, even alimony. In fact, about one-third of federal outlays are tied to changes in the CPI. Just a 1 percentage point correction in the upward bias of the CPI would save the federal budget nearly $100 billion annually by 2017.

Overstating the CPI also distorts other measures, such as wages, that use the CPI to adjust for inflation. For example, based on the official CPI, the average real wage in the U.S. economy fell by a total of about 2 percent in the last two decades. But if the CPI overstated inflation by at least 1 percent per year, as many researchers now believe, then the average real wage, instead of dropping by 2 percent, actually increased by about 20 percent. The Bureau of Labor Statistics, the group that estimates the CPI, is now working on these problems and has introduced an experimental version of the CPI that would reduce measured inflation. One experiment uses scanner data at supermarkets to find out how consumers respond, for example, to a rise in the price of romaine lettuce relative to iceberg lettuce, two products assumed to be reasonable substitutes for one another.



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6-4d The GDP Price Index

A price index is a weighted sum of various prices. Whereas the CPI focuses on just a sample of consumer purchases, a more complex and more comprehensive price index, the **GDP price index**, measures the average price of all goods and services produced in the economy. To calculate the GDP price index, we use the formula

$$\text{GDP price index} = \frac{\text{Nominal GDP} \times 100}{\text{Real GDP}}$$

where nominal GDP is the dollar value of GDP in a particular year measured in prices of that same year, and real GDP is the dollar value of GDP in a particular year measured in base-year prices. The challenge is finding real GDP in a particular year. Any measure of real GDP is constructed as the weighted sum of thousands of different goods and services produced in the economy. The question is what weights, or prices, to use. Prior to 1995, the Bureau of Economic Analysis (BEA) used prices for a particular base year (most recently 1987) to estimate real GDP. In this case, the quantity of each output in a particular year was valued by using the 1987 price of each output. So real GDP in, say, 1994 was the sum of 1994 output valued at 1987 prices.

6-4e Moving From Fixed Weights to Chain Weights

Estimating real GDP by using prices from a base year yields an accurate measure of real GDP as long as the year in question is close to the base year. But BEA used prices that prevailed in 1987 to value production from 1929 to 1995. In early 1996, BEA switched from a fixed-price weighting system to a **chain-weighted system**, using a complicated process that changes price weights from year to year. All you need to know is that the chain-weighted real GDP adjusts the weights more or less continuously from year to year, reducing the bias caused by a fixed-price weighting system.

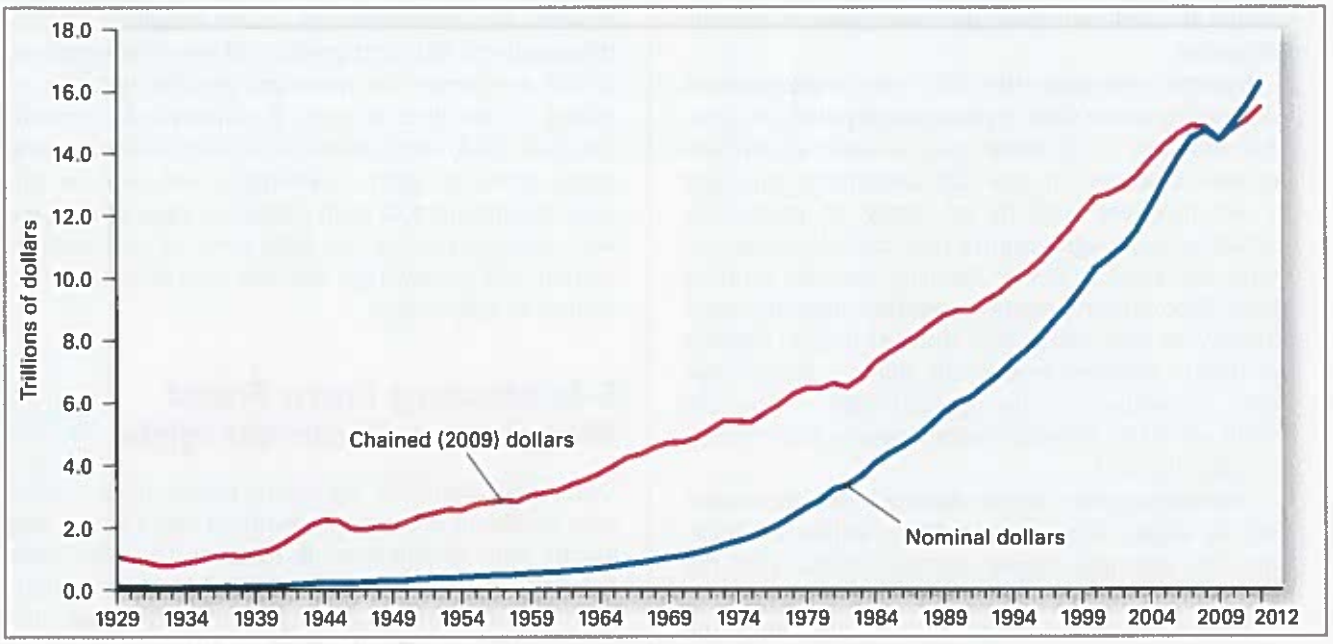
Even though the chain-type index adjusts the weights from year to year, any index, by definition, must still use some year as an anchor, or reference point—that is, any index must answer the question, "Compared to what?" To provide such a reference point, BEA measures U.S. real GDP and its components in *chained (2009) dollars*. Exhibit 6 presents nominal-dollar estimates of GDP as well as chained (2009) dollar estimates of real GDP. The blue line indicates nominal-dollar GDP since 1929. The red line indicates real GDP since 1929, or GDP measured in chained (2009) dollars. The

GDP price index
A comprehensive inflation measure of all goods and services included in the gross domestic product

chain-weighted system
An inflation measure that adjusts the weights from year to year in calculating a price index, thereby reducing the bias caused by a fixed-price weighting system

Exhibit 6

U.S. Gross Domestic Product in Nominal Dollars and Chained (2009) Dollars



SOURCE: Based on annual estimates from the Bureau of Economic Analysis, U.S. Department of Commerce. For the latest data, go to http://bea.gov/national/index.htm#gdp.

two lines intersect in 2009, because that's when real GDP equaled nominal GDP. Nominal GDP is below real GDP in years prior to 2009 because real GDP is based on chained (2009) prices, which on average are higher than prices prior to 2009. Nominal GDP reflects growth in real GDP and in the price level. Chained-dollar GDP reflects growth only in real GDP. So nominal-dollar GDP grows faster than chained-dollar GDP.

6-5 Final Word

This chapter discussed how GDP is measured and how it's adjusted for changes in the price level over time. The national income accounts have limitations, but they offer a reasonably accurate picture of the economy at a point in time as well as year-to-year movements in the economy. Subsequent chapters will refer to the distinction between real and nominal values.

$16.2 trillion < Nominal U.S. GDP in 2012

Real U.S. GDP in 2012 (chained 2009 dollars) > $15.5 trillion

70% < Consumption spending's average portion of GDP over the last decade

Government spending's average portion of GDP over the last decade > 19%

$65,000 < Approximate price of a first-generation video camera in 1967

Current price of a high definition video camera > $100

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