After studying this chapter, you will be able to:

- Explain why unemployment is a problem, define the unemployment rate, the employment-to-population ratio, and the labor force participation rate, and describe the trends and cycles in these labor market indicators
- Explain why unemployment is an imperfect measure of underutilized labor, why it is present even at full employment, and how unemployment and real GDP fluctuate together over a business cycle
- Explain why inflation is a problem, how we measure the price level and the inflation rate, and why the CPI measure of inflation might be biased

5 MONITORING JOBS AND INFLATION

Each month, we chart the course of employment and unemployment as measures of U.S. economic health. How do we count the number of people working and the number unemployed? What do the level of employment and the unemployment rate tell us? Are they reliable vital signs for the economy?

Having a good job that pays a decent wage is only half of the equation that translates into a good standard of living. The other half is the cost of living. We track the cost of the items that we buy with another number that is published every month, the Consumer Price Index, or CPI. What is the CPI? How is it calculated? And does it provide a reliable guide to the changes in our cost of living?

As the U.S. economy expanded after a recession in 2001, job growth was weak and questions about the health of the labor market became of vital importance to millions of American families. *Reading Between the Lines*, at the end of this chapter, puts the spotlight on the labor market during the expansion of the past few years and the slowdown of 2008.

We begin by looking at unemployment: What it is, why it matters, and how we measure it.

Employment and Unemployment

What kind of job market will you enter when you graduate? Will there be plenty of good jobs to choose among, or will jobs be so hard to find that you end up taking one that doesn't use your education and pays a low wage? The answer depends, to a large degree, on the total number of jobs available and on the number of people competing for them.

The class of 2009 had an unusually tough time in the jobs market. At the depth of recession in October 2009, 16.5 million American's wanted a job but couldn't find one. In a normal year, unemployment is less than half that level. And the U.S. economy is an incredible job-creating machine. Even in 2009 at the depths of recession, 139 million people had jobs—4 million more than in 1999 and 22 million more than in 1989. But in recent years, population growth has outstripped jobs growth, so unemployment is a serious problem.

Why Unemployment Is a Problem

Unemployment is a serious personal and social economic problem for two main reasons. It results in

- Lost incomes and production
- Lost human capital

Lost Incomes and Production The loss of a job brings a loss of income and lost production. These losses are devastating for the people who bear them and they make unemployment a frightening prospect for everyone. Unemployment benefits create a safety net, but they don't fully replace lost earnings.

Lost production means lower consumption and a lower investment in capital, which lowers the living standard in both the present and the future.

Lost Human Capital Prolonged unemployment permanently damages a person's job prospects by destroying human capital.

Economics in Action

What Keeps Ben Bernanke Awake at Night

The Great Depression began in October 1929, when the U.S. stock market crashed. It reached its deepest point in 1933, when 25 percent of the labor force was unemployed, and lasted until 1941, when the United States entered World War II. The depression quickly spread globally to envelop most nations.

The 1930s were and remain the longest and worst period of high unemployment in history. Failed banks, shops, farms, and factories left millions of Americans without jobs, homes, and food. Without the support of government and charities, millions would have starved.

The Great Depression was an enormous political event: It fostered the rise of the German and Japanese militarism that were to bring the most devastating war humans have ever fought. It also led to President Franklin D. Roosevelt's "New Deal," which enhanced the role of government in economic life and made government intervention in markets popular and the market economy unpopular.

The Great Depression also brought a revolution in economics. British economist John Maynard Keynes published his *General Theory of Employment, Interest, and Money* and created what we now call macroeconomics.

Many economists have studied the Great Depression and tried to determine why what started out as an ordinary recession became so devastating. Among them is Ben Bernanke, the Chairman of the Federal Reserve.

One of the reasons the Fed was so aggressive in cutting interest rates, saving Bear Stearns, and propping up Fannie Mae and Freddie Mac is because Ben Bernanke is so vividly aware of the horrors of total economic collapse and determined to avoid any risk of a repeat of the Great Depression.

Think about a manager who loses his job when his employer downsizes. The only work he can find is driving a taxi. After a year in this work, he discovers that he can't compete with new MBA graduates. Eventually, he gets hired as a manager but in a small firm and at a lower wage than before. He has lost some of his human capital.

The cost of unemployment is spread unequally, which makes it a highly charged political problem as well as a serious economic problem.

Governments make strenuous efforts to measure unemployment accurately and to adopt policies to moderate its level and ease its pain. Here, we'll learn how the U.S. government monitors unemployment.

Current Population Survey

Every month, the U.S. Census Bureau surveys 60,000 households and asks a series of questions about the age and job market status of the members of each household. This survey is called the Current Population Survey. The Census Bureau uses the answers to describe the anatomy of the labor force.

Figure 5.1 shows the population categories used by the Census Bureau and the relationships among the categories.

The population divides into two broad groups: the working-age population and others who are too young to work or who live in institutions and are unable to work. The **working-age population** is the total number of people aged 16 years and over who are not in jail, hospital, or some other form of institutional care.

The Census Bureau divides the working-age population into two groups: those in the labor force and those not in the labor force. It also divides the labor force into two groups: the employed and the unemployed. So the **labor force** is the sum of the employed and the unemployed.

To be counted as employed in the Current Population Survey, a person must have either a full-time job or a part-time job. To be counted as *un*employed, a person must be available for work and must be in one of three categories:

1. Without work but has made specific efforts to find a job within the previous four weeks
2. Waiting to be called back to a job from which he or she has been laid off
3. Waiting to start a new job within 30 days

FIGURE 5.1 Population Labor Force Categories

The total population is divided into the working-age population and the young and institutionalized. The working-age population is divided into those in the labor force and those not in the labor force. The labor force is divided into the employed and the unemployed.

Source of data: Bureau of Labor Statistics.

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Anyone surveyed who satisfies one of these three criteria is counted as unemployed. People in the working-age population who are neither employed nor unemployed are classified as not in the labor force.

In June 2010, the population of the United States was 309.6 million; the working-age population was 237.7 million. Of this number, 84 million were not in the labor force. Most of these people were in school full time or had retired from work. The remaining 153.7 million people made up the U.S. labor force. Of these, 139.1 million were employed and 14.6 million were unemployed.

Three Labor Market Indicators

The Census Bureau calculates three indicators of the state of the labor market. They are

- The unemployment rate
- The employment-to-population ratio
- The labor force participation rate

The Unemployment Rate The amount of unemployment is an indicator of the extent to which people who want jobs can't find them. The **unemployment rate** is the percentage of the people in the labor force who are unemployed. That is,

$$\text{Unemployment rate} = \frac{\text{Number of people unemployed}}{\text{Labor force}} \times 100$$

and

$$\text{Labor force} = \text{Number of people employed} + \text{Number of people unemployed.}$$

In June 2010, the number of people employed was 139.1 million and the number unemployed was 14.6 million. By using the above equations, you can verify that the labor force was 153.7 million (139.1 million plus 14.6 million) and the unemployment rate was 9.5 percent (14.6 million divided by 153.7 million, multiplied by 100).

Figure 5.2 shows the unemployment rate from 1980 to 2010. The average unemployment rate during this period is 6.2 percent—equivalent to 9.5 million people being unemployed in 2010.

The unemployment rate fluctuates over the business cycle and reaches a peak value after a recession ends.

Each peak unemployment rate in the recessions of 1982, 1990–1991, and 2001 was lower than the previous one. But the recession of 2008–2009 ended the downward trend.

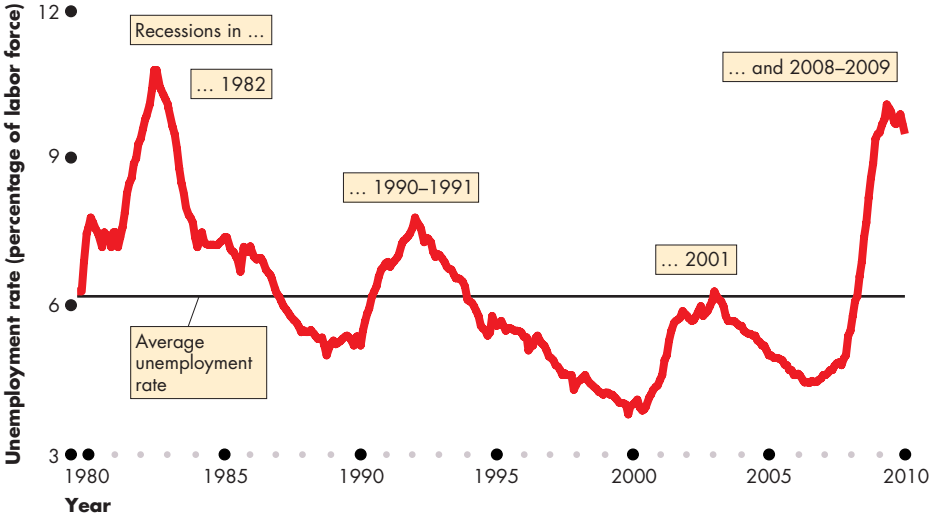
The Employment-to-Population Ratio The number of people of working age who have jobs is an indicator of both the availability of jobs and the degree of match between people's skills and jobs. The **employment-to-population ratio** is the percentage of people of working age who have jobs. That is,

$$\text{Employment-to-population ratio} = \frac{\text{Number of people employed}}{\text{Working-age population}} \times 100.$$

In June 2010, the number of people employed was 139.1 million and the working-age population was 237.7 million. By using the above equation, you can verify that the employment-to-population ratio was 58.5 percent (139.1 million divided by 237.7 million, multiplied by 100).

Figure 5.3 shows the employment-to-population ratio. This indicator followed an upward trend before 2000 and then a downward trend. The increase before 2000 means that the U.S. economy created

FIGURE 5.2 The Unemployment Rate: 1980–2010



The average unemployment rate from 1980 to 2010 was 6.2 percent. The unemployment rate increases in a recession, peaks after the recession ends, and decreases in an expansion. The peak unemployment rate during a recession was on a downward trend before the 2008–2009 recession, with each successive recession having a lower unemployment rate. The severe recession of 2008–2009 broke this trend.

Source of data: Bureau of Labor Statistics.

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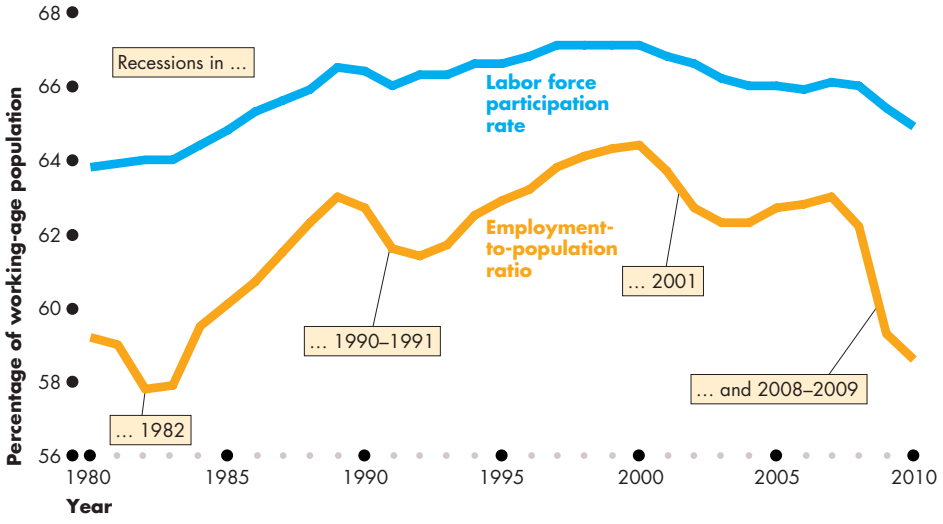
FIGURE 5.3 Labor Force Participation and Employment: 1980–2010



The trend in the labor force participation rate and the employment-to-population ratio is upward before 2000 and downward after 2000.

The employment-to-population ratio fluctuates more than the labor force participation rate over the business cycle and reflects cyclical fluctuations in the unemployment rate.

Source of data: Bureau of Labor Statistics.

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jobs at a faster rate than the working-age population grew. This indicator also fluctuates: It falls during a recession and increases during an expansion.

The Labor Force Participation Rate The number of people in the labor force is an indicator of the willingness of people of working age to take jobs. The **labor force participation rate** is the percentage of the working-age population who are members of the labor force. That is,

$$\text{Labor force participation rate} = \frac{\text{Labor force}}{\text{Working-age population}} \times 100.$$

In June 2010, the labor force was 153.7 million and the working-age population was 237.7 million. By using the above equation, you can verify that the labor force participation rate was 64.7 percent (153.7 million divided by 237.7 million, multiplied by 100).

Figure 5.3 shows the labor force participation rate. Like the employment-to-population ratio, this indicator has an upward trend before 2000 and then a downward trend. It also has mild fluctuations around the trend. These fluctuations result from unsuccessful job seekers leaving the labor force during a recession and reentering during an expansion.

Other Definitions of Unemployment

Do fluctuations in the labor force participation rate over the business cycle mean that people who leave the labor force during a recession should be counted as unemployed? Or are they correctly counted as not-in-the-labor force?

The Bureau of Labor Statistics (BLS) believes that the official unemployment definition gives the correct measure of the unemployment rate. But the BLS provides data on two types of underutilized labor excluded from the official measure. They are

- Marginally attached workers
- Part-time workers who want full-time jobs

Marginally Attached Workers A **marginally attached worker** is a person who currently is neither working nor looking for work but has indicated that he or she wants and is available for a job and has looked for work sometime in the recent past. A marginally attached worker who has stopped looking for a job because of repeated failure to find one is called a **discouraged worker**.

The official unemployment measure excludes marginally attached workers because they haven't made specific efforts to find a job within the past four weeks. In all other respects, they are unemployed.

Part-Time Workers Who Want Full-Time Jobs Many part-time workers want to work part time. This arrangement fits in with the other demands on their time. But some part-time workers would like full-time jobs and can't find them. In the official statistics, these workers are called economic part-time workers and they are partly unemployed.

Most Costly Unemployment

All unemployment is costly, but the most costly is long-term unemployment that results from job loss.

People who are unemployed for a few weeks and then find another job bear some costs of unemployment. But these costs are low compared to the costs borne by people who remain unemployed for many weeks.

Also, people who are unemployed because they voluntarily quit their jobs to find better ones or because they have just entered or reentered the labor market bear some costs of unemployment. But these costs are lower than those borne by people who lose their job and are forced back into the job market.

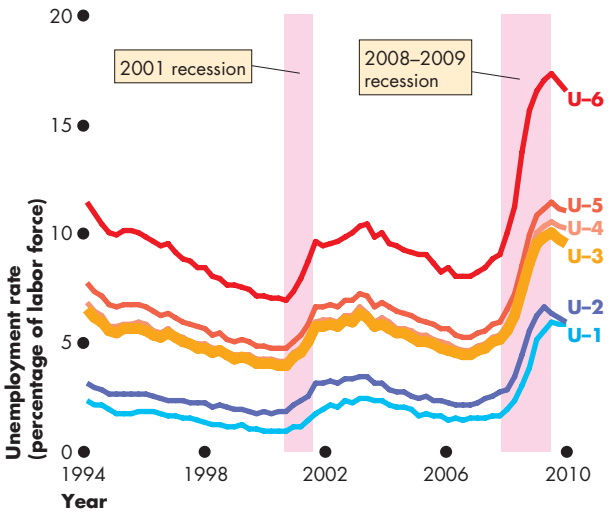
The unemployment rate doesn't distinguish among these different categories of unemployment. If most of the unemployed are long-term job losers, the situation is much worse than if most are short-term voluntary job searchers.

Alternative Measures of Unemployment

To provide information about the aspects of unemployment that we've just discussed, the Bureau of Labor Statistics reports six alternative measures of the unemployment rate: two narrower than the official measure and three broader ones. The narrower measures focus on the personal cost of unemployment and the broader measures focus on assessing the full amount of unused labor resources.

Figure 5.4 shows these measures from 1994 (the first year for which they are available) to 2010. U–3 is the official unemployment rate. Long-term unemployment (U–1) and unemployed job losers (U–2) are about 40 percent of the unemployed on average but 60 percent in a deep recession. Adding discouraged workers (U–4) makes very little difference to the unemployment rate, but adding all marginally attached workers (U–5) adds one percentage point. A big difference is made by adding the economic part-time workers (U–6). In June 2010, after adding these workers the unemployment rate was 16 percent.

FIGURE 5.4 Six Alternative Measures of Unemployment



U–1 are those unemployed for 15 weeks or more, and U–2 are job losers. U–3 is the official unemployment rate. U–4 adds discouraged workers, and U–5 adds all marginally attached workers. The broadest measure, U–6, adds part-time workers who want full-time jobs. Fluctuations in all the alternative measures are similar to those in the official measure, U–3.

Source of data: Bureau of Labor Statistics.

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REVIEW QUIZ

1. What determines if a person is in the labor force?
2. What distinguishes an unemployed person from one who is not in the labor force?
3. Describe the trends and fluctuations in the U.S. unemployment rate from 1980 to 2010.
4. Describe the trends and fluctuations in the U.S. employment-to-population ratio and labor force participation rate from 1980 to 2010.
5. Describe the alternative measures of unemployment.

You can work these questions in Study Plan 5.1 and get instant feedback. myeconlab

You've seen how we measure employment and unemployment. Your next task is to see what we mean by full employment and how unemployment and real GDP fluctuate over the business cycle.

Unemployment and Full Employment

There is always someone without a job who is searching for one, so there is always some unemployment. The key reason is that the economy is a complex mechanism that is always changing—it experiences frictions, structural change, and cycles.

Frictional Unemployment

There is an unending flow of people into and out of the labor force as people move through the stages of life—from being in school to finding a job, to working, perhaps to becoming unhappy with a job and looking for a new one, and finally, to retiring from full-time work.

There is also an unending process of job creation and job destruction as new firms are born, firms expand or contract, and some firms fail and go out of business.

The flows into and out of the labor force and the processes of job creation and job destruction create the need for people to search for jobs and for businesses to search for workers. Businesses don't usually hire the first person who applies for a job, and unemployed people don't usually take the first job that comes their way. Instead, both firms and workers spend time searching for what they believe will be the best available match. By this process of search, people can match their own skills and interests with the available jobs and find a satisfying job and a good income.

The unemployment that arises from the normal labor turnover we've just described—from people entering and leaving the labor force and from the ongoing creation and destruction of jobs—is called **frictional unemployment**. Frictional unemployment is a permanent and healthy phenomenon in a dynamic, growing economy.

Structural Unemployment

The unemployment that arises when changes in technology or international competition change the skills needed to perform jobs or change the locations of jobs is called **structural unemployment**. Structural unemployment usually lasts longer than frictional unemployment because workers must retrain and possibly relocate to find a job. When a steel plant in Gary, Indiana, is automated, some jobs in that city disappear. Meanwhile, new jobs for security guards, retail clerks, and life-insurance salespeople are created in Chicago and Indianapolis. The unemployed former steelworkers remain unemployed for several months until they move, retrain, and get one of these jobs. Structural unemployment is painful, especially for older workers for whom the best available option might be to retire early or take a lower-skilled, lower-paying job.

Cyclical Unemployment

The higher than normal unemployment at a business cycle trough and the lower than normal unemployment at a business cycle peak is called **cyclical unemployment**. A worker who is laid off because the economy is in a recession and who gets rehired some months later when the expansion begins has experienced cyclical unemployment.

"Natural" Unemployment

Natural unemployment is the unemployment that arises from frictions and structural change when there is no cyclical unemployment—when all the unemployment is frictional and structural. Natural unemployment as a percentage of the labor force is called the **natural unemployment rate**.

Full employment is defined as a situation in which the unemployment rate equals the natural unemployment rate.

What determines the natural unemployment rate? Is it constant or does it change over time?

The natural unemployment rate is influenced by many factors but the most important ones are

- The age distribution of the population
- The scale of structural change
- The real wage rate
- Unemployment benefits

The Age Distribution of the Population An economy with a young population has a large number of new job seekers every year and has a high level of frictional unemployment. An economy with an aging population has fewer new job seekers and a low level of frictional unemployment.

The Scale of Structual Change The scale of structural change is sometimes small. The same jobs using the same machines remain in place for many years. But sometimes there is a technological upheaval. The old

ways are swept aside and millions of jobs are lost and the skill to perform them loses value. The amount of structural unemployment fluctuates with the pace and volume of technological change and the change driven by fierce international competition, especially from fast-changing Asian economies. A high level of structural unemployment is present in many parts of the United States today (as you can see in *Economics in Action* below).

The Real Wage Rate The natural unemployment rate is influenced by the level of the real wage rate. Real wage rates that bring unemployment are a *minimum wage* and an *efficiency wage*. An *efficiency wage* is a wage set above the going market wage to enables firms to attract the most productive workers, get them to work hard, and discourage them from quitting.

Unemployment Benefits Unemployment benefits increase the natural unemployment rate by lowering the opportunity cost of job search. European countries have more generous unemployment benefits and higher natural unemployment rates than the United States. Extending unemployment benefits increases the natural unemployment rate.

There is no controversy about the existence of a natural unemployment rate. Nor is there disagreement that the natural unemployment rate changes. But economists don't know its exact size or the extent to which it fluctuates. The Congressional Budget Office estimates the natural unemployment rate and its estimate for 2010 was 4.8 percent—about a half of the unemployment in that year.

Real GDP and Unemployment Over the Cycle

The quantity of real GDP at full employment is *potential GDP* (p. 90). Over the business cycle, real GDP fluctuates around potential GDP. The gap between real GDP and potential GDP is called the **output gap**. As the output gap fluctuates over the business cycle, the unemployment rate fluctuates around the natural unemployment rate.

Economics in Action

Structural Unemployment and Labor Reallocation in Michigan

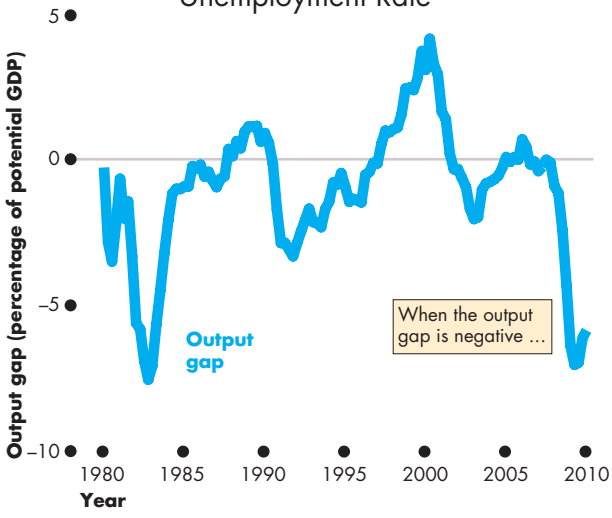
At 13.6 percent, Michigan had the nation's highest official unemployment rate in 2010. The long-term unemployment rate was 8.4 percent and when marginally attached workers and part-time workers who want full time jobs are added, almost 22 percent of the state's labor force was unemployed or underemployed.

Michigan's main problem is structural—a collapse of manufacturing jobs centered on the auto industry. These jobs had been disappearing steadily as robot technologies spread to do ever more of the tasks in the assembly of automobiles. The 2008–2009 recession accelerated this rate of job loss.

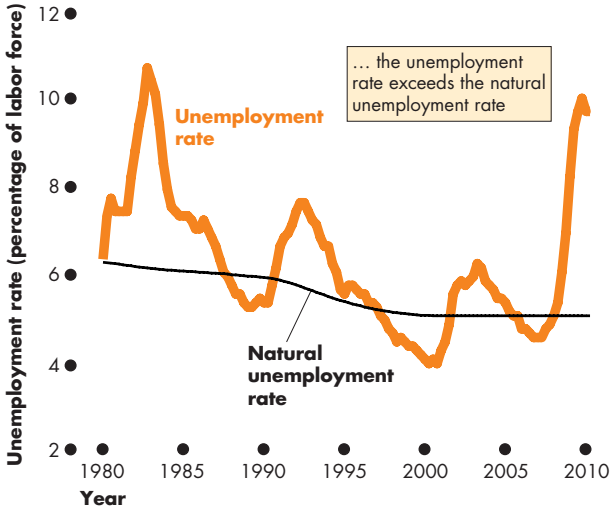
But the story is not all negative, and the outlook is not all bleak. Around 11,000 businesses in Michigan produce high-tech scientific instruments and components for defense equipment, energy plants, and medical equipment. These businesses employ almost 400,000 people, which is more than 10 percent of the state's labor force and two thirds of all manufacturing jobs. Workers in high-tech manufacturing enjoy incomes almost 60 percent higher than the state's average income. Although the recession hit these firms, they cut employment by only 10 percent, compared with a 24 percent cut in manufacturing jobs in the rest of the Michigan economy.

The structural unemployment rate remains high because job gains in new advanced-manufacturing firms are not yet enough to offset the job losses in the shrinking parts of manufacturing.

FIGURE 5.5 The Output Gap and the Unemployment Rate



(a) Output gap



(b) Unemployment rate

As real GDP fluctuates around potential GDP in part (a), the unemployment rate fluctuates around the natural unemployment rate in part (b). In recessions, cyclical unemployment peaks and the output gap becomes negative. At business cycle peaks, the unemployment rate falls below the natural rate and the output gap becomes positive. The natural unemployment rate decreased during the 1980s and 1990s.

Sources of data: Bureau of Economic Analysis, Bureau of Labor Statistics, and Congressional Budget Office.

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Figure 5.5 illustrates these fluctuations in the United States between 1980 and 2010—the output gap in part (a) and the unemployment rate and natural unemployment rate in part (b).

When the economy is at full employment, the unemployment rate equals the natural unemployment rate and real GDP equals potential GDP so the output gap is zero. When the unemployment rate is less than the natural unemployment rate, real GDP is greater than potential GDP and the output gap is positive. And when the unemployment rate is greater than the natural unemployment rate, real GDP is less than potential GDP and the output gap is negative.

Figure 5.5(b) shows the natural unemployment rate estimated by the Congressional Budget Office. This estimate puts the natural unemployment rate at 6.2 percent in 1980 and falling steadily through the 1980s and 1990s to 4.8 percent by 2000. This estimate of the natural unemployment rate in the United States is one that many, but not all, economists agree with.

REVIEW QUIZ

1. Why does unemployment arise and what makes some unemployment unavoidable?
2. Define frictional unemployment, structural unemployment, and cyclical unemployment. Give examples of each type of unemployment.
3. What is the natural unemployment rate?
4. How does the natural unemployment rate change and what factors might make it change?
5. Why is the unemployment rate never zero, even at full employment?
6. What is the output gap? How does it change when the economy goes into recession?
7. How does the unemployment rate fluctuate over the business cycle?

You can work these questions in Study Plan 5.2 and get instant feedback. myeconlab

Your next task is to see how we monitor the price level and the inflation rate. You will learn about the Consumer Price Index (CPI), which is monitored every month. You will also learn about other measures of the price level and the inflation rate.

The Price Level, Inflation, and Deflation

What will it *really* cost you to pay off your student loan? What will your parent's life savings buy when they retire? The answers depend on what happens to the **price level**, the average level of prices, and the value of money. A persistently rising price level is called **inflation;** a persistently falling price level is called **deflation**.

We are interested in the price level, inflation, and deflation for two main reasons. First, we want to measure the annual percentage change of the price level—the inflation rate or deflation rate. Second, we want to distinguish between the money values and real values of economic variables such as your student loan and your parent's savings.

We begin by explaining why inflation and deflation are problems. Then we'll look at how we measure the price level and the inflation rate. Finally, we'll return to the task of distinguishing real values from money values.

Why Inflation and Deflation are Problems

Low, steady, and anticipated inflation or deflation isn't a problem, but an unexpected burst of inflation or period of deflation brings big problems and costs. An unexpected inflation or deflation:

- Redistributes income
- Redistributes wealth
- Lowers real GDP and employment
- Diverts resources from production

Redistribution of Income Workers and employers sign wage contracts that last for a year or more. An unexpected burst of inflation raises prices but doesn't immediately raise the wages. Workers are worse off because their wages buy less than they bargained for and employers are better off because their profits rise.

An unexpected period of deflation has the opposite effect. Wage rates don't fall but the prices fall. Workers are better off because their fixed wages buy more than they bargained for and employers are worse off with lower profits.

Redistribution of Wealth People enter into loan contracts that are fixed in money terms and that pay an interest rate agreed as a percentage of the money borrowed and lent. With an unexpected burst of inflation, the money that the borrower repays to the lender buys less than the money originally loaned. The borrower wins and the lender loses. The interest paid on the loan doesn't compensate the lender for the loss in the value of the money loaned. With an unexpected deflation, the money that the borrower repays to the lender buys *more* than the money originally loaned. The borrower loses and the lender wins.

Lowers Real GDP and Employment Unexpected inflation that raises firms' profits brings a rise in investment and a boom in production and employment. Real GDP rises above potential GDP and the unemployment rate falls below the natural rate. But this situation is *temporary*. Profitable investment dries up, spending falls, real GDP falls below potential GDP and the unemployment rate rises. Avoiding these swings in production and jobs means avoiding unexpected swings in the inflation rate.

An unexpected deflation has even greater consequences for real GDP and jobs. Businesses and households that are in debt (borrowers) are worse off and they cut their spending. A fall in total spending brings a recession and rising unemployment.

Diverts Resources from Production Unpredictable inflation or deflation turns the economy into a casino and diverts resources from productive activities to forecasting inflation. It can become more profitable to forecast the inflation rate or deflation rate correctly than to invent a new product. Doctors, lawyers, accountants, farmers—just about everyone—can make themselves better off, not by specializing in the profession for which they have been trained but by spending more of their time dabbling as amateur economists and inflation forecasters and managing their investments.

From a social perspective, the diversion of talent that results from unpredictable inflation is like throwing scarce resources onto a pile of garbage. This waste of resources is a cost of inflation.

At its worst, inflation becomes **hyperinflation**—an inflation rate of 50 percent a month or higher that grinds the economy to a halt and causes a society to collapse. Hyperinflation is rare, but Zimbabwe in recent years and several European and Latin American countries have experienced it.

We pay close attention to the inflation rate, even when its rate is low, to avoid its consequences. We monitor the price level every month and devote considerable resources to measuring it accurately. You're now going to see how we do this.

The Consumer Price Index

Every month, the Bureau of Labor Statistics (BLS) measures the price level by calculating the **Consumer Price Index (CPI)**, which is a measure of the average of the prices paid by urban consumers for a fixed basket of consumer goods and services. What you learn here will help you to make sense of the CPI and relate it to your own economic life. The CPI tells you about the *value* of the money in your pocket.

Reading the CPI Numbers

The CPI is defined to equal 100 for a period called the *reference base period*. Currently, the reference base period is 1982–1984. That is, for the average of the 36 months from January 1982 through December 1984, the CPI equals 100.

In June 2010, the CPI was 218. This number tells us that the average of the prices paid by urban consumers for a fixed market basket of consumer goods and services was 118 percent higher in 2010 than it was on the average during 1982–1984.

Constructing the CPI

Constructing the CPI involves three stages:

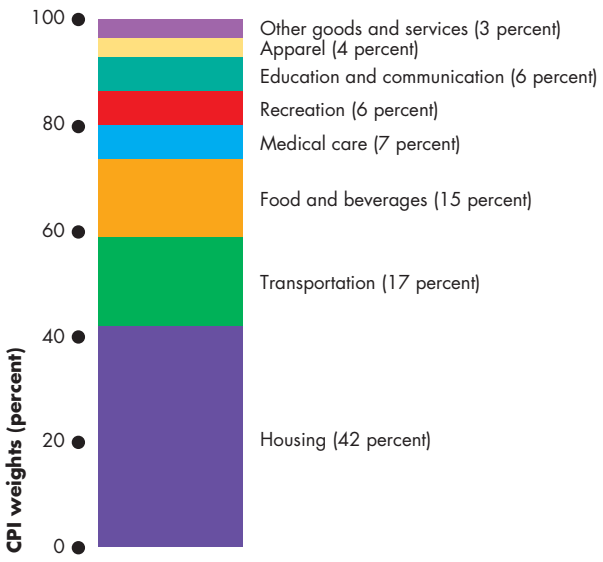
- Selecting the CPI basket
- Conducting the monthly price survey
- Calculating the CPI

The CPI Basket The first stage in constructing the CPI is to select what is called the *CPI basket*. This basket contains the goods and services represented in the index, each weighted by its relative importance. The idea is to make the relative importance of the items in the CPI basket the same as that in the budget of an average urban household. For example, because people spend more on housing than on bus rides, the CPI places more weight on the price of housing than on the price of a bus ride.

To determine the CPI basket, the BLS conducts a Consumer Expenditure Survey. Today's CPI basket is based on data gathered in the Consumer Expenditure Survey of 2008.

Figure 5.6 shows the CPI basket in June 2010. As you look at the relative importance of the items in the CPI basket, remember that it applies to the *average* household. *Individual* household's baskets are spread around the average. Think about what you buy and compare your basket with the CPI basket.

FIGURE 5.6 The CPI Basket



The CPI basket consists of the items that an average urban household buys. It consists mainly of housing (42 percent), transportation (17 percent), and food and beverages (15 percent). All other items add up to 26 percent of the total.

Sources of data: United States Census Bureau and Bureau of Labor Statistics.

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The Monthly Price Survey Each month, BLS employees check the prices of the 80,000 goods and services in the CPI basket in 30 metropolitan areas. Because the CPI aims to measure price *changes*, it is important that the prices recorded each month refer to exactly the same item. For example, suppose the price of a box of jelly beans has increased but a box now contains more beans. Has the price of jelly beans increased? The BLS employee must record the details of changes in quality or packaging so that price changes can be isolated from other changes.

Once the raw price data are in hand, the next task is to calculate the CPI.

Calculating the CPI To calculate the CPI, we

1. Find the cost of the CPI basket at base-period prices.
2. Find the cost of the CPI basket at current-period prices.
3. Calculate the CPI for the base period and the current period.

We'll work through these three steps for the simple artificial economy in Table 5.1, which shows the quantities in the CPI basket and the prices in the base period (2010) and current period (2011).

Part (a) contains the data for the base period. In that period, consumers bought 10 oranges at $1 each and 5 haircuts at $8 each. To find the cost of the CPI basket in the base-period prices, multiply the quantities in the CPI basket by the base-period prices. The cost of oranges is $10 (10 at $1 each), and the cost of haircuts is $40 (5 at $8 each). So total cost of the CPI basket in the base period of the CPI basket is $50 ($10 + $40).

Part (b) contains the price data for the current period. The price of an orange increased from $1 to $2, which is a 100 percent increase—($1 ÷ $1) × 100 = 100. The price of a haircut increased from $8 to $10, which is a 25 percent increase—($2 ÷ $8) × 100 = 25.

The CPI provides a way of averaging these price increases by comparing the cost of the basket rather than the price of each item. To find the cost of the CPI basket in the current period, 2011, multiply the quantities in the basket by their 2011 prices. The cost of oranges is $20 (10 at $2 each), and the cost of haircuts is $50 (5 at $10 each). So total cost of the fixed CPI basket at current-period prices is $70 ($20 + $50).

You've now taken the first two steps toward calculating the CPI: calculating the cost of the CPI basket in the base period and the current period. The third step uses the numbers you've just calculated to find the CPI for 2010 and 2011.

The formula for the CPI is

$$\text{CPI} = \frac{\text{Cost of CPI basket at current prices}}{\text{Cost of CPI basket at base-period prices}} \times 100.$$

In Table 5.1, you established that in 2010 (the base period), the cost of the CPI basket was $50 and in 2011, it was $70. If we use these numbers in the CPI formula, we can find the CPI for 2010 and 2011. For 2010, the CPI is

$$\text{CPI in 2010} = \frac{\$50}{\$50} \times 100 = 100.$$

For 2011, the CPI is

$$\text{CPI in 2011} = \frac{\$70}{\$50} \times 100 = 140.$$

The principles that you've applied in this simplified CPI calculation apply to the more complex calculations performed every month by the BLS.

TABLE 5.1 The CPI: A Simplified Calculation

(a) The cost of the CPI basket at base-period prices: 2010

CPI basket			
Item	**Quantity**	**Price**	**Cost of CPI Basket**
Oranges	10	$1.00	$10
Haircuts	5	$8.00	$40
Cost of CPI basket at base-period prices			$50

(b) The cost of the CPI basket at current-period prices: 2011

CPI basket			
Item	**Quantity**	**Price**	**Cost of CPI Basket**
Oranges	10	$2.00	$20
Haircuts	5	$10.00	$50
Cost of CPI basket at current-period prices			$70

Measuring the Inflation Rate

A major purpose of the CPI is to measure changes in the cost of living and in the value of money. To measure these changes, we calculate the *inflation rate* as the annual percentage change in the CPI. To calculate the inflation rate, we use the formula:

$$\text{Inflation rate} = \frac{\text{CPI this year} - \text{CPI last year}}{\text{CPI last year}} \times 100.$$

We can use this formula to calculate the inflation rate in 2010. The CPI in June 2010 was 218.0, and the CPI in June 2009 was 215.7. So the inflation rate during the twelve months to June 2010 was

$$\text{Inflation rate} = \frac{(218.0 - 215.7)}{215.7} \times 100 = 1.1\%.$$

Distinguishing High Inflation from a High Price Level

Figure 5.7 shows the CPI and the inflation rate in the United States between 1970 and 2010. The two parts of the figure are related and emphasize the distinction between high inflation and high prices.

When the price level in part (a) *rises rapidly*, (1970 through 1982), the inflation rate in part (b) is *high*. When the price level in part (a) *rises slowly*, (after 1982), the inflation rate in part (b) is *low*.

A high inflation rate means that the price level is rising rapidly. A high price level means that there has been a sustained period of rising prices.

When the price level in part (a) *falls* (2009), the inflation rate in part (b) is negative—deflation.

The CPI is not a perfect measure of the price level and changes in the CPI probably overstate the inflation rate. Let's look at the sources of bias.

The Biased CPI

The main sources of bias in the CPI are

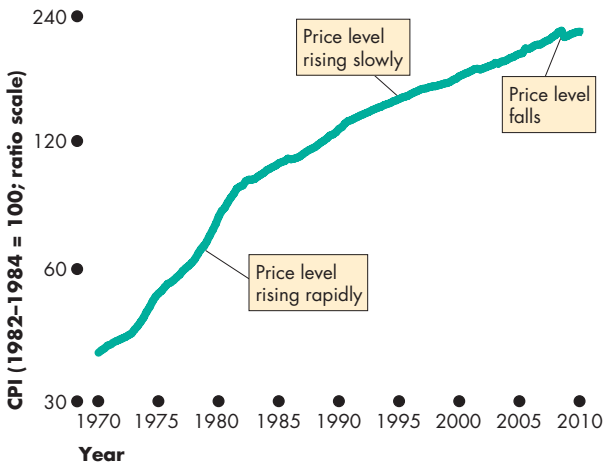
- New goods bias
- Quality change bias
- Commodity substitution bias
- Outlet substitution bias

New Goods Bias If you want to compare the price level in 2009 with that in 1969, you must somehow compare the price of a computer today with that of a typewriter in 1969. Because a PC is more expensive than a typewriter was, the arrival of the PC puts an upward bias into the CPI and its inflation rate.

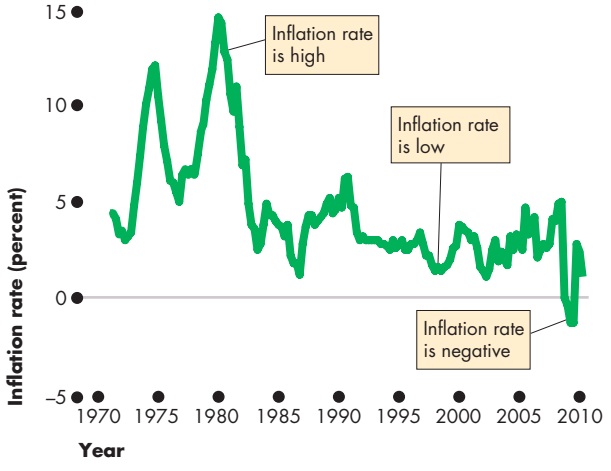
Quality Change Bias Cars, CD players, and many other items get better every year. Part of the rise in the prices of these items is a payment for improved quality and is not inflation. But the CPI counts the entire price rise as inflation and so overstates inflation.

Commodity Substitution Bias Changes in relative prices lead consumers to change the items they buy. For example, if the price of beef rises and the price of chicken remains unchanged, people buy more chicken and less beef. This switch from beef to chicken might provide the same amount of protein and the same enjoyment as before and expenditure is the same as before. The price of protein has not changed. But because the CPI ignores the substitution of chicken for beef, it says the price of protein has increased.

FIGURE 5.7 The CPI and the Inflation Rate



(a) CPI



(b) Inflation rate

When the price level rises rapidly, the inflation rate is high, and when the price level rises slowly, the inflation rate is low. When the price level falls, the inflation rate is negative.

From 1970 through 1982, the price level increased rapidly in part (a) and the inflation rate was high in part (b). After 1982, the price level rose slowly in part (a) and the inflation rate was low in part (b). In 2009, the price level fell and the inflation rate was negative—there was deflation.

Source of data: Bureau of Labor Statistics.

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Outlet Substitution Bias When confronted with higher prices, people use discount stores more frequently and convenience stores less frequently. This phenomenon is called *outlet substitution*. The CPI surveys do not monitor outlet substitutions.

The Magnitude of the Bias

You've reviewed the sources of bias in the CPI. But how big is the bias? This question was tackled in 1996 by a Congressional Advisory Commission on the Consumer Price Index chaired by Michael Boskin, an economics professor at Stanford University. This commission said that the CPI overstates inflation by 1.1 percentage points a year. That is, if the CPI reports that inflation is 3.1 percent a year, most likely inflation is actually 2 percent a year.

Some Consequences of the Bias

The bias in the CPI distorts private contracts and increases government outlays. Many private agreements, such as wage contracts, are linked to the CPI. For example, a firm and its workers might agree to a three-year wage deal that increases the wage rate by 2 percent a year *plus* the percentage increase in the CPI. Such a deal ends up giving the workers more real income than the firm intended.

Close to a third of federal government outlays, including Social Security checks, are linked directly to the CPI. And while a bias of 1 percent a year seems small, accumulated over a decade it adds up to almost a trillion dollars of additional expenditures.

Alternative Price Indexes

The CPI is just one of many alternative price level index numbers and because of the bias in the CPI, other measures are used for some purposes. We'll describe three alternatives to the CPI and explain when and why they might be preferred to the CPI. The alternatives are

- Chained CPI
- Personal consumption expenditure deflator
- GDP deflator

Chained CPI The *chained CPI* is a price index that is calculated using a similar method to that used to calculate *chained-dollar real GDP* described in Chapter 4 (see pp. 98–99).

The *chained* CPI overcomes the sources of bias in the CPI. It incorporates substitutions and new goods bias by using current and previous period quantities rather than fixed quantities from an earlier period.

The practical difference made by the chained CPI is small. This index has been calculated since 2000 and the average inflation rate since then as measured by the chained CPI is only 0.3 percentage points lower than the standard CPI—2.5 percent versus 2.8 percent per year.

Personal Consumption Expenditure Deflator The *personal consumption expenditure deflator* (or *PCE deflator*) is calculated from data in the national income accounts that you studied in Chapter 4. When the Bureau of Economic Analysis calculates *real GDP*, it also calculates the real values of its expenditure components: real consumption expenditure, real investment, real government expenditure, and real net exports. These calculations are done in the same way as that for real GDP described in simplified terms on p. 89 and more technically on pp. 98–99 in Chapter 4.

To calculate the PCE deflator, we use the formula:

$$\text{PCE deflator} = (\text{Nominal } C \div \text{Real } C) \times 100,$$

where C is personal consumption expenditure.

The basket of goods and services included in the PCE deflator is broader than that in the CPI because it includes all consumption expenditure, not only the items bought by a typical urban family.

The difference between the PCE deflator and the CPI is small. Since 2000, the inflation rate measured by the PCE deflator is 2.4 percent per year, 0.4 percentage points lower than the CPI inflation rate.

GDP Deflator The *GDP deflator* is a bit like the PCE deflator except that it includes all the goods and services that are counted as part of GDP. So it is an index of the prices of the items in consumption, investment, government expenditure, and net exports.

$$\text{GDP deflator} = (\text{Nominal GDP} \div \text{Real GDP}) \times 100.$$

This broader price index is appropriate for macroeconomics because it is a comprehensive measure of the cost of the real GDP basket of goods and services.

Since 2000, the GDP deflator has increased at an average rate of 2.6 percent per year, only 0.2 percentage points below the CPI inflation rate.

Core CPI Inflation

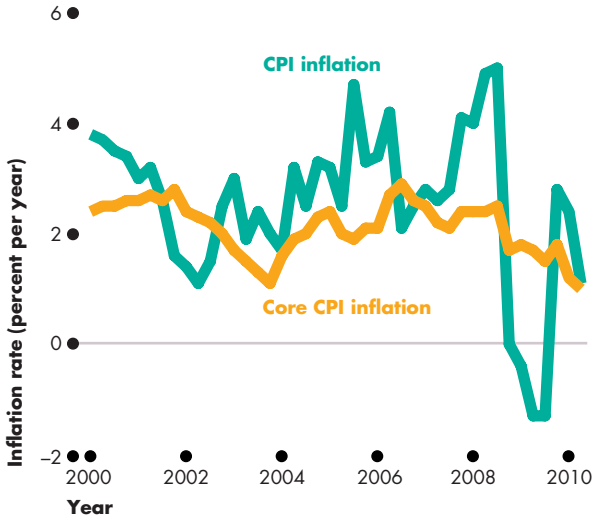
No matter whether we calculate the inflation rate using the CPI, the chained CPI, the personal consumption expenditure deflator, or the GDP deflator, the number bounces around a good deal from month to month or quarter to quarter. To determine the trend in the inflation rate, we need to strip the raw numbers of their volatility. The **core CPI inflation rate**, which is the CPI inflation rate excluding volatile elements, attempts to do just that and reveal the underlying inflation trend.

As a practical matter, the core CPI inflation rate is calculated as the percentage change in the CPI (or other price index) excluding food and fuel. The prices of these two items are among the most volatile.

While the core CPI inflation rate removes the volatile elements in inflation, it can give a misleading view of the true underlying inflation rate. If the relative prices of the excluded items are changing, the core CPI inflation rate will give a biased measure of the true underlying inflation rate.

Such a misleading account was given during the years between 2003 and 2008 when the relative prices of food and fuel were rising. The result was a core CPI inflation rate that was systematically below the CPI inflation rate. Figure 5.8 shows the two series since 2000. More refined measures of core inflation have been suggested that eliminate the bias.

FIGURE 5.8 Core Inflation



The core CPI inflation rate excludes volatile price changes of food and fuel. Since 2003, the core CPI inflation rate has mostly been below the CPI inflation rate because the relative prices of food and fuel have been rising.

Source of data: Bureau of Labor Statistics.

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The Real Variables in Macroeconomics

You saw in Chapter 4 how we measure real GDP. And you've seen in this chapter how we can use nominal GDP and real GDP to provide another measure of the price level—the GDP deflator. But viewing real GDP as nominal GDP deflated, opens up the idea of other real variables. By using the GDP deflator, we can deflate other nominal variables to find their real values. For example, the *real wage rate* is the nominal wage rate divided by the GDP deflator.

We can adjust any nominal quantity or price variable for inflation by deflating it—by dividing it by the price level.

There is one variable that is a bit different—an interest rate. A real interest rate is *not* a nominal interest rate divided by the price level. You'll learn how to adjust the nominal interest rate for inflation to find the real interest rate in Chapter 7. But all the other real variables of macroeconomics are calculated by dividing a nominal variable by the price level.

REVIEW QUIZ

1. What is the price level?
2. What is the CPI and how is it calculated?
3. How do we calculate the inflation rate and what is its relationship with the CPI?
4. What are the four main ways in which the CPI is an upward-biased measure of the price level?
5. What problems arise from the CPI bias?
6. What are the alternative measures of the price level and how do they address the problem of bias in the CPI?

You can work these questions in Study Plan 5.3 and get instant feedback. myeconlab

You've now completed your study of the measurement of macroeconomic performance. Your next task is to learn what determines that performance and how policy actions might improve it. But first, take a close-up look at the labor market in 2009 and 2010 in *Reading Between the Lines* on pp. 122–123.