The Labor Market in the Macroeconomy

13

In Chapter 7 we described some features of the U.S. labor market and explained how the unemployment rate is measured. In Chapter 11 we considered the labor market briefly in our discussion of the aggregate supply curve. We learned that the labor market is key to understanding how and when government policy can be useful. Sticky wages in the labor market cause the *AS* curve to be upward sloping and create room for government spending and tax policy to increase aggregate output. If wages are completely flexible and rise every time the price level rises by the same percentage, the *AS* curve will be vertical and government attempts to stimulate the economy will only lead to price increases.

Understanding how wages are set is thus key to macroeconomics. It is also one of the most disputed parts of the field. We begin our discussion with a review of the classical view, which holds that wages always adjust to clear the labor market, that is, to equate the supply of and demand for labor. We then consider what might be wrong with the classical set of assumptions, why the labor market may not always clear, and why unemployment may exist. Finally, we discuss the relationship between inflation and unemployment. As we go through the analysis, it is important to recall why unemployment is one of the three primary concerns of macroeconomics. Go back and reread "The Costs of Unemployment" in Chapter 7 (pp. 155–165). Unemployment imposes heavy costs on society.

CHAPTER OUTLINE AND LEARNING OBJECTIVES

13.1 LEARNING OBJECTIVE

Define fundamental concepts of the labor market.

The Labor Market: Basic Concepts

On the first Friday of every month, the Labor Department releases the results of a household survey that provides an estimate of the number of people with a job, the employed (*E*), as well as the number of people who are looking for work but cannot find a job, the unemployed (*U*). The labor force (*LF*) is the number of employed plus unemployed:

$$LF = E + U$$

unemployment rate The ratio of the number of people unemployed to the total number of people in the labor force.

The **unemployment rate** is the number of people unemployed as a percentage of the labor force:

$$\text{unemployment rate} = \frac{U}{LF}$$

To repeat, to be unemployed, a person must be out of a job and actively looking for work. When a person stops looking for work, he or she is considered *out of the labor force* and is no longer counted as unemployed.

It is important to realize that even if the economy is running at or near full capacity, the unemployment rate will never be zero. The economy is dynamic. Students graduate from schools and training programs; some businesses make profits and grow, whereas others suffer losses and go out of business; people move in and out of the labor force and change careers. It takes time for people to find the right job and for employers to match the right worker with the jobs they have. This **frictional** and **structural unemployment** is inevitable and in many ways desirable.

frictional unemployment The portion of unemployment that is due to the normal working of the labor market; used to denote short-run job/skill matching problems.

structural unemployment The portion of unemployment that is due to changes in the structure of the economy that result in a significant loss of jobs in certain industries.

In this chapter, we are primarily concerned with **cyclical unemployment**, the increase in unemployment that occurs during recessions and depressions. When the economy contracts, the number of people unemployed and the unemployment rate rise. The United States has experienced several periods of high unemployment. During the Great Depression, the unemployment rate remained high for nearly a decade. In December 1982, more than 12 million people were unemployed, putting the unemployment rate at 10.8 percent. In the recession of 2008–2009, the unemployment rate rose to more than 10 percent.

cyclical unemployment The increase in unemployment that occurs during recessions and depressions.

In one sense, the reason employment falls when the economy experiences a downturn is obvious. When firms cut back on production, they need fewer workers, so people get laid off. Employment tends to fall when aggregate output falls and to rise when aggregate output rises. *Nevertheless, a decline in the demand for labor does not necessarily mean that unemployment will rise.* If markets work as we described in Chapters 3 and 4, a decline in the demand for labor will initially create an excess supply of labor. As a result, the wage rate should fall until the quantity of labor supplied again equals the quantity of labor demanded, restoring equilibrium in the labor market. Although the equilibrium quantity of labor is lower, at the new wage rate everyone who wants a job will have one.

If the quantity of labor demanded and the quantity of labor supplied are brought into equilibrium by rising and falling wage rates, there should be no persistent unemployment above the frictional and structural amount. Labor markets should behave just like output markets described by supply and demand curves. This was the view held by the classical economists who preceded Keynes, and it is still the view of a number of economists. Other economists believe that the labor market is different from other markets and that wage rates adjust only slowly to decreases in the demand for labor. If true, economies can suffer bouts of involuntary unemployment.

13.2 LEARNING OBJECTIVE

Explain the classical view of the labor market.

The Classical View of the Labor Market

The classical view of the labor market is illustrated in Figure 13.1. Classical economists assumed that the wage rate adjusts to equate the quantity demanded with the quantity supplied, thereby implying that unemployment does not exist. If we see people out of work, it just means that they are not interested in working at the going market wage for someone with their skills. To see how wage adjustment might take place, we can use the supply and demand curves in Figure 13.1.

Curve D_0 is the **labor demand curve**. Each point on D_0 represents the amount of labor firms want to employ at each given wage rate. Each firm's decision about how much labor to demand is part of its overall profit-maximizing decision. A firm makes a profit by selling output to households. It will hire workers if the value of its output is sufficient to justify the wage that is being paid. Thus, the amount of labor that a firm hires depends on the value of output that workers produce.

labor demand curve A graph that illustrates the amount of labor that firms want to employ at each given wage rate.

Figure 13.1 also shows a **labor supply curve**, labeled *S*. Each point on the labor supply curve represents the amount of labor households want to supply at each given wage rate. Each household's decision concerning how much labor to supply is part of the overall consumer choice problem of a household. Each household member looks at the market wage rate, the prices of outputs, and the value of leisure time (including the value of staying at home and working in the yard or raising children) and chooses the amount of labor to supply (if any). A household member not in the labor force has decided that his or her time is more valuable in nonmarket activities.

labor supply curve A graph that illustrates the amount of labor that households want to supply at each given wage rate.

In Figure 13.1 the labor market is initially in equilibrium at W_0 and L_0. Now consider what classical economists think would happen if there is a decrease in the demand for labor. The demand for labor curve shifts in from D_0 to D_1. The new demand curve intersects the labor supply curve at L_1 and W_1. There is a new equilibrium at a lower wage rate, in which fewer people are employed. Note that the fall in the demand for labor has not caused any unemployment. There are fewer people working, but all people interested in working at the wage W_1 are in fact employed.

The classical economists saw the workings of the labor market—the behavior of labor supply and labor demand—as optimal from the standpoint of both individual households and firms and from the standpoint of society. If households want more output than is currently being produced, output demand will increase, output prices will rise, the demand for labor will increase, the wage rate will rise, and more workers will be drawn into the labor force. (Some of those who preferred not to be a part of the labor force at the lower wage rate will be lured into the labor force at the higher wage rate.) At equilibrium, prices and wages reflect a trade-off between the value households place on outputs and the value of time spent in leisure and nonmarket work. At equilibrium, the people who are not working have *chosen* not to work at that market wage. There is always *full employment* in this sense. The classical economists believed that the market would achieve the optimal result if left to its own devices, and there is nothing the government can do to make things better.

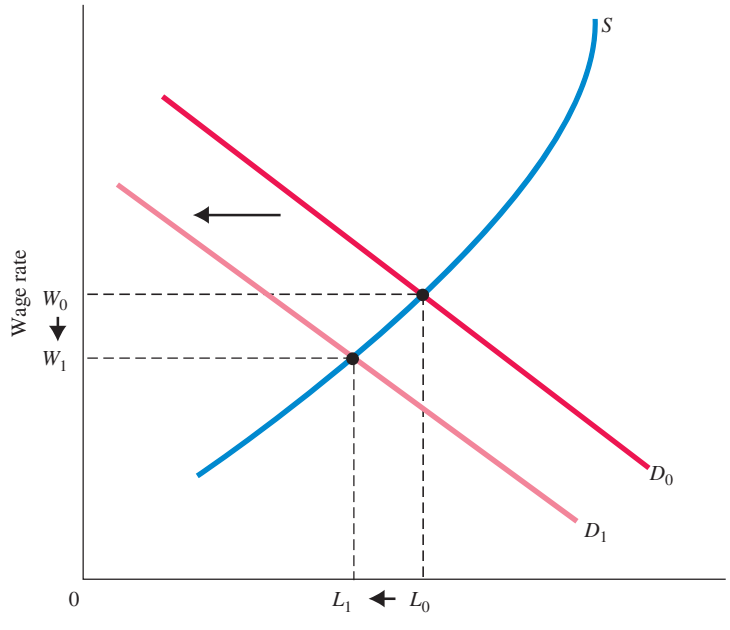

FIGURE 13.1 The Classical Labor Market
Classical economists believe that the labor market always clears. If the demand for labor shifts from D_0 to D_1, the equilibrium wage will fall from W_0 to W_1. Anyone who wants a job at W_1 will have one.

MyLab Economics Concept Check

The Classical Labor Market and the Aggregate Supply Curve MyLab Economics Concept Check

How does the classical view of the labor market relate to the theory of the vertical *AS* curve we covered in Chapter 11? The classical idea that wages adjust to clear the labor market is consistent with the view that wages respond quickly to price changes. In the absence of sticky wages, the *AS* curve will be vertical. In this case, monetary and fiscal policy will have no effect on real output. Indeed, in this view, there is no unemployment problem to be solved!

The Unemployment Rate and the Classical View MyLab Economics Concept Check

If, as the classical economists assumed, the labor market works well, how can we account for the fact that the unemployment rate at times seems high? There seem to be times when millions of people who want jobs at prevailing wage rates cannot find them. How can we reconcile this situation with the classical assumption about the labor market?

Some economists answer by arguing that the unemployment rate is not a good measure of whether the labor market is working well. We know the economy is dynamic and at any given time some industries are expanding and some are contracting. Consider, for example, a carpenter who is laid off because of a contraction in the construction industry. She had probably developed specific skills related to the construction industry—skills not necessarily useful for jobs in other industries. If she were earning $40,000 per year as a carpenter, she may be able to earn only $30,000 per year in another industry. Will this carpenter take a job at $30,000? There are at least two reasons she may not. First, she may believe that the slump in the construction industry is temporary and that she will soon get her job back. Second, she may mistakenly believe that she can earn more than $30,000 in another industry and will continue to look for a better job.

If our carpenter decides to continue looking for a job paying more than $30,000 per year, she will be considered unemployed because she is actively looking for work. This does not necessarily mean that the labor market is not working properly. The carpenter has *chosen* not to work for a wage of $30,000 per year, but if her value to any firm outside the construction industry is no more than $30,000 per year, we would not expect her to find a job paying more than $30,000. In this case, a positive unemployment rate as measured by the government does not necessarily indicate that the labor market is working poorly. It just tells us that people are slow to adjust their expectations about what they can earn in the labor market.

If the degree to which industries are changing in the economy fluctuates over time, there will be more people like our carpenter at some times than at others. This variation will cause the measured unemployment rate to fluctuate. Some economists argue that the measured unemployment rate may sometimes *seem* high even though the labor market is working well. The quantity of labor supplied at the current wage is equal to the quantity demanded at the current wage. The fact that there are people willing to work at a wage higher than the current wage does not mean that the labor market is not working. Whenever there is an upward-sloping supply curve in a market (as is usually the case in the labor market), the quantity supplied at a price higher than the equilibrium price is always greater than the quantity supplied at the equilibrium price.

Economists who view unemployment this way do not see it as a major problem. Yet the haunting images of the bread lines in the 1930s are still with us, and many find it difficult to believe everything was optimal when more than 12 million people were counted as unemployed in 2012. There are other views of unemployment, as we will now see.

13.3 LEARNING OBJECTIVE

Discuss four reasons for the existence of unemployment.

Explaining the Existence of Unemployment

We noted previously and in Chapter 7 that some unemployment is frictional or structural. The rest we categorized as cyclical—unemployment that moves up and down with the business cycle. This categorization is, however, a little too simple. Economists have argued that there may be unemployment that is higher than frictional plus structural and yet does not fluctuate much with the business cycle. We turn to these arguments first before considering cyclical unemployment.

Efficiency Wage Theory MyLab Economics Concept Check

One argument for unemployment beyond frictional and structural centers on the **efficiency wage theory**. According to this theory, raising the wage rate can also increase the productivity of workers in the firm. If this is true, then firms may have an incentive to pay wages *above* the wage at which the quantity of labor supplied is equal to the quantity of labor demanded.

efficiency wage theory An explanation for unemployment that holds that the productivity of workers increases with the wage rate. If this is so, firms may have an incentive to pay wages above the market-clearing rate.

The key argument of the efficiency wage theory is that by offering workers a wage in excess of the market wage, the productivity of those workers is increased. Some economists have likened the payment of this higher wage to a gift exchange: Firms pay a wage in excess of the market wage, and in return, workers work harder or more productively than they otherwise would. From the outside the wage looks higher than the market wage but in fact from the firm's perspective the higher wage is worth it. Empirical studies of labor markets have identified several potential benefits that firms might receive from paying workers more than the market-clearing wage. Among them are lower turnover, improved morale, and reduced "shirking" of work.

Under these circumstances, there will be people who want to work at the wage paid by firms and cannot find employment. Indeed, for the efficiency wage theory to operate, it must be the case that the wage offered by firms is above the market wage. It is the gap between the two that motivates workers who do have jobs to outdo themselves.

Imperfect Information MyLab Economics Concept Check

Thus far we have been assuming that firms know exactly what wage rates they need to set to clear the labor market. They may not choose to set their wages at this level, but at least they know what the market-clearing wage is. In practice, however, firms may not have enough information at their disposal to know what the market-clearing wage is. In this case, firms are said to have imperfect information. If firms have imperfect or incomplete information, they may simply set wages wrong—wages that do not clear the labor market.

If a firm sets its wages too high, more workers will want to work for that firm than the firm wants to employ, resulting in some potential workers being turned away. The result is, of course, unemployment. One objection to this explanation is that it accounts for the existence of unemployment only in the very short run. As soon as a firm sees that it has made a mistake, why would it not immediately correct its mistake and adjust its wages to the correct market-clearing level? Why would unemployment persist?

If the economy were simple, it should take no more than a few months for firms to correct their mistakes, but the economy is complex. Although firms may be aware of their past mistakes and may try to correct them, new events are happening all the time. Because constant change—including a constantly changing equilibrium wage level—is characteristic of the economy, firms may find it hard to adjust wages to the market-clearing level. The labor market is not like the stock market or the market for wheat, where prices are determined in organized exchanges every day. Instead, thousands of firms are setting wages and millions of workers are responding to these wages. It may take considerable time for the market-clearing wages to be determined after they have been disturbed from an equilibrium position.

Minimum Wage Laws MyLab Economics Concept Check

Minimum wage laws set a floor for wage rates—a minimum hourly rate for any kind of labor. In 2018, the federal minimum wage was $7.25 per hour, although some states had considerably higher rates. If the market-clearing wage for some groups of workers is below this amount, this group will be unemployed.

minimum wage laws Laws that set a floor for wage rates—that is, a minimum hourly rate for any kind of labor.

Out-of-school teenagers, who have relatively little job experience, are most likely to be hurt by minimum wage laws. If some teenagers can produce only $6.90 worth of output per hour, no firm would be willing to hire them at a wage of $7.25. To do so would incur a loss of $0.35 per hour. In an unregulated market, these teenagers would be able to find work at the market-clearing wage of $6.90 per hour. If the minimum wage laws prevent the wage from falling below $7.25, these workers will not be able to find jobs and they will be unemployed. Others who may be hurt include people with very low skills and some recent immigrants.

To the extent that minimum wage legislation prevents wages from falling, causing unemployment, it does not provide a challenge to the classical view, but rather an explanation for what happens when the government prevents that market model from working. In the United States the federal minimum wages has not changed in a number of years and most economists view its effect on unemployment at present to be small.

Like the theories of the efficiency wage and imperfect information, the existence of government rules on how low wages can fall tell us little about the causes of cyclical unemployment. We turn to this now.

13.4 LEARNING OBJECTIVE

Discuss the reasons for the existence of cyclical unemployment.

Explaining the Existence of Cyclical Unemployment

The classical model of wage setting, even in a world of imperfect information and efficiency wages, does not lead us to predict cyclical unemployment. Explaining cyclical unemployment requires us to look to other theories. Key to these theories is explaining why wages might have trouble adjusting downward when economic activity causes firms to seek fewer workers. If wages are sticky in a downward direction, the frictional and structural unemployment that we see in a normal economy will grow in a downturn, and we will experience cyclical unemployment.

Sticky Wages MyLab Economics Concept Check

sticky wages The downward rigidity of wages as an explanation for the existence of unemployment.

Unemployment (above and beyond normal frictional and structural unemployment) occurs because wages are **sticky** on the downward side. We described this briefly in our building of the *AS* curve. This situation is illustrated in Figure 13.2, where the equilibrium wage gets stuck at W_0 (the original wage) and does not fall to W^* when demand decreases from D_0 to D_1. The result is unemployment of the amount $L_0 - L_1$, where L_0 is the quantity of labor that households want to supply at wage rate W_0 and L_1 is the amount of labor that firms want to hire at wage rate W_0. $L_0 - L_1$ is the number of workers who would like to work at W_0 but cannot find jobs.

The sticky wage explanation of unemployment, however, begs the question: *Why* are wages sticky, if they are, and *why* do wages not fall to clear the labor market during periods of high unemployment? Many answers have been proposed, but as yet no one answer has been agreed on. This lack of consensus is one reason macroeconomics has been in a state of flux for so long. The existence of unemployment continues to be a puzzle. Although we will discuss the major theories that economists have proposed to explain why wages may not clear the labor market, we can offer no conclusions.

social, *or* implicit, contracts Unspoken agreements between workers and firms that firms will not cut wages.

relative-wage explanation of unemployment An explanation for sticky wages (and therefore unemployment): If workers are concerned about their wages relative to the wages of other workers in other firms and industries, they may be unwilling to accept a wage cut unless they know that all other workers are receiving similar cuts.

Social, or Implicit, Contracts

One explanation for downwardly sticky wages is that firms enter into **social, *or* implicit, contracts** with workers not to cut wages. It seems that extreme events—deep recession, deregulation, or threat of bankruptcy—are necessary for firms to cut wages. Wage cuts did occur in the Great Depression, in the airline industry following deregulation of the industry in the 1980s, and recently when some U.S. manufacturing firms found themselves in danger of bankruptcy from stiff foreign competition. Even then, wage cuts were typically imposed only on new workers, not existing workers, as in the auto industry in 2008–2009. Broad-based wage cuts are exceptions to the general rule. For reasons that may be more sociological than economic, cutting wages seems close to being a taboo. In one study, Truman Bewley of Yale University surveyed hundreds of managers about why they did not reduce wage rates in downturns. The most common response was that wage cuts hurt worker morale and thus negatively affect worker productivity. Breaking the taboo and cutting wages may be costly in this sense. Firms seem to prefer laying off existing workers to lowering their wages.

A related argument, the **relative-wage explanation of unemployment**, holds that workers are concerned about their wages *relative* to the wages of other workers in other firms and industries and may be unwilling to accept wage cuts unless they know that other workers are receiving similar cuts. Because it is difficult to reassure any one group of workers that all other workers are in the same situation, workers may resist any cut in their wages. There may be an implicit

ECONOMICS IN PRACTICE

Evidence on Sticky Wages

It should be clear to you from the text the important role the assumption of sticky wages plays in helping to explain both unemployment and the ability of fiscal stimulus in a period of unemployment to increase output and reduce that unemployment. This might lead you to wonder about the evidence of stickiness in the real labor market.

Until recently it has been hard to find the right data to answer the question of wage stickiness. After all, we cannot just look at average wages since labor is differentiated. We really want to ask for a set of workers how much wage change each of them experiences over time. A recent paper using a longitudinal survey done by the Census Bureau has done just that.[1]

The Census Bureau in its Survey of Income and Program Participation (SIPP) followed 39,095 people for periods of 24 to 48 months, interviewing them quarterly about their work and wages. All the workers were hourly workers, making the wage data easier to interpret than that of salaried workers. The data allowed Barattieri et al. to distinguish between wage changes achieved by changing jobs and wage changes within jobs.

The period of the survey was 1996–2000. Looking back on the data in Chapter 5 you will see this was a period of low unemployment and high growth, precisely the time we would expect to see wages going up. The researchers found, however, considerable evidence of wage stickiness, especially among those who did not change jobs. They found that the probability of a within-job wage change is between 16 and

21 percent per quarter. This translates into wages that remain unchanged for about a year, which tells us that average wages change much less than average prices.

CRITICAL THINKING

1. Why do you think wages are sticky even during high growth periods?

[1]Alessandro Barattieri, Susanto Basu, and Peter Gottschalk, "Some Evidence on the Importance of Sticky Wages," *American Economic Journal: Macroeconomics*, January 2014, 70–101.

understanding between firms and workers that firms will not do anything that would make their workers worse off relative to workers in other firms.

Explicit Contracts Many workers—in particular unionized workers—sign 1- to 3-year employment contracts with firms. These contracts stipulate the workers' wages for each year of the contract. Wages set in this way do not fluctuate with economic conditions, either upward or

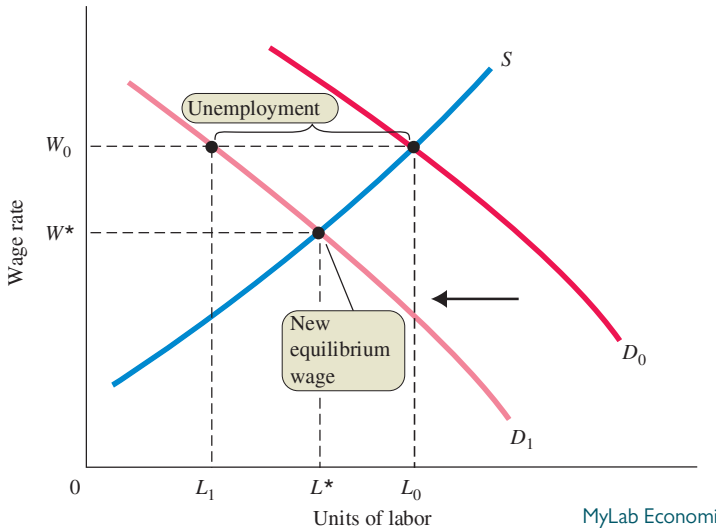

FIGURE 13.2 Sticky Wages
If wages "stick" at W_0 instead of falling to the new equilibrium wage of W^* following a shift of demand from D_0 to D_1, the result will be unemployment equal to $L_0 - L_1$.

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ECONOMICS IN PRACTICE

How the Sharing Economy Is Transforming the Job Market

The last few decades have witnessed prolonged levels of high unemployment across the world. As much as technological advancement has been blamed for many job losses, recent research suggests[1] that it has actually helped transform the job market and create more jobs. Digitalization, in particular, has resulted in the birth of the sharing economy, a community-based shared online market platform built around peer-to-peer-based renting, borrowing, swapping, and collaborating of assets, capital, and labor. The sharing economy is a new socio-economic system whose revenue is estimated to grow from $14 billion in 2014 to $335 billion by 2025.

Such a platform allows low income consumers access to items that were previously unaffordable. In the job market, entrepreneurs can access low-cost and high-outreach market platforms to sustain themselves and generate employment. Individuals who are seasonally unemployed can have access to temporary jobs, and those who are structurally unemployed can generate income independently till they acquire the skills needed for permanent employment. Similarly, those in need of flexible working hours can make extra income. In fact, profit can be generated even without employment, such as by sharing a car or renting assets! Apps such as Uber, TaskRabbit, Airbnb, and *La Ruche qui dit Oui* have given customers access to customized goods and services in this manner.

Economist Arun Sundararajan argues[2] that since the supply of capital and labor comes from decentralized crowds of individuals, the future of exchange is in crowd-based marketplaces rather than by centralized third parties.

CRITICAL THINKING

1. What are the labor law reforms that you believe are essential for sustainable employment under the sharing economy model?

[1]Ian Hathaway and Mark Muro (2016). *Tracking the Gig Economy: New Numbers*, October 13. Washington, D.C.: Brookings Institution.
[2]Arun Sundararajan (2016). *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*. Cambridge, MA: The MIT Press.

downward. If the economy slows down and firms demand fewer workers, the wage will not fall. Instead, some workers will be laid off.

explicit contracts Employment contracts that stipulate workers' wages, usually for a period of 1 to 3 years.

Although **explicit contracts** can explain why some wages are sticky, a deeper question must also be considered. Workers and firms surely know at the time a contract is signed that unforeseen events may cause the wages set by the contract to be too high or too low. Why do firms and workers bind themselves in this way? One explanation is that negotiating wages is costly. Negotiations between unions and firms can take a considerable amount of time—time that could be spent producing output—and it would be very costly to negotiate wages weekly or monthly. Contracts are a way of bearing these costs at no more than 1-, 2-, or 3-year intervals. There is a trade-off between the costs of locking workers and firms into contracts for long periods of time and the costs of wage negotiations. The length of contracts that minimizes negotiation costs seems to be (from what we observe in practice) between 1 and 3 years.

cost-of-living adjustments (COLAs) Contract provisions that tie wages to changes in the cost of living. The greater the inflation rate, the more wages are raised.

Some multiyear contracts adjust for unforeseen events by **cost-of-living adjustments (COLAs)** written into the contract. COLAs tie wages to changes in the cost of living: The greater the rate of inflation, the more wages are raised. COLAs thus protect workers from unexpected inflation, although many COLAs adjust wages by a smaller percentage than the percentage increase in prices. Regarding deflation, few contracts allow for wage cuts in the face of deflation.

An Open Question MyLab Economics Concept Check

As we have seen, there are many explanations for why we might see unemployment. Some of these explanations focus on why we might see levels of unemployment higher than frictional plus structural. Other explanations focus on the reasons for cyclical unemployment. The theories we have just set forth are not necessarily mutually exclusive, and there may be elements of

truth in all of them. The aggregate labor market is complicated, and there are no simple answers to why there is unemployment. Much current work in macroeconomics is concerned directly or indirectly with this question, and it is an exciting area of study. Which argument or arguments will win out in the end is an open question.

The Short-Run Relationship between the Unemployment Rate and Inflation

13.5 LEARNING OBJECTIVE

Analyze the short-run relationship between unemployment and inflation.

In Chapter 11 we described the Fed as concerned about both output and the price level. In practice, the Fed typically describes its interests as being unemployment on the one hand and inflation on the other. For example, Janet Yellen, the former Fed chair, gave a speech at the San Francisco Fed on March 27, 2015, in which she said, "Our goal in adjusting the federal funds rate over time will be to achieve and sustain economic conditions close to maximum employment with inflation averaging 2 percent." Jerome Powell, the current chair, has similarly committed to the joint goal of price stability and employment growth. We are now in a position to connect the Fed interest in output with the unemployment rate and to explore the connection between unemployment and prices.

We begin by looking at the relation between aggregate output (income) (Y) and the unemployment rate (U). For an economy to increase aggregate output, firms must hire more labor to produce that output. Thus, more output implies greater employment. An increase in employment means more people working (fewer people unemployed) and a lower unemployment rate. An increase in Y corresponds to a *decrease* in U. Thus, U and Y are *negatively* related: When Y rises, the unemployment rate falls, and when Y falls, the unemployment rate rises, all else equal.

What about the relationship between aggregate output and the overall price level? The AS curve, reproduced in Figure 13.3, shows the relationship between Y and the overall price level (P). The relationship is a positive one: When P increases, Y increases, and when P decreases, Y decreases.

As you will recall from the last chapter, the shape of the AS curve is determined by the behavior of firms in reacting to an increase in demand. If aggregate demand shifts to the right and the economy is operating on the nearly flat part of the AS curve—far from capacity—output will increase, but the price level will not change much. However, if the economy is operating on the steep part of the AS curve—close to capacity—an increase in demand will drive up the price level, but output will be constrained by capacity and will not increase much.

Now let us put the two pieces together and think about what will happen following an event that leads to an increase in aggregate demand. First, firms experience an unanticipated decline in inventories. They respond by increasing output (Y) and hiring workers—the unemployment rate falls. If the economy is not close to capacity, there will be little increase in the price level. If, however, aggregate demand continues to grow, the ability of the economy to increase output

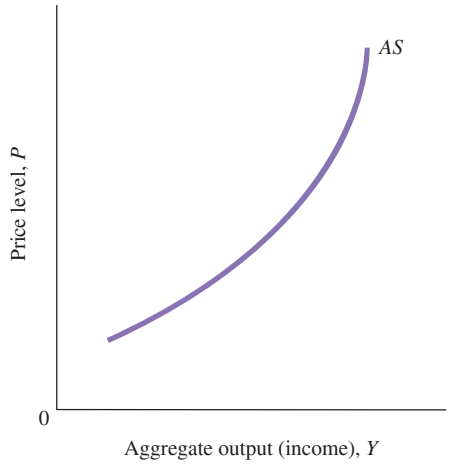

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FIGURE 13.3 The Aggregate Supply Curve
The AS curve shows a positive relationship between the price level (P) and aggregate output (income) (Y).

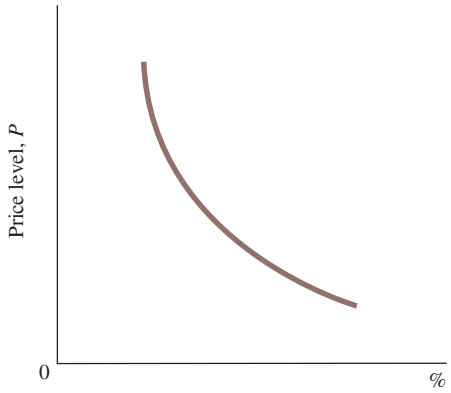

FIGURE 13.4 The Relationship Between the Price Level and the Unemployment Rate
This curve shows a negative relationship between the price level (P) and the unemployment rate (U). As the unemployment rate declines in response to the economy's moving closer and closer to capacity output, the price level rises more and more.

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will eventually reach its limit. As aggregate demand shifts farther and farther to the right along the *AS* curve, the price level increases more and more and output begins to reach its limit. At the point at which the *AS* curve becomes vertical, output cannot rise any farther. If output cannot grow, the unemployment rate cannot be pushed any lower. There is a negative relationship between the unemployment rate and the price level. As the unemployment rate declines in response to the economy's moving closer and closer to capacity output, the overall price level rises more and more, as shown in Figure 13.4.

The *AS* curve in Figure 13.3 shows the relationship between the price level and aggregate output and thus implicitly between the price level and the unemployment rate, which is depicted in Figure 13.4. In policy formulation and discussions, however, economists have focused less on the relationship between the price level and the unemployment rate than on the relationship between the **inflation rate**—the percentage change in the price level—and the unemployment rate. Note that the price level and the percentage change in the price level are not the same. The curve describing the relationship between the inflation rate and the unemployment rate, which is shown in Figure 13.5, is called the **Phillips Curve**, after British economist A. W. Phillips, who first examined it using data for the United Kingdom. Fortunately, the analysis behind the *AS* curve (and thus the analysis behind the curve in Figure 13.4) will enable us to see both why the Phillips Curve initially looked so appealing as an explanation of the relationship between inflation and the unemployment rate and how more recent history has changed our views of the interpretation of the Phillips Curve.

inflation rate The percentage change in the price level.

Phillips Curve A curve showing the relationship between the inflation rate and the unemployment rate.

The Phillips Curve: A Historical Perspective MyLab Economics Concept Check

In the 1950s and 1960s, the data showed a remarkably smooth relationship between the unemployment rate and the rate of inflation, as Figure 13.6 shows for the 1960s. As you can see, the data points fit fairly closely around a downward-sloping curve; in general, the higher the unemployment rate is, the lower the rate of inflation. The historical data in fact look quite like the hypothetical Phillips Curve in Figure 13.5, which tells us that to lower the inflation rate, we must accept a higher unemployment rate, and to lower the unemployment rate, we must accept a higher rate of inflation.

Textbooks written in the 1960s and early 1970s relied on the Phillips Curve as the main explanation of inflation. The story was simple—inflation appeared to respond in a fairly predictable way to changes in the unemployment rate. Policy discussions in the 1960s often revolved around the Phillips Curve. The role of the policy maker, it was thought, was to choose a point on the curve. Conservatives usually argued for choosing a point with a low rate of inflation and were willing to accept a higher unemployment rate in exchange for this. Liberals usually argued for accepting more inflation to keep unemployment at a low level.

Life did not turn out to be quite so simple. Data from the 1970s on no longer show the simple negative relationship between the unemployment rate and inflation. Look at Figure 13.7, which graphs the unemployment rate and inflation rate for the period from 1970 to 2017. The points in Figure 13.7 show no particular relationship between inflation and the unemployment rate.

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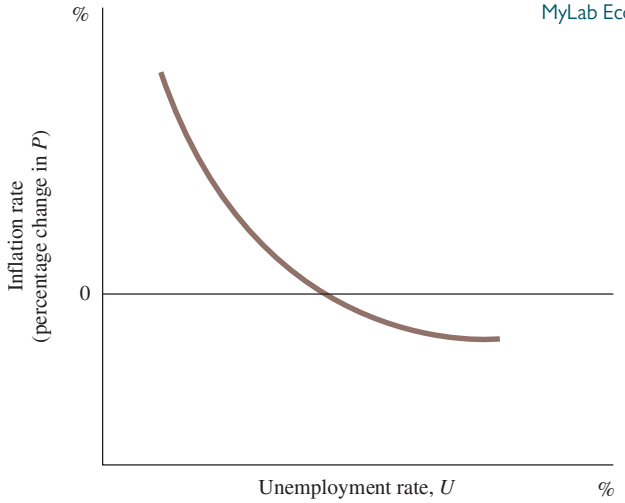

FIGURE 13.5
The Phillips Curve
The Phillips Curve shows the relationship between the inflation rate and the unemployment rate.

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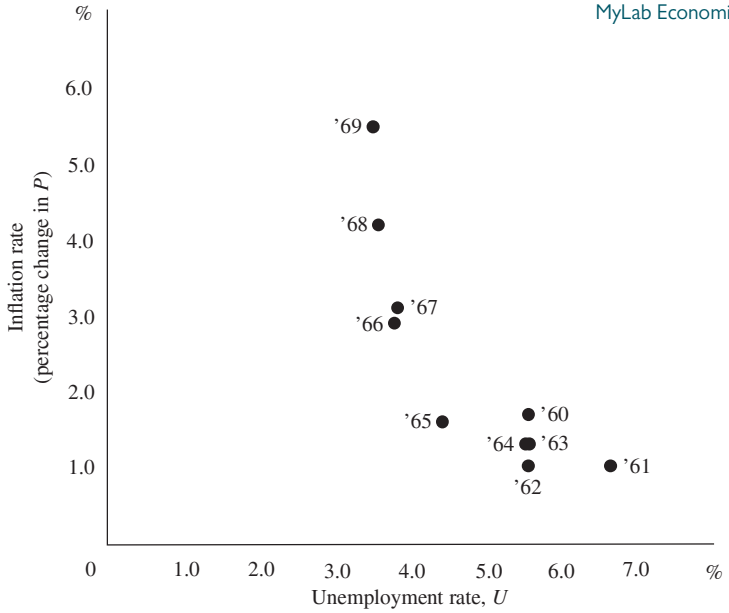

FIGURE 13.6
Unemployment and Inflation, 1960–1969
During the 1960s, there seemed to be an obvious trade-off between inflation and unemployment. Policy debates during the period revolved around this apparent trade-off.

Source: U.S Bureau of Labor Statistics.

MyLab Economics Real-time data

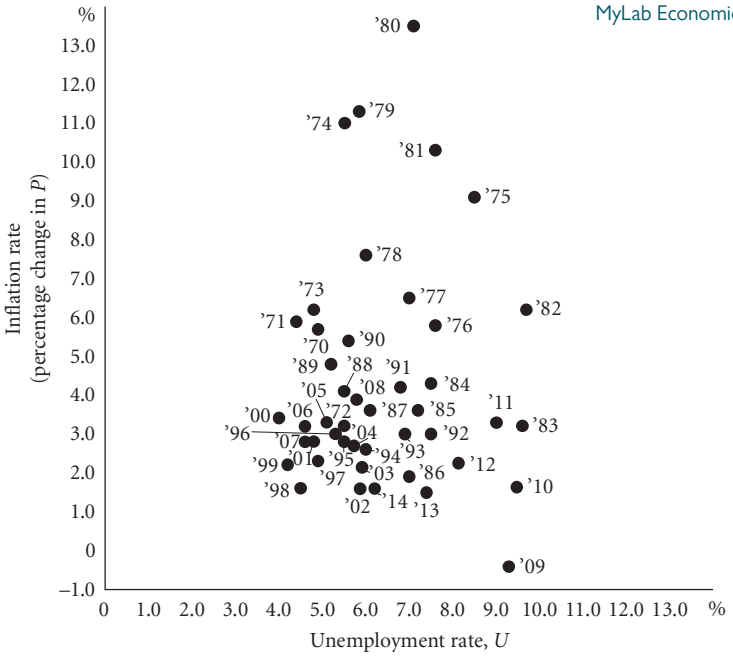

FIGURE 13.7
Unemployment and Inflation, 1970–2017
From the 1970s on, it became clear that the relationship between unemployment and inflation was anything but simple.

Source: U.S Bureau of Labor Statistics.

Aggregate Supply and Aggregate Demand Analysis and the Phillips Curve MyLab Economics Concept Check

How can we explain the stability of the Phillips Curve in the 1950s and 1960s and the lack of stability after that? To answer, we need to return to *AS*/*AD* analysis.

If the *AD* curve shifts from year to year but the *AS* curve does not, the values of *P* and *Y* each year will lie along the *AS* curve (Figure 13.8(a)). The shifting *AD* curve creates a set of *AS*/*AD* intersections that trace out the *AS* curve. (Try doing this yourself on a graph of the *AS* and *AD* curves.) The plot of the relationship between *P* and *Y* will be upward sloping in this case. Correspondingly, the plot of the relationship between the unemployment rate (which decreases with increased output) and the rate of inflation will be a curve that slopes downward. In other words, if the new equilibrium data reflect a stable *AS* curve and a shifting *AD* curve, we would expect to see a negative relationship between the unemployment rate and the inflation rate, just as we see in Figure 13.6 for the 1960s.

However, the relationship between the unemployment rate and the inflation rate will look different if the *AS* curve shifts from year to year, perhaps from a change in oil prices, but the *AD* curve does not move. A leftward shift of the *AS* curve with the *AD* curve stable will cause an *increase* in the price level (*P*) and a *decrease* in aggregate output (*Y*) (Figure 13.8(b)). When the *AS* curve shifts to the left, the economy experiences both inflation *and* an increase in the unemployment rate (because decreased output means increased unemployment). In other words, if the *AS* curve is shifting from year to year, we would expect to see a positive relationship between the unemployment rate and the inflation rate.

If both the *AS* and the *AD* curves are shifting simultaneously, however, there is no systematic relationship between *P* and *Y* (Figure 13.8(c)) and thus no systematic relationship between the unemployment rate and the inflation rate. One explanation for the change in the Phillips Curve between the 1960s and later periods is that both the *AS* and the *AD* curves appear to be shifting in the later periods—both shifts from the supply side and shifts from the demand side. This can be seen by examining a key cost variable: the price of imports.

The Role of Import Prices We discussed in the previous chapter that one of the main factors that causes the *AS* curve to shift are changes in energy prices, particularly the price of oil. Because the United States imports much of its oil, the price index of U.S. imports is highly correlated with the (world) price of oil. As a result, a change in the U.S. import price index, which we will call "the price of imports," shifts the *AS* curve. The price of imports is plotted in Figure 13.9 for the 1960 I–2017 IV period. As you can see, the price of imports changed very little between 1960 and 1970. There were no large shifts in the *AS* curve in the 1960s due to changes in the price of imports. There were also no other large changes in input prices in the 1960s, so overall the *AS* curve shifted very little during the decade. The main variation in the 1960s was in aggregate demand, so the shifting *AD* curve traced out points along the *AS* curve.

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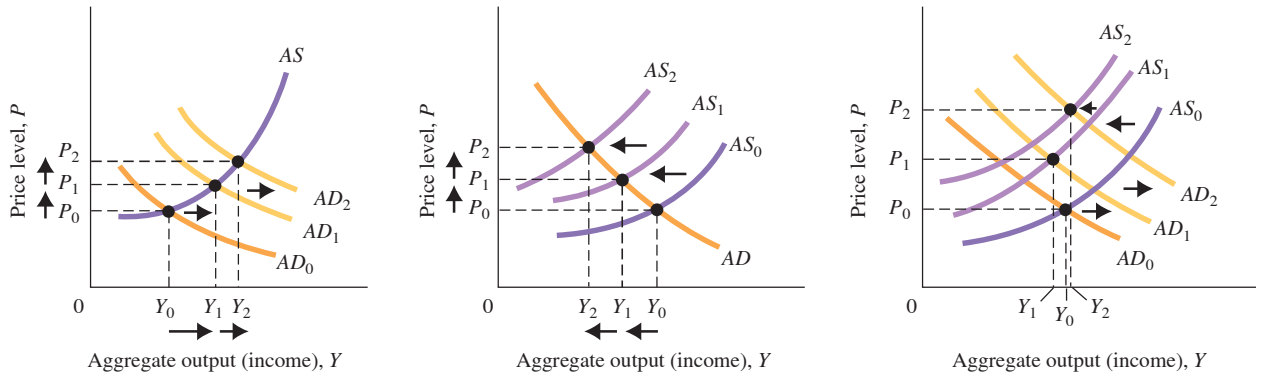
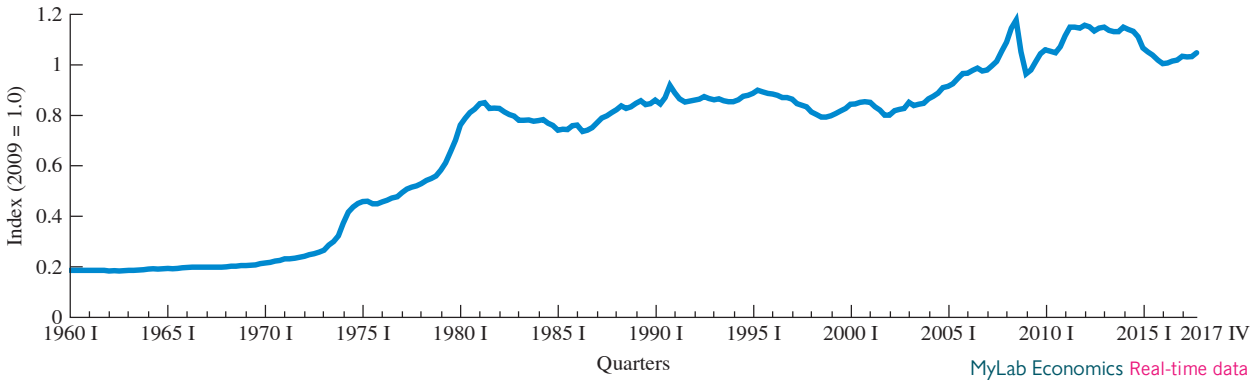


a. *AD* shifts with no *AS* shifts trace out the *AS* curve (a positive relationship between *P* and *Y*).

b. *AS* shifts with no *AD* shifts trace out the *AD* curve (a negative relationship between *P* and *Y*).

c. If both *AD* and *AS* are shifting, there is no systematic relationship between *P* and *Y*.

▲ **FIGURE 13.8 Changes in the Price Level and Aggregate Output Depend on Shifts in Both Aggregate Demand and Aggregate Supply**



▲ **FIGURE 13.9 The Price of Imports, 1960 I–2017 IV**
The price of imports changed very little in the 1960s and early 1970s. It increased substantially in 1974 and again in 1979–1980. Between 1981 and 2002, the price of imports changed very little. It generally rose between 2003 and 2008, fell somewhat in late 2008 and early 2009, rose slightly in 2011 and then remained flat.

Figure 13.9 also shows that the price of imports increased considerably in the 1970s. This rise led to large shifts in the *AS* curve during the decade, but the *AD* curve was also shifting throughout the 1970s. With both curves shifting, the data points for *P* and *Y* were scattered all over the graph and the observed relationship between *P* and *Y* was not at all systematic.

This story about import prices and the *AS* and *AD* curves in the 1960s and 1970s carries over to the Phillips Curve. The Phillips Curve was stable in the 1960s because the primary source of variation in the economy was demand, not costs. In the 1970s, both demand *and* costs were varying so no obvious relationship between the unemployment rate and the inflation rate was apparent. To some extent, what is remarkable about the Phillips Curve is not that it was not smooth after the 1960s, but that it ever was smooth.

Expectations and the Phillips Curve MyLab Economics Concept Check

Another reason the Phillips Curve is not stable concerns expectations. We saw in Chapter 12 that if a firm expects other firms to raise their prices, the firm may raise the price of its own product. If all firms are behaving this way, prices will rise because they are expected to rise. In this sense, expectations are self-fulfilling. Similarly, if inflation is expected to be high in the future, negotiated wages are likely to be higher than if inflation is expected to be low. Wage inflation is thus affected by expectations of future price inflation. Because wages are input costs, prices rise as firms respond to the higher wage costs. Price expectations that affect wage contracts eventually affect prices themselves.

If the rate of inflation depends on expectations, the Phillips Curve will shift as expectations change. For example, if inflationary expectations increase, the result will be an increase in the rate of inflation even though the unemployment rate may not have changed. In this case, the Phillips Curve will shift to the right. If inflationary expectations decrease, the Phillips Curve will shift to the left—there will be less inflation at any given level of the unemployment rate.

It so happened that inflationary expectations were quite stable in the 1950s and 1960s. The inflation rate was moderate during most of this period, and people expected it to remain moderate. With inflationary expectations not changing very much, there were no major shifts of the Phillips Curve, a situation that helps explain its stability during the period.

Near the end of the 1960s, inflationary expectations began to increase, primarily in response to the actual increase in inflation that was occurring because of the tight economy caused by the Vietnam War. Inflationary expectations increased even further in the 1970s as a result of large oil price increases. These changing expectations led to shifts of the Phillips Curve and are another reason the curve was not stable during the 1970s.

Inflation and Aggregate Demand MyLab Economics Concept Check

It is important to realize that the fact that the historical data since the 1970s do not trace out a smooth downward-sloping Phillips curve does not mean that aggregate demand has no effect on inflation. It simply means that inflation is affected by more than just aggregate demand. If,

say, inflation is also affected by cost variables like the price of imports, there will be no stable relationship between just inflation and aggregate demand unless the cost variables are not changing. Similarly, if the unemployment rate is taken to be a measure of aggregate demand, where inflation depends on both the unemployment rate and cost variables, there will be no stable Phillips Curve unless the cost variables are not changing. Therefore, the unemployment rate can have an important effect on inflation even though this will not be evident from a plot of inflation against the unemployment rate—that is, from the Phillips Curve.

13.6 LEARNING OBJECTIVE

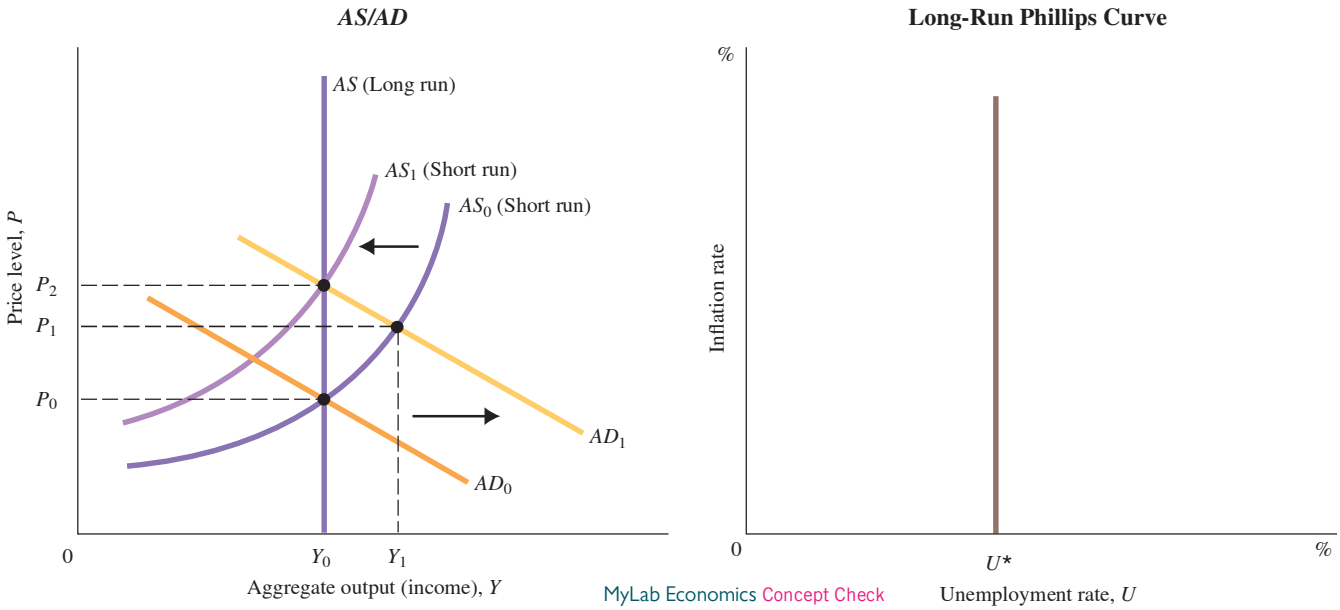
Discuss the long-run relationship between unemployment and output.

The Long-Run Aggregate Supply Curve, Potential Output, and the Natural Rate of Unemployment

Thus far we have been discussing the relationship between inflation and unemployment, looking at the short-run *AS* and *AD* curves. We turn now to look at the long run, focusing on the connection between output and unemployment.

Recall from Chapter 11 that many economists believe that in the long run, the *AS* curve is vertical. We have illustrated this case in Figure 13.10. Assume that the initial equilibrium is at the intersection of AD_0 and the long-run aggregate supply curve. Now consider a shift of the aggregate demand curve from AD_0 to AD_1. If wages are sticky and lag prices, in the short run, aggregate output will rise from Y_0 to Y_1. (This is a movement along the short-run *AS* curve AS_0.) In the longer run, wages catch up. For example, next year's labor contracts may make up for the fact that wage increases did not keep up with the cost of living this year. If wages catch up in the longer run, the *AS* curve will shift from AS_0 to AS_1 and drive aggregate output back to Y_0. If wages ultimately rise by exactly the same percentage as output prices, firms will produce the same level of output as they did before the increase in aggregate demand.

As we indicated in Chapter 11, Y_0 is sometimes called *potential output*. Aggregate output can be pushed above Y_0 in the short run. When aggregate output exceeds Y_0, however, there is upward pressure on input prices and costs. The unemployment rate is already quite low, firms are beginning to encounter the limits of their plant capacities, and so on. At levels of aggregate output above Y_0, costs will rise, the *AS* curve will shift to the left, and the price level will rise. Thus, potential output is the level of aggregate output that can be sustained in the long run without inflation.



MyLab Economics Concept Check

▲ **FIGURE 13.10 The Long-Run Phillips Curve: The Natural Rate of Unemployment**

If the *AS* curve is vertical in the long run, so is the Phillips Curve. In the long run, the Phillips Curve corresponds to the natural rate of unemployment—that is, the unemployment rate that is consistent with the notion of a fixed long-run output at potential output. U^* is the natural rate of unemployment.

This story is directly related to the Phillips Curve. Those who believe that the *AS* curve is vertical in the long run at potential output also believe that the Phillips Curve is vertical in the long run at some natural rate of unemployment. Changes in aggregate demand—including increases in government spending—increase prices, but do not change employment. Recall from Chapter 7 that the **natural rate of unemployment** refers to unemployment that occurs as a normal part of the functioning of the economy. It is sometimes taken as the sum of frictional unemployment and structural unemployment. The logic behind the vertical Phillips Curve is that whenever the unemployment rate is pushed below the natural rate, wages begin to rise, thus pushing up costs. This leads to a *lower* level of output, which pushes the unemployment rate back up to the natural rate. At the natural rate, the economy can be considered to be at full employment.

natural rate of unemployment The unemployment that occurs as a normal part of the functioning of the economy. Sometimes taken as the sum of frictional unemployment and structural unemployment.

The Nonaccelerating Inflation Rate of Unemployment (NAIRU) MyLab Economics Concept Check

In Figure 13.10, the long-run vertical Phillips Curve is a graph with the inflation rate on the vertical axis and the unemployment rate on the horizontal axis. The natural rate of unemployment is U^*. In the long run, with a long-run vertical Phillips Curve, the actual unemployment rate moves to U^* because of the natural workings of the economy.

Another graph of interest is Figure 13.11, which plots the *change in* the inflation rate on the vertical axis and the unemployment rate on the horizontal axis. Many economists believe that the relationship between the change in the inflation rate and the unemployment rate is as depicted by the *PP* curve in the figure. The value of the unemployment rate where the *PP* curve crosses zero is called the *nonaccelerating inflation rate of unemployment* (**NAIRU**). If the actual unemployment rate is below the NAIRU, the change in the inflation rate will be positive. As depicted in the figure, at U_1, the change in the inflation rate is 1. Conversely, if the actual unemployment rate is above the NAIRU, the change in the inflation rate is negative: At U_2, the change is −1.

NAIRU The nonaccelerating inflation rate of unemployment.

Consider what happens if the unemployment rate decreases from the NAIRU to U_1 and stays at U_1 for many periods. Assume also that the inflation rate at the NAIRU is 2 percent. Then in the first period the inflation rate will increase from 2 percent to 3 percent. The inflation rate does not, however, just stay at the higher 3 percent value. In the next period, the inflation rate will increase from 3 percent to 4 percent and so on. The price level will be accelerating—that is, the change in the inflation rate will be positive—when the actual unemployment rate is below the NAIRU. Conversely, the price level will be decelerating—that is, the change in the inflation rate will be negative—when the actual unemployment rate is above the NAIRU.[1]

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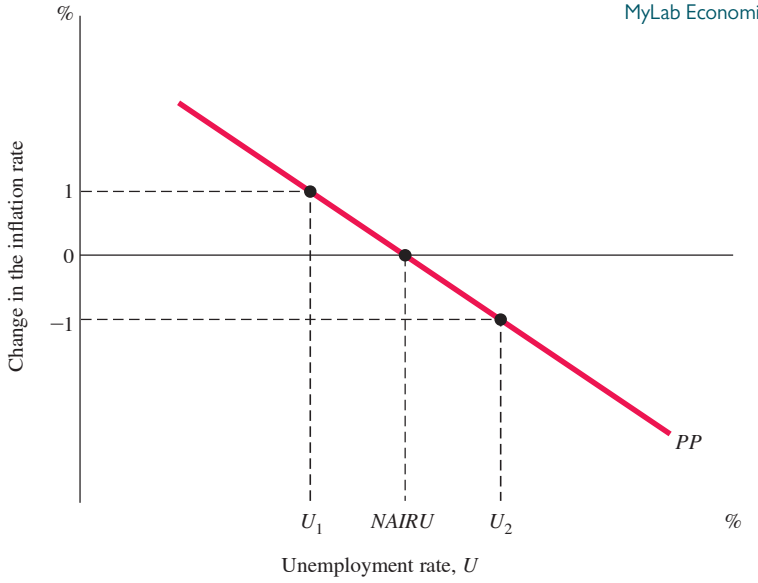

FIGURE 13.11 The NAIRU Diagram
At an unemployment rate below the NAIRU, the price level is accelerating (positive changes in the inflation rate); at an unemployment rate above the NAIRU, the price level is decelerating (negative changes in the inflation rate). Only when the unemployment rate is equal to the NAIRU is the price level changing at a constant rate (no change in the inflation rate).

[1]The NAIRU is actually misnamed. It is the *price level* that is accelerating or decelerating, not the inflation rate, when the actual unemployment rate differs from the NAIRU. The inflation rate is not accelerating or decelerating, but simply changing by the same amount each period. The namers of the NAIRU forgot their physics.

The *PP* curve in Figure 13.11 is like the *AS* curve in Figure 13.3—the same factors that shift the *AS* curve, such as cost shocks, can also shift the *PP* curve. Figure 11.2 on p. 246 summarizes the various factors that can cause the *AS* curve to shift, and these are also relevant for the *PP* curve. A favorable shift for the *PP* curve is to the left because the *PP* curve crosses zero at a lower unemployment rate, indicating that the NAIRU is lower. Some have argued that one possible recent source of favorable shifts is increased foreign competition, which may have kept wage costs and other input costs down.

Before about 1995, proponents of the NAIRU theory argued that the value of the NAIRU in the United States was around 6 percent. By the end of 1995, the unemployment rate declined to 5.6 percent, and by 2000, the unemployment rate was down to 3.8 percent. At the end of 2017 it was 4.1 percent. If the NAIRU had been 6 percent, one should have seen a continuing increase in the inflation rate beginning about 1995. In fact, the 1995 to 2000 period saw slightly declining inflation. Not only did inflation not continually increase, it did not even increase once to a new, higher value and then stay there. As the unemployment rate declined during this period, proponents of the NAIRU lowered their estimates of it, more or less in line with the actual fall in the unemployment rate. This recalibration can be justified by arguing that there have been continuing favorable shifts of the *PP* curve, such as possible increased foreign competition. Critics, however, have argued that this procedure is close to making the NAIRU theory vacuous. Can the theory really be tested if the estimate of the NAIRU is changed whenever it is not consistent with the data? How trustworthy is the appeal to favorable shifts? The 2015–2017 period also saw declining unemployment rates with no increase in the inflation rate, further evidence against the NAIRU theory.

Looking Ahead

This chapter concludes our basic analysis of how the macroeconomy works. In the preceding six chapters, we have examined how households and firms behave in the three market arenas—the goods market, the money market, and the labor market. We have seen how aggregate output (income), the interest rate, and the price level are determined in the economy, and we have examined the relationship between two of the most important macroeconomic variables, the inflation rate and the unemployment rate. In Chapter 14, we use everything we have learned up to this point to examine a number of important policy issues.

SUMMARY

13.1 THE LABOR MARKET: BASIC CONCEPTS *p. 274*

1. Because the economy is dynamic, *frictional* and *structural unemployment* are inevitable and in some ways desirable. Times of *cyclical unemployment* are of concern to macroeconomic policy makers.
2. In general, employment tends to fall when aggregate output falls and rise when aggregate output rises.

13.2 THE CLASSICAL VIEW OF THE LABOR MARKET *p. 274*

3. Classical economists believe that the interaction of supply and demand in the labor market brings about equilibrium and that unemployment (beyond the frictional and structural amounts) does not exist.
4. The classical view of the labor market is consistent with the theory of a vertical aggregate supply curve.
5. Some economists argue that the unemployment rate is not an accurate indicator of whether the labor market is working properly. Unemployed people who are considered part of the labor force may be offered jobs but may be unwilling to take those jobs at the offered salaries. Some of the unemployed may have chosen not to work, but this result does not mean that the labor market has malfunctioned.

13.3 EXPLAINING THE EXISTENCE OF UNEMPLOYMENT *p. 276*

6. Efficiency wage theory holds that the productivity of workers increases with the wage rate. If this is true, firms may have an incentive to pay wages above the wage at which the quantity of labor supplied is equal to the quantity of labor demanded. At all wages above the equilibrium, there will be an excess supply of labor and therefore unemployment.
7. If firms are operating with incomplete or imperfect information, they may not know what the market-clearing wage is. As a result, they may set their wages incorrectly and bring about unemployment. Because the economy is so complex, it may take considerable time for firms to correct these mistakes.