

9 Unemployment and the Labor Market Process

If the typical recession were nothing more than a 2-3 percent fall in real GDP, most people would probably shrug it off as a nuisance. But recessions are typically associated with a sharp rise in unemployment, so that the costs are painfully concentrated on a narrow segment of the population. Why the economy should suffer from recurring bouts of unemployment is one of the great puzzles of macroeconomics. In this chapter, we explore the concept and causes of unemployment and lay the groundwork for macroeconomic policies that might reduce it.

9.1 The Concepts of Employment and Unemployment

One implication of the perfectly competitive model of the labor market as we described it in the last chapter is that everyone who wants to work at the market wage is able to find work at that wage. To put this another way: there is no involuntary unemployment. Yet, every month the government announces that some significant percentage of the labor force is unemployed. An important question, then, is, why is there unemployment?

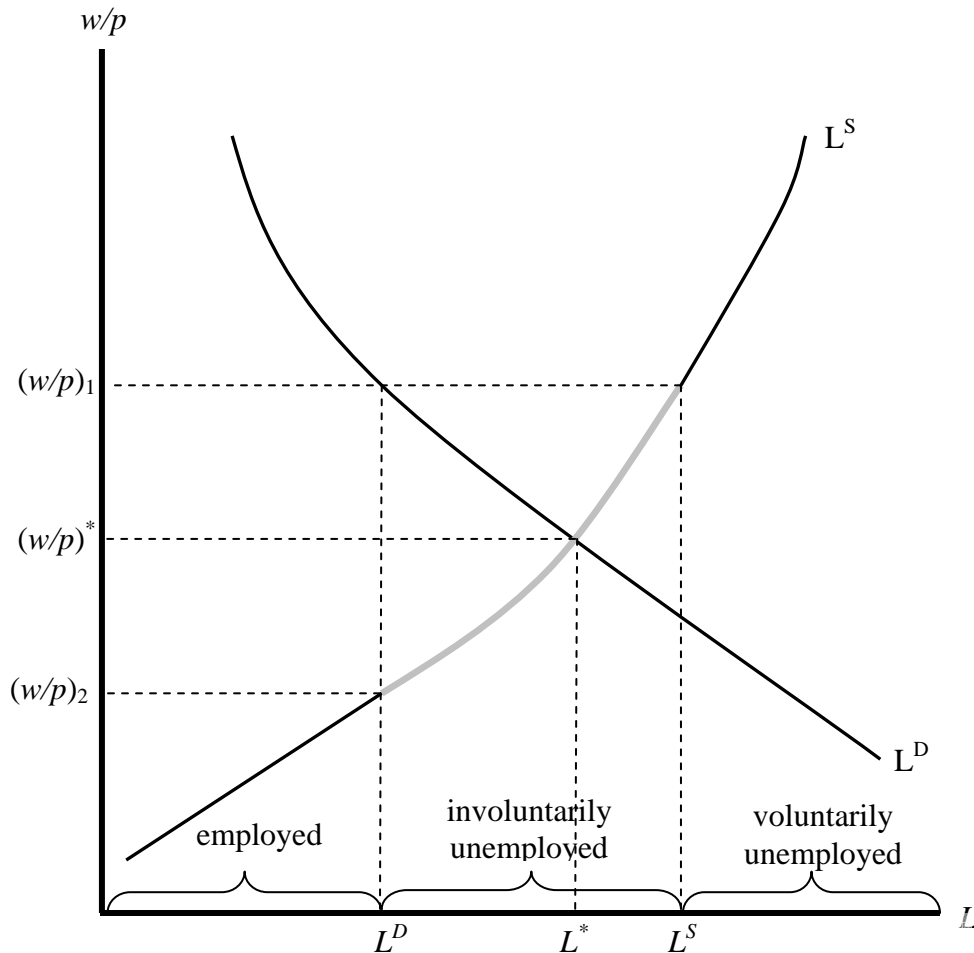
Before we attempt to answer that question, it will help to understand what unemployment means. In this section, we shall consider labor markets out of equilibrium. Our goal is to define some important concepts. We return to the question of *why* the labor market is out of equilibrium in the next section.

Where the labor supply and demand curves cross in Figure 9.1 determines the market-clearing level of employment (L^*) and the real-wage rate $(w/p)^*$. Since the question that interests us here is whether people are working or not working, it is best to think of L as measuring the number of workers rather than aggregate hours of work.

Consider what would happen if the market wage rate were higher than the market-clearing rate at $(w/p)_1$. At this wage rate, labor supply (L^S) exceeds labor demand (L^D). Since firms cannot be forced to hire workers whose marginal product would not cover their wage, the actual amount of labor employed is determined by labor demand ($L = L^D$). The market wage rate and labor demand divide the labor supply curve into three segments: *Employment* comprises every worker to the left of L^D . The remaining workers are unemployed. The wage rate $(w/p)_1$ divides the unemployed into two groups: **VOLUNTARY UNEMPLOYMENT** comprises those workers whose reservation wage is greater than $(w/p)_1$ (that is, those to the right of L^S); **INVOLUNTARY UNEMPLOYMENT** comprises those unemployed workers whose reservation wage is lower than $(w/p)_1$ (that is, those between L^D and L^S , corresponding to the gray segment of the labor-supply curve). For the voluntarily unemployed, the real wage is not high enough to overcome the opportunity cost of working. They are not now part of the labor force; but, if their wage were higher, they might reassess their situation and choose to participate. The involuntarily unemployed want to work at the market wage (and all but the marginal worker would be willing to work even at a wage *below* the market wage), but firms will not hire them, since the market real wage exceeds their marginal product.

Notice that when markets clear and labor supply equals labor demand, involuntary unemployment vanishes. The market-clearing level of employment is also known as

Figure 9.1
The Classification of Unemployment



At a $(w/p)_1$, a wage above the market-clearing level, the difference between labor supply and labor demand is involuntary unemployment (people corresponding to the gray segment of the labor-supply curve). Voluntary unemployment consists of people who do not wish to work at $(w/p)_1$ (upper black segment). Employment corresponds to labor demand at $(w/p)_1$ (lower black segment). The real wage $(w/p)_2$ indicates the lowest real wage that workers would accept and still supply just the labor demand at $(w/p)_1$. It measures the amount the firms would overpay workers at $(w/p)_1$. When the real wage is at $(w/p)^$, labor demand and supply are equal and there is no involuntary unemployment.*

FULL EMPLOYMENT, *a state which every worker who wants to work at the going wage has a job*. It does not mean every worker capable of working is employed. And it does not set an upper bound on total employment. Even at full employment, voluntary unemployment persists; if the real wage were higher, some people would leave voluntary unemployment to join the labor force.

It is easy to conflate “voluntary” with “good” and “involuntary” with “bad.” Some might argue that voluntary unemployment raises no policy issue: the voluntarily unemployed have chosen to be out of work and, if they wished to do so, could lower their reservation wage to a point that firms would hire them. This argument is wrong. A choice may be made voluntarily and nonetheless be undesirable. A thief puts a gun to your head and says, “your money or your life,” and you give him your money. It a voluntary choice in the important sense that it is the product of reflection and assessment of the options rather than merely a reflex. Yet it is not a choice that you desire to make, and it is one that public policy (the law and the police) tries to protect you from having to make. Similarly, if a financial manager finds that he could gain employment only at half the salary he has come to expect, he may voluntarily choose not to work. He may have made the best choice under the circumstances; yet, once again, it is a choice he wished not to make. Economic policy may legitimately want to direct the economy in a way that prevents him from having to make such a choice. Although policy may have a role to play in reducing voluntary unemployment – that is, in increasing the real-wage rate and the participation rate – we shall see later in the chapter that it takes different sorts of policy to affect voluntary and involuntary unemployment.

9.2 Measuring the Labor Market in Theory and Practice

9.2.1 LABOR MARKET DATA

In the United States, the Bureau of Labor Statistics (BLS) conducts two surveys from which it constructs most of its labor market data. The first is the so-called **Household Survey**. Conducted monthly as part of the *Current Population Survey*, the Household Survey employees trained interviewers to contact about 60,000 households and is used to generate data on the employed and unemployed – both overall and classified by age, sex, race, marital status, occupation, industry, and other characteristics. It also generates data on the past work experiences of people who are not in the labor force. The Household Survey is the source for the most commonly published measure of the U.S. unemployment rate.

The second survey is known as the **Establishment Survey**. It is part of a regular electronic survey (*Current Employment Statistics*) in which employers provide information on nonfarm wage and salaried employment, average weekly hours, average hourly earnings, and average weekly earnings both nationally and for smaller geographic areas. The survey contacts about 160,000 businesses and government agencies, which pass on information on about 400,000 workers. The active sample includes around one-third of all nonfarm payroll workers.

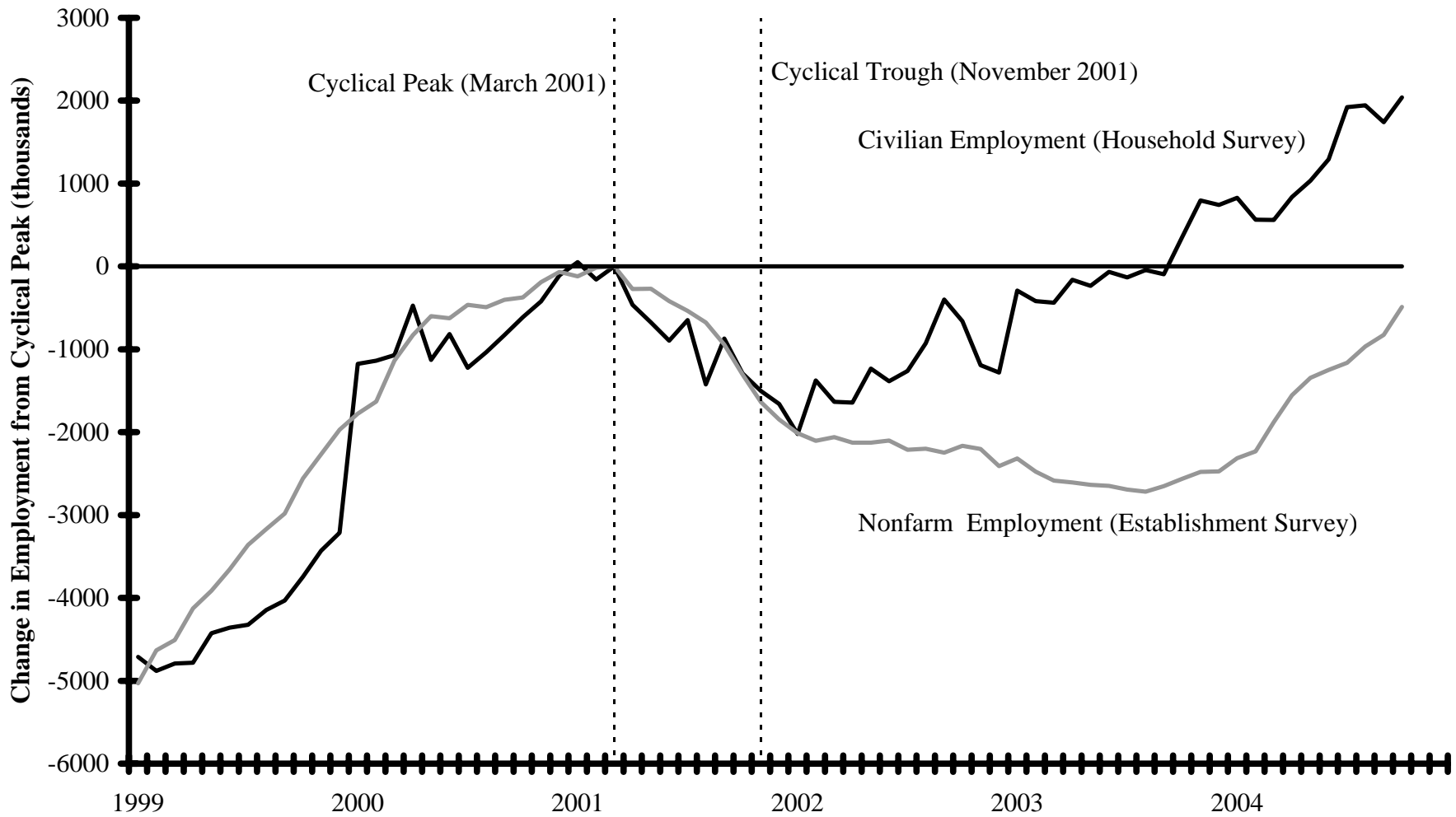
The two surveys are complementary. Only the Household Survey can be used to generate unemployment rates, but both surveys provide estimates of total employment. Because its sample is so much larger, the Establishment Survey has generally been regarded as the more reliable guide to employment rates, although recently that has been called into question (see Box 9.1). [**Box 9.1 – near here.**]

Box 9.1 A Jobless Recovery?

The U.S. Bureau of Labor Statistics reports two broad measures of overall employment: *civilian employment* from the Household Survey and *nonfarm employment* from the Establishment Survey. Generally, the two series track each other well. But in recovery from the recession of 2001, they told quite different stories (Figure B9.1). Each of the candidates in the 2004 U.S. presidential election pointed to the series most helpful to his election chances. Since nonfarm employment never regained its pre-recession peak, John Kerry stigmatized George Bush as the first president since Herbert Hoover on track to end his term with fewer people employed than when he began. Pointing to civilian employment, Bush took credit for the recovery in employment by October 2003 and the addition of 2 million more jobs in the following year up to the time of the election.

Who was right remains a puzzle. The Household Survey is generally regarded as more noisy – reflected in the jagged appearance of the time series for civilian employment in the figure. The Establishment Survey, which uses a much larger sample, and is typically considered more accurate – again reflected in much smoother the time series for nonfarm employment. The difference between the series after the recession, however, is not a question of month-to-month fluctuations but of a more prolonged divergence. Proponents of the Household Survey argue that many of the jobs created since 2001 were either self-employment or new (and often small) firms. The Household Survey would pick up these kinds of jobs, whereas the Establishment Survey that adds new firms only slowly and may miss self-employment altogether missed them.

Figure B9.1
Two Measures of Employment



Source: Bureau of Labor Statistics.

9.2.2 THE UNEMPLOYMENT RATE

Theoretically, the **UNEMPLOYMENT RATE** can be defined as $U = \frac{L^S - L^D}{L^S}$. The numerator is the amount of involuntary unemployment and the denominator is the number of workers whose reservations wages are at or below the market wage rate. It would be reasonable to assume that near the peak of the business cycle the economy is as close to full employment as it is going to be. Figure 9.2 plots the official unemployment rate for the United States (the shaded areas show recessions). Surprisingly, the data show that the lowest unemployment rate ever achieved in the United States over the past 60 years was not zero but 2.5 percent (May and June 1952). And the unemployment rates achieved near the peaks of the business cycle are typically much higher than this (as high as 5.7 percent in May 1979). Why is it that there is so much measured unemployment even when the economy is “as good as it gets” near the peak of the business cycle?

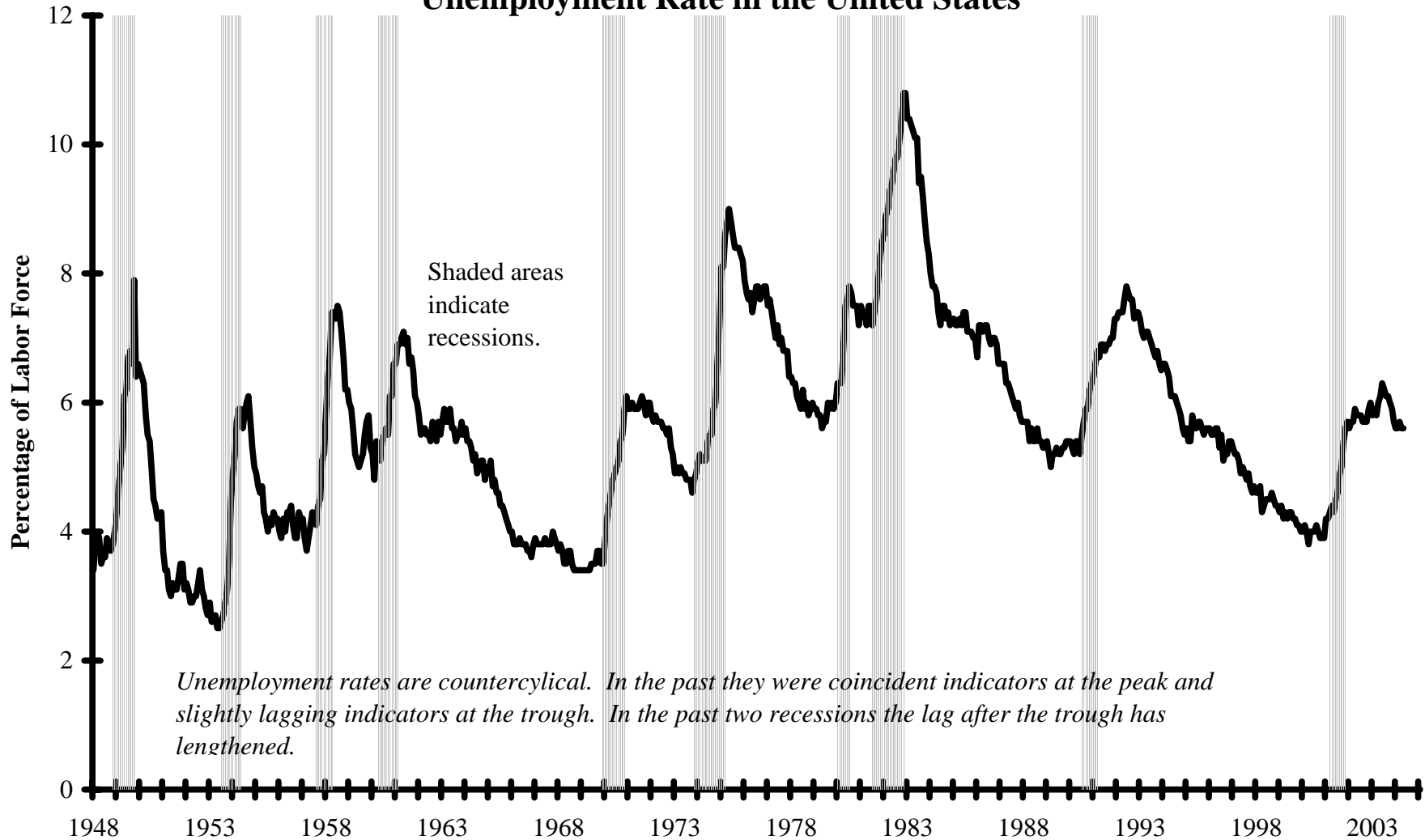
There are at least three complementary explanations.

(i) Mismatched Definitions

To estimate the unemployment rate, the Bureau of Labor Statistics asks its sample households what amount to the following two questions: “Are you currently working?” and, if not, “Are you actively seeking work?”¹ Anyone answering “yes” to the first

¹ More precisely, the BLS asks (1) “Did you do any work as a paid employee, proprietor of a business or farmer, or 15 hours or more of unpaid work in a family business? Or were you temporarily absent from such work because of illness, bad weather, vacation, labor-management disputes or similar personal reasons?” (2) “If the answer to (1) is, ‘no,’ were you available for work during the survey week and did you take a specific action to contact a potential employer within the past four weeks? Or were you waiting to be recalled to a job after being laid off within the last six months?”

Figure 9.2
Unemployment Rate in the United States



Source: Bureau of Labor Statistics, Household Survey.

question is counted as employed and in the labor force (no distinction is made between full-time and part-time employment). Anyone answering “yes” to the second question is counted as unemployed and in the labor force. Everyone else is counted as not in the labor force. Based on these data the BLS calculates the unemployment rate as

$$U = \frac{\text{labor force} - \text{employment}}{\text{labor force}}$$

and the participation rate as

$$PR = \frac{\text{labor force}}{\text{population over 16 years of age}}.$$

These survey questions are not ideal in light of macroeconomic theory. An economist would prefer to replace the BLS’s second question with: “Are you willing to work *at the going wage for the kind of work that you are actively seeking and qualified to do?*” It is possible for a person to answer the BLS’s second question “yes” and this question “no.”

The economist would not count someone as involuntarily unemployed whose reservation wage was higher than wages currently offered in the market. The BLS could.

Similarly, the economist would not count someone as unemployed who sought a job for which he was not qualified. The BLS could. I should not be counted as unemployed because the University of California Davis Medical Center will not hire me as a surgeon or because the Washington Redskins will not hire me as a quarterback.

Some workers who are essentially unemployable because of high reservation wages or unrealistic assessments of qualifications will count as “unemployed” according to BLS definitions. In fact, they should count as “out-of-the-labor-force” according to economically ideal definitions. Some such incorrectly measured unemployment will persist even at the peak of the business cycle.

There are practical reasons why the BLS does not use the economist’s ideal definitions. Since labor is heterogeneous and is paid a variety of wages, it is difficult to determine what is “the going wage” without really detailed information about firms.

Similarly, workers are heterogeneous both in skills and in tastes. A worker may be qualified for a number of different sorts of jobs that pay different wages and yet be willing to work only at some subset of those jobs. In a sense, the worker is involuntarily unemployed with respect to some jobs and voluntarily unemployed with respect to others.

Finally, there is a large measure of subjective judgement about a worker’s qualification for a particular job. It is not a fact that can necessarily be easily ascertained through a survey. In the event, the worker and the employer have to agree about qualifications only when a worker is actually hired. And, even then, hiring may be on a trial basis in order to discover whether the judgement was correct. What qualifications are required and how willing a firm is to train a worker varies not only from firm to firm, but also from time to time, depending on how tight the labor market is. No practical survey could address such nuanced questions even if there were a sharp answer in every case. The BLS survey is a compromise with practicality.

(ii) Transitional Unemployment

Heterogeneity in employment helps to explain the persistence of unemployment even at the peak of the business cycle in another way. Because firms grow at different rates and experience different rates of technological improvement, there are always some firms reducing and other firms increasing the sizes of their workforces. It takes time to find new jobs: when times are good, a shorter time; when times are bad, a longer time; yet always, some time.

Transitional unemployment *comprises people in the labor force who are out of work and actively searching for jobs.* In most cases, people laid off from one job and searching for another are probably involuntarily unemployed. Even in cases in which people quit a job voluntarily, they may still be involuntarily unemployed in the sense that they are willing to work at the going wage at some other job. In some cases, however, workers actively engaged in job searches are voluntarily unemployed because their reservation wage is higher than the going wage. Generally, as time passes and such searches prove unfruitful, workers lower their reservation wages and enter the ranks of the involuntarily unemployed.

Whether voluntary or involuntary, the key point is that, even in a growing and successful economy, transitions between jobs are normal and are captured in the unemployment statistics. The failure of the unemployment rate to ever fall to zero is no surprise; it would be a miracle if it did.

(iii) A Real-Wage Floor

A third explanation for unemployment persisting even near the peak of the business cycle depends on the existence of a **real-wage floor** defined as *a lower bound to how far the real wage can fall*. If, for any reason, the real wage for any job is higher than the market-clearing real wage, firms will hire fewer workers than the market-clearing number.

For example, **minimum-wage laws** require firms to pay no less than a certain wage rate. (The U.S. minimum wage in 2004 was \$5.15 per hour.)² A firm that hired a worker the value of whose marginal product was less than the minimum wage would reduce its profits. Some low productivity workers may be employable only at a wage below the minimum. Even at the peak of the business cycle, firms will not hire them. (Minimum wage laws are discussed more fully in section 9.3.1.)

Another example of a real-wage floor occurs when firms themselves believe that their profits would suffer if they were to set wage rates too low. The **REAL EFFICIENCY-WAGE HYPOTHESIS** argues that workers paid real wages above the market-clearing rate are more productive or efficient than workers paid at the market-clearing rate. There are many reasons why this may be true.

First, a real wage above market-clearing marks out a job as a good job. Workers work harder at jobs that they regard as good – either because of the favorable psychological effect or because it raises the opportunity cost of losing the job and having to find another, less good job.

² A “subminimum wage” (sometimes called a “training wage”) of \$4.25 per hour is allowed for workers under 20 for the first 90 days of their employment.

A firm may care that workers regard their jobs as good, because workers have a great deal of discretion in how well they serve the firm. An illustration is provided by the tactic of “work-to-rule.” Many (particularly, but not exclusively, unionized) jobs are subject to contract. Often if workers follow their contracts to the letter and do not adjust their service flexibly in ways that contravene contractual terms, the firm cannot deliver its product effectively. Even so, the firm has no legal grounds for complaint.

For example, in the spring and summer of 2000, pilots at United Airlines, while bargaining for a new contract, decided to abide precisely by the overtime rules of the existing contract. Since the airline relied on pilots working overtime in situations that the contract did not allow, schedules were badly disrupted – passengers were stranded and flights cancelled. Not only did United ultimately have to accept the pilots terms, it had to issue a public apology and give its best customers extra frequent-flyer miles in an attempt to rebuild goodwill.

A second reason why firms might want to pay higher than the market-clearing wage is that they often incur certain fixed costs when they hire a worker, so that a high wage, which reduces the attractiveness of other jobs and lowers turnover costs, may actually raise their profits. Firms have strong incentive to reduce turnover. The cost of replacing and retraining a worker has been estimated to be typically 1½ year’s salary. These costs matter less in some occupations than others. Just as the minimum-wage is likely to affect unskilled jobs in the secondary labor market, efficiency wages are more likely to be paid in the high-skilled, primary labor market.

Even if firms rationally desire to pay a higher wage, they still should not hire workers at a wage greater than their marginal products. An efficiency wage, therefore,

implies that firms will hire fewer workers at higher marginal products. At higher rates, more people want to work, but fewer are hired. Whatever its source, a real-wage floor means that some workers will not be hired even when the market wage is above their reservation-wage rates – there is involuntary unemployment.

Frictional Unemployment

Measured unemployment never falls to zero. Whatever the reason (mismatched definitions, transitional unemployment, or various real-wage floors), we summarize the phenomenon using the term **FRictional UNEMPLOYMENT** defined as *the unemployment that persists even at the peak of the business cycle*. Just as lubrication can make a wheel turn more smoothly yet not completely eliminate friction, good economic times can reduce unemployment yet not eliminate frictional unemployment.

9.2.3 OTHER DIMENSIONS OF UNEMPLOYMENT

The unemployment rate is the most widely reported measure of unused labor resources. Yet, like other aggregate measures, it paints only part of the picture of unemployment. In addition to the questions from which it constructs the unemployment rate, the BLS asks a variety of questions that provide a much richer canvas.

Part-time Employment

The official unemployment rate treats workers as either in or out-of-the-labor-force with no recognition of degrees of participation nor degrees of employment. Since the mid-1950s, part-time employment has accounted for between 11 and 20 percent of the labor

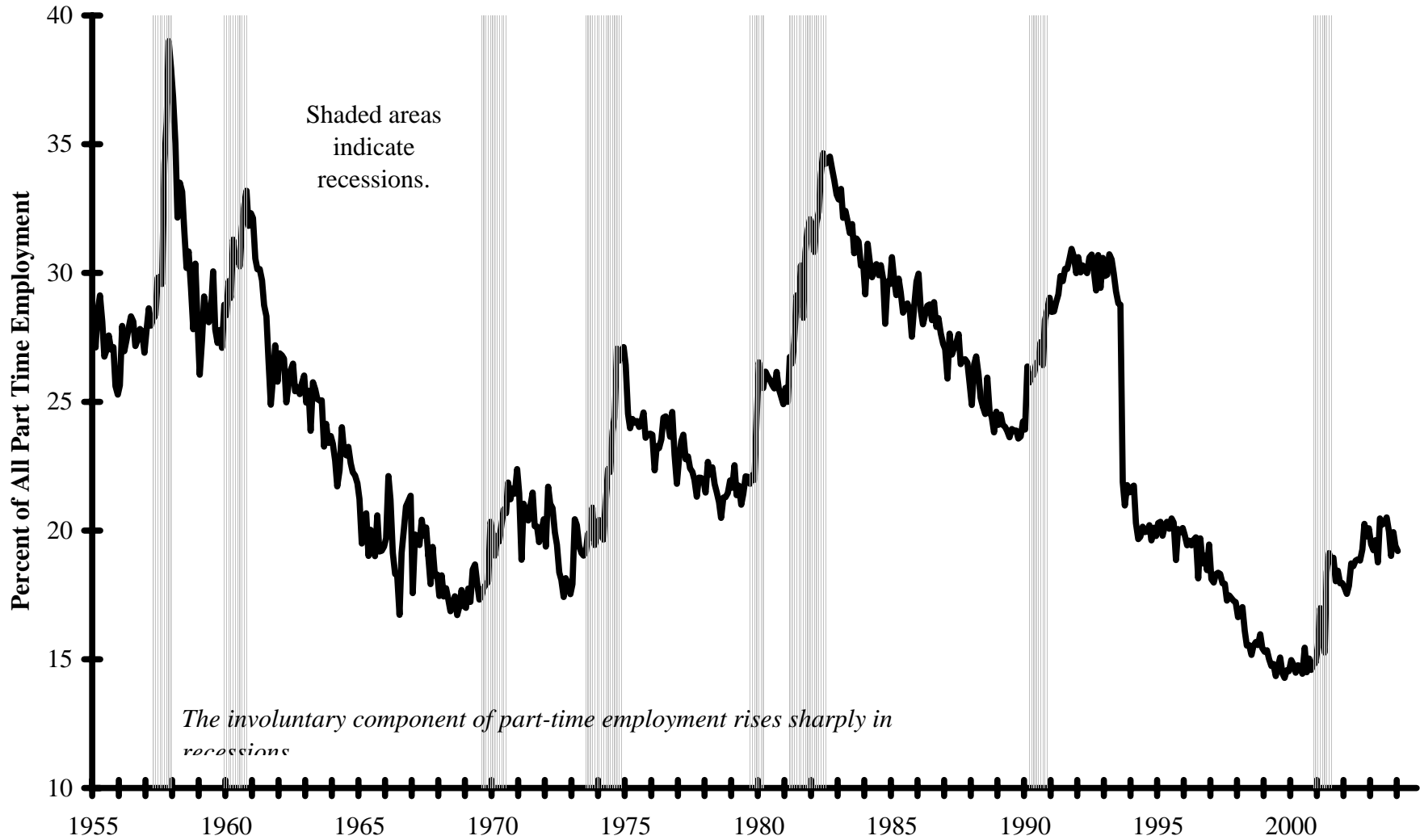
force. Some of the part-timers work their desired number of hours. They can be regarded as partial participants, whose non-working hours are voluntary. Some of the part-timers, however, want to work full-time. They should be regarded as partially unemployed. Figure 9.3 shows that involuntarily part-time employment as a percentage of all part-time employment rises sharply in recessions and falls steadily in recoveries.

Overtime Employment

Wage workers must generally be paid 1½ times their usual wage for work beyond the statutory 40 hour week. Some union contracts call for double time or more. Such regulations were introduced in the 1930s to encourage employers to abide by the standard workweek and to hire more workers rather than to work fewer employees more intensely. Even with such a disincentive to use overtime, manufacturing workers averaged around three hours of overtime per week from the mid-1950s through the early 1980s. Average overtime then climbed throughout the 1980s and has stabilized around 4½ hours per week since the early 1990s. Overtime in other sectors of the economy is surely less than in manufacturing, since the average work week for all workers is only about 35 hours.

A fall in the opportunity cost to firms of hiring overtime workers may partly explain the rise in overtime in the 1980s. At that time, an increasing part of worker compensation was shifted to tax-free benefits, such as health insurance and pensions, rather than to direct wages. Since the time-and-a-half rule applies only to the explicit wage, overtime wage rates are less than 1½ times wages including benefits. And they become proportionately less, the larger benefits become relative to explicit wages. Some

Figure 9.3
Ratio of U.S. Involuntary Part Time Employment to All Part Time Employment



Source: Bureau of Labor Statistics, Household Survey.

firms find it more profitable to increase the hours of existing workers than to incur, for example, the fixed costs of training and health insurance for new employees.

Overtime, like part-time employment, may be voluntary or involuntary. As we saw in Chapter 8, section 8.2.1, workers may want to work more than the statutory 40 hours per week, but be constrained by their employers to work only 40. In that case, an offer of overtime may be welcome. In some cases, a worker will not want to work overtime (at least not of the required amount). Then, overtime is voluntary only in the sense that the worker has a choice between accepting the mandatory overtime or leaving the job altogether. Even in the case in which he accepts mandatory overtime, the worker may still be constrained from adjusting labor supply at the margin (i.e., an hour more or less). In that sense, a worker may agree to the overtime and, at the same time, it may be partially involuntary.

Loosely Attached Workers

Just as part-time and overtime indicate different degrees of employment, there can be different degrees of unemployment. Imagine the unlikely situation in which measured unemployment fell to zero. Would that put an absolute limit on additional labor supply? Most likely not. Where would the additional labor supply come from? First, existing workers can be asked to work overtime. Second, employees who are involuntarily working only part-time can be used full time. Third, with labor in short supply, real wages would rise and would attract new participants into the labor force (including some voluntarily part-time workers shifting to fulltime work). Beyond, these three sources of

labor, current measurement practices may exclude people from the ranks of the unemployed who are effectively in the labor force.

Since the mid-1990s, the BLS has tracked marginally attached and discouraged workers. **Marginally attached workers** are *people who indicate that they desire to work, are ready to work, and have looked for work sometime in the recent past, but who are not now working or actively seeking work*. **Discouraged workers** are *a subset of the marginally attached who offer a job-market related reason for not seeking work, such as believing that current employment prospects are so poor that a search would be fruitless*.

The BLS now calculates six measures of underutilization of the labor force, called U-1 to U-6 (see Table 9.1). U-3 is identical to the usual unemployment rate, while the other U's measure different aspects of unemployment. Figure 9.4 shows the historical relationships among these measures since 1994.

The narrowest these indicators (U-1), which essentially measures long-term unemployment of those who continue to identify themselves as in the labor force, is less one third of the official unemployment rate (U-3). In contrast, broadest measure of underutilization (U-6) is almost double the official unemployment rate.

The ratios of the different indicators are very stable. The gaps between U-1 and U-2 and the official unemployment rate narrow a little after the recession of 2001, but the gaps between U-4, U-5, U-6 are nearly constant. Overall, the comovement of the six measures is so strong, that, even though the official unemployment rate may not give the full picture of the underutilization of labor, it gives a good index of whether it is becoming more or less severe.

Table 9.1
Concepts of Underutilization of Labor

| Concept | Definition |
|----------------|--|
| U-1 | Persons unemployed 15 weeks or longer as a percent of the civilian labor force. |
| U-2 | Job losers and persons who completed temporary jobs as a percent of the civilian labor force. |
| U-3 | Total unemployed as a percent of the civilian labor force (i.e., the official unemployment rate). |
| U-4 | Total unemployed, plus discouraged workers, as a percent of the civilian labor force plus discouraged workers. |
| U-5 | Total unemployed, plus discouraged workers, plus all other marginally attached workers, as a percent of the civilian labor force plus all marginally attached workers. |
| U-6 | Total unemployed, plus all marginally attached workers, plus total employed part time for economic reasons (i.e., voluntarily part-time workers) as a percentage of the civilian labor force plus all marginally attached workers. |

Source: Bureau of Labor Statistics. "The Employment Situation," Table A.7.

Figure 9.4
Measures of Underutilized Labor in the United States



Source: Bureau of Labor Statistics, Household Survey. Definitions of U-1 to U-6 are in Table 9.1.

Underemployment

Another aspect of underutilization of the labor force is much more difficult to measure: the mismatch between the skills of the jobholder and those needed to perform the job. In the primary-employment sector, firms place a premium on getting this match right. Turnover is expensive. The firm obviously does not want to squander training on an unqualified worker, and an *overqualified* worker is unlikely to stay when times are good. It is less important for the secondary-employment sector, in which training costs are low and rapid turnover is the norm.

UNDEREMPLOYMENT occurs when workers who are laid off from primary-sector jobs may take jobs below their ability and their potential value added – particularly, jobs in the secondary sector. An unemployed engineer may work as a taxi driver; an unemployed accountant may work at McDonald's. When the recovery gets underway, not only do the unemployed get hired, the underemployed move on to jobs which better match their skills. Their productivity rises. The existence of underemployment helps to explain why, even at low levels of unemployment, output can rise faster than employment. Instead working more, people work better.

International Comparisons of Underutilization of Labor

How do U.S. labor markets measure up in international comparisons? Table 9.2 shows unemployment rates and rate of part-time employment (by sex) for selected countries in 2003, a year in which the labor market in the United States had not fully recovered from the recession of 2001. Nevertheless, of the G-7 countries, only Japan and the United Kingdom had lower unemployment rates the U.S. rate of 6 percent (and they were close).

Table 9.2
Underutilization of Labor in Selected Countries, 2003

| | Unemployment Rate (percentage of labor force) | Part-time Employment (percentage of employment) | |
|------------------------|--|--|--------|
| | | Male | Female |
| The G-7 | | | |
| Canada | 7.6 | 11.0 | 27.9 |
| France | 9.4 | 4.7 | 22.8 |
| Germany | 9.3 | 5.9 | 36.3 |
| Italy | 8.6 | 4.9 | 23.6 |
| Japan | 5.3 | 14.7 | 42.2 |
| United Kingdom | 5.0 | 9.6 | 40.1 |
| United States | 6.0 | 8.0 | 18.8 |
| Other Countries | | | |
| Australia | 6.1 | 16.5 | 42.2 |
| Belgium | 8.1 | 5.9 | 33.4 |
| Ireland | 4.6 | 8.1 | 34.7 |
| Luxembourg | 3.7 | N/A | 28.1* |
| Mexico | N/A | 7.0 | 25.7 |
| Netherlands | 3.8 | 14.8 | 59.6 |
| Poland | 19.2 | 7.1 | 16.8 |
| South Korea | 3.6 | 5.3 | 11.2 |
| Spain | 11.3 | 2.5 | 16.5 |
| Turkey | N/A | 3.6 | 12.3 |
| OECD Europe | 8.8 | 5.9 | 27.1 |
| Total OECD | 7.1 | 7.2 | 24.8 |

*2002.

Source: Organization of Economic Cooperation and Development, *Employment Outlook, 2004*.

The other large, European countries (France, Germany, and Italy) reported substantially higher unemployment rates, all in the area of 9 percent. U.S. rates were much lower than European rates and below the OECD average of 7.1 percent.

The table shows huge variability among countries in part-time employment. This is not surprising as part-time employment sometimes reflects involuntary underemployment of labor and sometimes highly desirable flexibility in labor markets. Part-time employment of males (8.0 percent) in the United States was above both OECD and European averages. In contrast, the United States shows one of the lowest part-time employment rates for females (18.8 percent) – about two-thirds the OECD and European averages.

9.3 The Labor-Market Process

Let us now return to the question postponed in the last section: How is it that labor-markets remain out of equilibrium? How is it that unemployment can persist? Unemployment is fundamentally a mismatch between the supply of and the demand for labor. The problem is, then, why do labor markets not adjust quickly to bring supply and demand back together?

Up to now we have assumed that aggregate demand always adjusted to the level of aggregate supply. In this section, we drop that assumption. Aggregate demand determines how much firms can sell and, therefore, affects their demand for labor. We must, therefore, take the possibility of a mismatch between aggregate demand and supply into account.

9.3.1 WHY DO WAGES NOT FALL?

The Unemployment Puzzle

To an economist, unemployment is a puzzling phenomenon. In the face of a pool of unemployed workers why do firms not reduce the wages that they pay to their workers with the threat that they will fire them and hire unemployed workers in their places?

Look back at Figure 9.1. Recall that the wage $(w/p)_1$ is higher than the market-clearing wage $(w/p)^*$, so that there is involuntary unemployment. The number of workers who wish to work at that wage exceeds the number firms wish to hire. In Figure 9.1, every employed worker is willing to work at the wage $(w/p)_2$ or less. So, why would firms not follow the rules for profit maximization and simultaneously increase their use of labor to L^* and reduce the wage to $(w/p)^*$? Or, if they thought that they could not sell this extra output, why would they not lower the wages of existing workers to $(w/p)_2$?

Notice that the problem is to lower the *real* wage. A cut in real wages may or may not mean a cut in the *nominal-wage rate*. Since $\left(\frac{\hat{w}}{\hat{p}}\right) = \hat{w} - \hat{p}$, the real wage will fall whenever wage inflation is less than price inflation, even if both are positive. A falling real wage is compatible with either rising or falling nominal wages and prices.

Also notice that the issue is not whether real wages ever fall in the face of unemployment. They often do. The issue is instead why they might not fall far enough or fast enough to guarantee that every worker who wants a job gets one without spending an extended period unemployed. The persistence of unemployment and the failure of wages to adjust properly to clear labor markets is, perhaps, the single most vexed problem in macroeconomics over the past eighty years. Many explanations have been

offered, many may contain some part of the answer, but none has gained universal acceptance. This question remains a focus of cutting-edge research.

No one doubts that a god or a magician who could choose each price and wage rate in the economy could ensure that the labor market and all other markets cleared. An old axiom of economics known as **Say's law**, after the French economist Jean-Baptiste Say (1767-1832), says "*supply creates its own demand.*" In this context, Say's law means that firms could cut real wages and expand production, and the additional incomes generated from the larger level of employment and the higher profits would be enough to purchase the newly produced goods. In other words, there is no barrier to full employment. Of course, believers in Say's law are not blind. They too can see that measured rates of unemployment can be high. Most would argue that high unemployment results from some "unnatural" impediment to the smooth operation of markets. Some would go further to claim that measured unemployment is, in reality, largely voluntary, so that an apparently underemployed economy is really at full employment after all.

A more reasonable approach stresses the fact that production and labor are complex and heterogeneous. The simple analysis of the aggregate labor-supply/labor-demand diagram may be misleading. There is a **fallacy of division** (the opposite of a fallacy of composition): *what is true of the whole is not necessarily true of the parts.* Here what is true in aggregate is not true for the individual firms. Yes, if a god or a magician could arrange it just so, the economy could always move to full employment. But imagine how things appear to a single firm paying $(w/p)_1$ and employing L_1 workers

in Figure 9.1 (in your mind convert the aggregate upper-case L to the firm-specific lower-case l).

Suppose it sells all that it produces, but experiences no excess demand for its product. If it increases employment to L^* , who is going to buy the extra output? Of course, our knowledge of the national income and product accounts (Chapter 2) tells us that aggregate output equals aggregate income. And things would work fine in this case if the workers took some portion of the very goods they had produced as their wage. (Similarly, a firm's suppliers of raw materials would have to be willing to be paid in kind.)³ But most firms are specialized, and they rarely produce the goods that individuals want to consume. A steelworker's marginal product is measured in tons of steel per hour. Yet the steelworker does not want to be paid in cold-rolled sheet steel. He does not want to be paid his literal marginal product. He wants to be paid the *value* of his marginal product *in money*.

The problem for the firm is that it can pay its workers in money only if it is able to sell their product and realize its value. If it fails to sell the product, the output is added to the inventory of the firm and counts as income to its owners, as if the firm had sold the goods to itself. The national accounts still balance, but the "income" arrives in a form that does not motivate the firm to produce more. Nor will it cover the money wages the firm must pay to the workers. If each and every firm could simultaneously expand its employment and output, it would be possible to reach full employment for the economy.

³ In the Soviet Union and initially in post-Soviet Russia, the absence of well-structured markets and financial systems encouraged many firms to attempt to conduct business through barter of their products for necessary inputs. It proved to be an extremely inefficient and cumbersome system – an element in the collapse of the Soviet Union and an impediment to the growth and development of the Russian economy.

Unfortunately, none of the gods or magicians of the real world has volunteered to take on the job of economic coordinator. And without such a coordinator each firm must wait until demand increases before it is able to expand production and employment.

Just pointing out the possibility of a **DEMAND FAILURE** does not eliminate the puzzle, it merely changes its form. Look at Figure 9.1 once more. The marginal product of labor at the employment level L_1 is the same as the wage rate on the labor-demand curve $(w/p)_1$ while firms' marginal labor cost measured on the labor-supply curve is lower at $(w/p)_2$. Every currently employed worker would be willing to work for a real wage of $(w/p)_2$ or lower. The difference would be pure profit. Even if demand were insufficient to justify higher production, why would firms not lower the wages they pay? A benefit of lower wages and higher profits is that firms could afford to lower prices to stimulate demand. If they were successful, the economy would move toward full employment. Yet, this does not seem to be how firms actually behave.

The puzzle of unemployment can be restated: why is it that workers are sometimes involuntarily unemployed and yet the real wage does not show a tendency to fall fast enough or far enough to clear the labor market, eliminating the unemployment? Firms appear to be missing profit opportunities. Economists are rarely satisfied with economic analysis that suggest that there is an unexploited profit opportunity. We shall look at three explanations for the failure of wages to adjust: efficiency wages, unions, and government actions.

Cutting Wages or Raising Prices

To lower the real wage, a firm could cut its own nominal wage or it could allow relatively faster inflation to erode the real value of the nominal wage – that is, *collectively* firms might raise prices faster than nominal wages.

Since it is the product-real wage ($= \frac{w}{\text{price of the firm's own product}}$) that should

matter to labor demand, one might think that the firm could achieve the same effect by raising its own price irrespective of what others firms do. Once again, there is a fallacy of division. An increase in the price of its own output, if other firms do not go along and raise their prices, will reduce demand for the firm's product – especially relative to its direct competitors – which would not be helpful in increasing employment. If all prices rise simultaneously, relative prices are unaffected. And, if the reason for a higher general price level is an increase in *nominal* aggregate demand larger than the increase in prices (which is likely when there are unused resources), *real* aggregate demand will rise, moving the economy in the direction of full employment.

In contrast to the firms, which care about a single (or no more than a few) prices, workers care about the average price level for the basket of goods that they typically consume. A higher general price level that reduces the real wage also lowers the size of the labor force as the economy moves down the labor-supply curve. The unemployment rate falls both because firms hire more workers and because relatively fewer people want to work.

Real-wage adjustment strictly through price inflation (that is, with the nominal wage fixed) is usually a slow process. For example, if the real wage is 10 percent above its market-clearing level and the inflation rate is 5 percent, it would take two years of

persistent unemployment to close the gap. Unlike the general price level, which is beyond the control of the individual firm, its own nominal-wage rate is within its control. So why does the firm not just lower it to a more profitable level? Once again, what might work for all firms taking coordinated action might be unprofitable for any one firm.

Efficiency Wages

Previously in Section 9.2.2, we considered efficiency wages as placing a floor below which the real wage could not fall. The *real efficiency-wage hypothesis* is not, it turns out, helpful for the problem at hand. Real wages need to fall to clear the market, and the real efficiency-wage hypothesis says that they will not. It is not just that the nominal wage will not be cut. If workers experience general price inflation, the firm would have to *increase* the nominal wage to keep the real wage constant at the efficient level.

The efficiency-wage hypothesis nevertheless may be helpful. The important point is that worker productivity is affected by the wage rate. George Akerlof (winner of the Nobel Prize in Economic Science, 2001) and Janet Yellen (President of the Federal Reserve Bank of San Francisco) and various colleagues have stressed the idea that productivity is connected to workers feeling fairly treated, and that *nominal* wages may be an important measure.⁴ Workers might measure fairness against various benchmarks.

⁴ George A. Akerlof and Janet L. Yellen, *Efficiency Wage Models of the Labor Market*. Cambridge: Cambridge University Press, 1986.

- First, in addition to their purchasing power, which depends on the real wage, workers might care about their relative social position, and judge it against similar workers in other firms. For example, the relative real wage between United and

American Airlines is $\frac{\left(\frac{W_{United}}{P}\right)}{\left(\frac{W_{American}}{P}\right)} = \frac{W_{United}}{W_{American}}$. Since the price-level terms cancel

out, relative *real* position and relative *nominal* position are identical. Each airline would be reluctant to be the first to cut its nominal-wage rate, because that would shift the relative wage against its own employees and make them less efficient. Of course, each airline has to strike a balance. The savings in direct costs of a nominal wage cut may sometimes be greater than the value of lost efficiency. In that case, the airline would cut the nominal-wage rate. Any case in which the efficiency of workers depends on the nominal wage might be called the **NOMINAL EFFICIENCY-WAGE HYPOTHESIS**. The **relative efficiency-wage hypothesis** is one example of a nominal efficiency-wage hypothesis, as well as an example of Akerlof and Yellen's **fair-wage hypothesis**.

- Second, workers may judge their positions relative to workers in their own firms. Truman Bewley, an economist at Yale University, conducted extensive interviews with employers, union officials, and job-placement professionals during the recession of the early 1990s.⁵ He argues that both workers and firms have relatively poor information about compensation and working conditions at other firms and base their judgements about fairness on the conditions in their own

⁵ Truman F. Bewley, *Why Wages Don't Fall in a Recession*. Cambridge, MA: Harvard University Press, 1999.

firms.

An example that predates Bewley's research is found in the case of the London newspaper printers' union. The union struck the *Times of London* for 10½ months beginning in November 1978.⁶ One cause of the strike was a narrowing in the relative wage differential between its members and janitorial staff. The union would have been just as satisfied with a cut in the janitors' wages as with an increase in the wages of its own members.

Academic labor markets provide another example. New assistant professors are paid whatever the competitive wage is in the year that they are hired. Once they are hired, their wage often rises more slowly than market wages, so that the last hired is often the best paid. Department chairs and deans are familiar with the cries of "unfair" from the more senior assistant professors.

- Third, workers may judge their wage relative to their own past wages. Bewley's survey indicates that workers generally regard any cut in their nominal wage as unfair, even if they do not know the wages of other workers. The economic psychologist Daniel Kahneman (winner of the Nobel Prize in Economic Science in 2002) and his colleagues studied worker reactions to wage cuts.⁷ Workers typically found a 5 percent cut in the nominal wage when the inflation rate was zero to be unfair, but they did not object to a 7 percent increase in the nominal wage when the inflation rate was 12 percent. Yet both scenarios represent a 5 percent cut in real purchasing power. Economists typically stigmatize such

⁶ *Wall Street Journal*, October 22, 1979, p. 23.

⁷ Daniel Kahneman, Jack L. Knetsch, J. and Richard Thaler. "Fairness as a Constraint on Profit Seeking: Entitlements in the Market. *American Economic Review*, vol. 76, no. 4, 1986, pp. 728-741.

behavior as irrational. Workers are said to suffer from **money illusion** – that is, to not understand the equivalence of the two situations. Of course, workers may sometimes suffer from money illusion – even relatively simple economic reasoning is not inborn. Still, greater concern for a nominal-wage cut than for a price-level increase is not necessarily irrational.

Workers may rationally care about what their bosses think of their performance and may take psychic pleasure from a good appraisal and feel psychic pain from a poor one. Talk is cheap. Decisions about wages may convey the boss's feelings more persuasively than words could do. If workers recognize that individual firms have little control over, say, the CPI, they will take their signal from the nominal-wage rate. What is more, workers may not monitor the CPI at all closely, so that a change in their paycheck provides a far more direct signal than a change in the real wage could.

Prices typically change continuously, while nominal wages change infrequently – often only annually. The real wage then is constantly changing. It would be inconvenient and costly for workers to monitor their real wages daily and to adjust their behavior in direct proportion. It is far more practical to focus on the discrete changes in the nominal wage.

Cognitive psychology plays a part here. It is said (although this may be a science legend) that a frog dropped into hot water will immediately jump out; but, if dropped into cold water that is then heated gradually, it will allow itself to be poached. To some extent, people are like that. We more easily notice a discrete, relatively large drop in real purchasing power owing to a cut in nominal wages

than its gradual erosion owing to inflation.

Whether the workers' concern for nominal wages is rational or irrational, Bewley's survey confirms that employers are reluctant to cut them. Even when the alternative is cutting everyone's wages (and/or hours of work) and maintaining employment levels, firms would generally prefer to maintain wages (and hours) and lay off redundant workers. A smaller work force with the good will attributed to the higher wages typically offsets any cost savings that might be gained from lowering the wage.

Unions

The actions of unions provides a second explanation for wages not falling in the face of unemployment. Unionized members typically work under a contract. During the life of the contract, the wage rate can be lowered only with the agreement of the union. If the agreement is for a nominal-wage rate, inflation may nonetheless erode the real wage and move the economy toward market-clearing. Often, especially in times (such as the 1970s) when inflation rates are high and variable, unions negotiate cost-of-living adjustments (COLAs) into their contracts. The COLA ties the nominal wage to a price index, such as the CPI. A contract with a COLA is effectively a contract for a definite real wage.

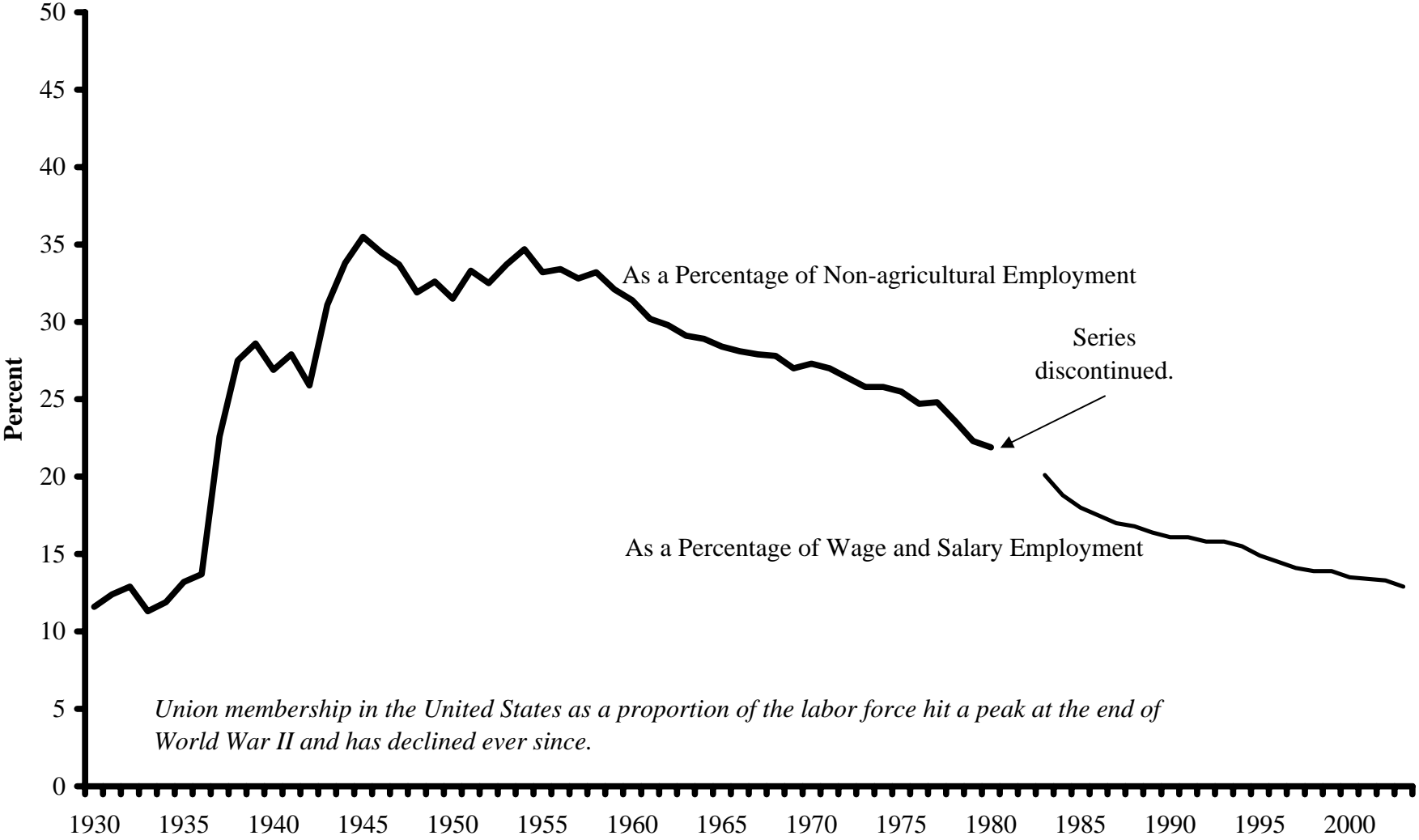
Why do firms enter into such contracts? To a large degree, firms deal with unions because the law says that they must. Still, the same considerations that go into efficiency wages, may matter for contracts as well. Workers under contract with a known wage may work more reliably and productively than workers without such contracts.

One might think that unions would have an interest in increasing employment. But the situation is more complicated than that. Generally, only workers who are employed, on temporary layoff or on strike are members of the union. The members or *insiders* may prefer high wages for themselves, even if it means that the unemployed or *outsiders* remain unemployed. The **INSIDER/OUTSIDER MODEL OF UNEMPLOYMENT** is often thought to explain relatively high levels of unemployment in Europe compared to the United States over the past quarter century. The situation could easily arise in the United States as well, but, in contrast to Europe, only a small and shrinking share of the labor force in the United States is unionized.

Union membership, which grew significantly after the Great Depression peaked at about one-quarter of the workforce in the mid-1950s and has fallen steadily since then (Figure 9.5). In 2003, union membership was just 13 percent of wage-and-salary employment. What is more, government workers form a larger share of union membership than in the past, leaving a small number of unionized private sector workers concentrated in a limited number of trades. Unionization may, then, explain some part of the failure of wages to adjust, though not a large part.

In contrast, unionization rates in most European countries are double or more than in the United States (Table 9.3). Unionization in France is actually lower than in the United States at 9 percent, while in Sweden it is massively higher at 82 percent. Most European countries also have extensive social and labor legislation that gives workers (unionized or not) extensive rights with respect to dismissal, severance pay, maternity leaves, and so forth. Many economists, as well as domestic critics, have argued that the design of many of these programs discourages flexibility in the labor market and actually

Figure 9.5
Unionization of Labor in the United States



Source: Bureau of Labor Statistics.

Table 9.3
Unionization Rates in Selected Countries, 2000

| Union Members (percentage of all employees) | |
|---|----|
| The G-7 | |
| Canada | 30 |
| France | 9 |
| Germany | 26 |
| Italy | 35 |
| Japan | 22 |
| United Kingdom | 29 |
| United States | 13 |
| Other Countries | |
| Australia | 25 |
| Austria | 37 |
| Belgium | 53 |
| Denmark | 76 |
| Finland | 76 |
| Ireland | 45 |
| Netherlands | 25 |
| New Zealand | 25 |
| Norway | 57 |
| Sweden | 82 |
| Switzerland | 22 |

Source: Organization of Economic Cooperation and Development; data for France, Ireland, and Italy from the European Industrial Relations Observatory.

contribute to higher unemployment rates as firms are reluctant to hire and incur the risks of not being able to adjust their labor use downward in future. The countries that appear to have the most flexible labor markets in Europe, such as the United Kingdom and the Netherlands, also have relatively low unemployment rates despite relatively high unionization compared to the United States. Germany, which has a similar level of unionization to these countries but extensive labor-protection laws, has consistently had a high unemployment rate in recent years.

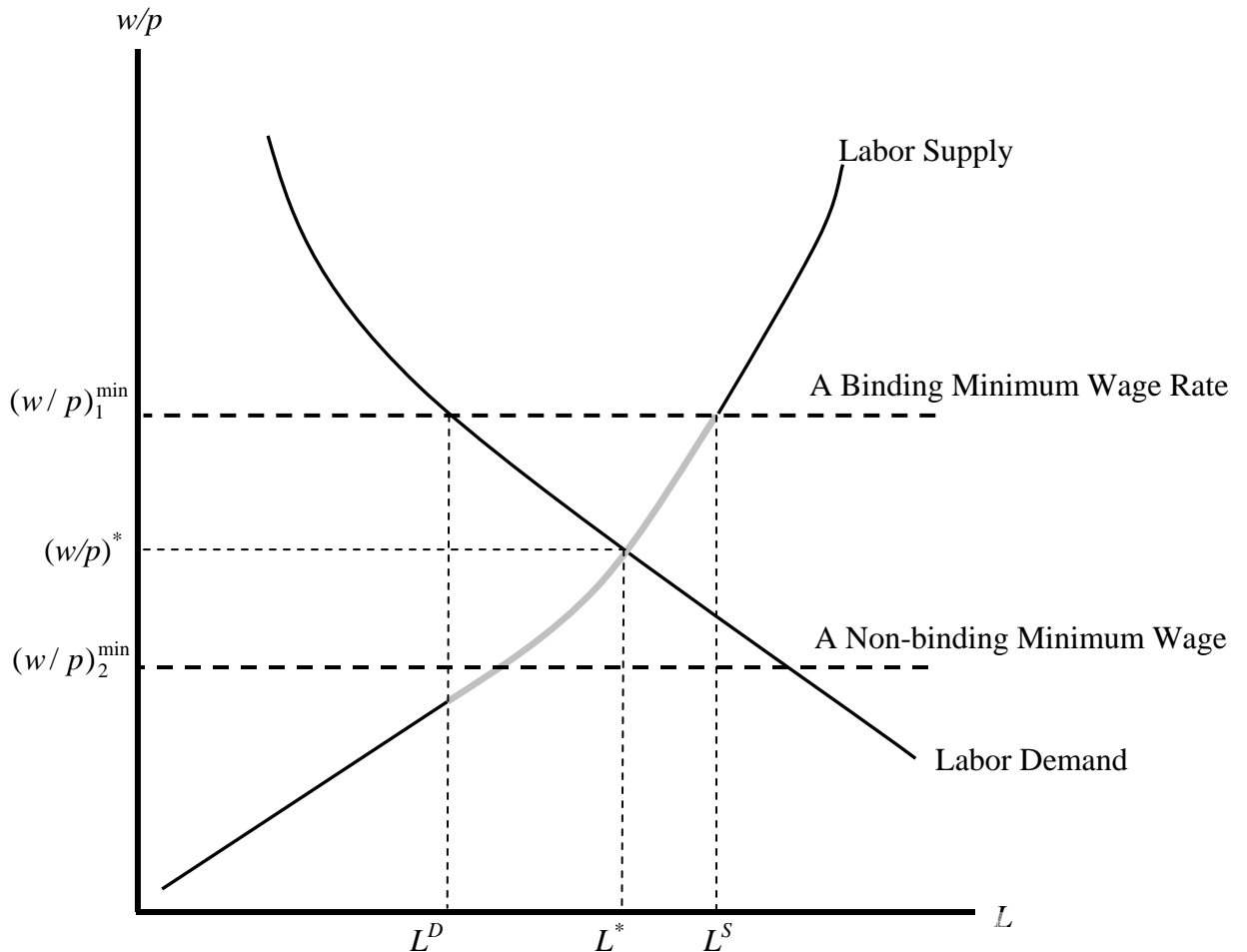
Government Actions

A third explanation for the failure of wages to adjust in the face of unemployment points to the actions of the government. In one sense the power of the unions is the result of government action. Without the National Labor Relations Act employers would not have to recognize the right of unions to represent workers.⁸ Aside from providing the legal basis for unions, the government intervenes more directly in wage setting.

The best-known instance is the minimum-wage law. A required minimum wage means that firms cannot profitably hire any worker whose marginal product is less than the minimum wage. Figure 9.6 shows the labor market. When wages are set freely, the market clears at $(w/p)^*$. But when the government imposes a minimum wage above the market-clearing rate at $(w/p)_1^{\min}$, labor supply exceeds labor demand and $L^S - L^D$ workers are unemployed. Firms would willingly hire more workers, and workers would willingly accept lower wages, but the law prohibits them from going below the minimum.

⁸ The National Labor Relations Act is known as the Wagner Act of 1935, as amended by the Taft-Hartley Act of 1947 and the Landrum-Griffin Act of 1959.

Figure 9.6
The Effect of the Minimum Wage on Unemployment



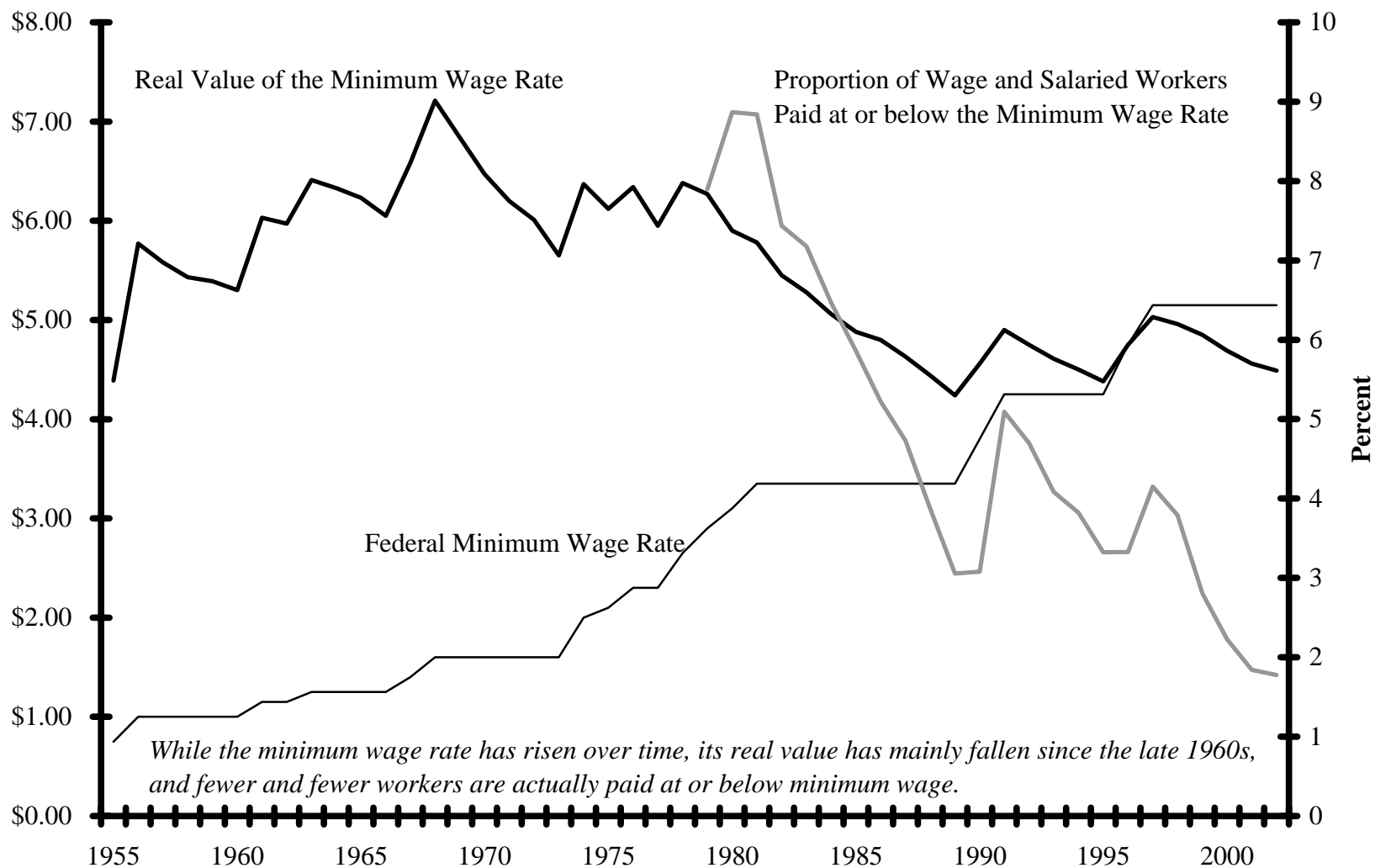
A binding minimum wage rate (e.g., $(w/p)_1^{\min}$) sets the real wage above the market-clearing wage $(w/p)^$, where labor supply exceeds labor demand and results in involuntary unemployment (gray segment of the labor-supply curve) of $L^S - L^D$. When the minimum wage rate is set below the market-clearing rate (e.g., at $(w/p)_2^{\min}$), it has no effect on unemployment as firms willing pay the market clearing wage.*

Minimum wage rates are set in nominal terms and updated only infrequently. Over time inflation may erode the real value of the minimum wage, so that it falls in the direction of, or even below, market clearing real wage. The real wage $((w/p)_2^{\min})$ in Figure 9.6) is an example of a *non-binding minimum wage rate*. When the minimum wage rate is non-binding, firms will offer higher wages (in this case, the market-clearing rate, $(w/p)^*$). Figure 9.7 shows the real and nominal value of the minimum wage in the United States *and* the percentage of workers actually paid at (or below) minimum wage. The fact that the real minimum wage does not trend upwards as average real wages have in the United States and the fact that the number of workers subject to minimum wage has trended downward together suggest that, for most jobs, the minimum wage is non-binding.

Economic theory predicts that minimum-wage laws will raise unemployment rates unless they are non-binding. Any worker who remains employed benefits from an increase in the wage rate, but these benefits are offset to some degree by the income lost to those who are fixed or who are never hired because of a binding minimum wage. It is useful to remember that jobs and workers are heterogeneous. The minimum wage (at least at the rates that have prevailed over the past five decades) is relevant only for the most unskilled workers. If the labor-demand curve for occupations that pay minimum wage is very steep, then even a large change in the minimum-wage rate would have little effect on unemployment.

In the 1990s, the economists David Card (University of California, Berkeley) and Alan Krueger (Princeton University) unleashed a vigorous debate about the minimum wage with a study that appeared to show that an increase in the minimum-wage rate in

Figure 9.7
The Minimum Wage in the United States



Source: Bureau of Labor Statistics, "Characteristics of Minimum Wage Workers: 2002," Table 10 and author's calculations.

New Jersey had actually raised employment.⁹ For economists this was a man-bites-dog story and their methods and evidence were quickly challenged by other economists.¹⁰

While the controversy continues, now that the dust has settled there is little evidence that overall employment would increase by much if the minimum wage were cut nor that overall unemployment would rise by much if the minimum wage rate were raised moderately. Both negative and positive effects would likely be concentrated on particular groups, such as teenagers.

Another example of government regulation of wage rates is provided by the Davis-Bacon Act, first adopted in 1931. The act requires that firms pay workers on federal construction projects at prevailing union wage rates for those trades in those areas, whether or not the workers are unionized. The act extends the influence of unions in preventing wage cuts to a wider group of workers.

There have been numerous proposals from time to time to establish **comparable-worth laws** that would categorize jobs according to some standard other than the supply and demand for workers of a particular type. The proponents of such legislation argue that certain types of jobs have been regarded as “women’s work” and pay less than jobs that are in some sense just as valuable. Compared to plumbers, for example, nurses might require more education and face life-and-death responsibilities and yet be paid less. A comparable-worth law might, therefore, judge that nurses should be paid more than plumbers. Any increase in the wage for plumbers – for example, as the result of an

⁹ David Card and Alan B. Krueger, *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, N.J.: Princeton University Press, 1995.

¹⁰ One of the many opposing studies is Richard V. Burkhauser, Kenneth A. Couch, and David Wittenburg, “Who Gets What From Minimum Wage Hikes: A Replication and Re-estimation of Card and Krueger,” *Industrial and Labor Relations Review*, vol. 49, no. 3, April 1996, pp. 547-552.

increase in demand – would have to be met by a proportionate increase in the wage for nurses to maintain comparable worth, even if that increase raised the wage above its market-clearing level and reduced the demand for nurses, adding to their unemployment.

So far comparable-worth legislation in the United States has been restricted to a couple of states and applied only to state and local employees. Comprehensive extension to the private sector seems unlikely politically (few politicians wish to support central planning) and economically (setting wage rates independent of supply and demand interferes with their ability to transmit information important to economic efficiency).

9.3.2 THE LABOR-SUPPLY PROCESS

Job Search

Unemployment is a stock variable, similar to other stock variables such as capital and wealth. We likened stock variables to a lake or a pool into which some correlative variables (investment for capital and savings for wealth) flow in and some (depreciation and dissavings) flow out. Unemployment may also be envisaged as a pool in which laid-off or newly entering workers are streams flowing in and the newly employed or workers leaving the labor force are streams flowing out. A richer analogy would be, perhaps, that the economy is a mansion with many rooms (firms or workplaces) and many hallways. Those out-of-the-labor-force are outside the house. The unemployed wander the hallways in search of the appropriate room. The firms determine how many workers may stay in a room, rather like a game of musical chairs in which the firms determine the number of chairs. The house is a busy place.

Obviously, in a recession, the halls teem with workers searching for rooms with empty chairs. The number of chairs falls short of the available workers. Still, some workers find chairs. The halls become less crowded in the late stages of a business-cycle expansion, but even then there are plenty of workers about. Different firms grow at different rates. Technological improvements may reduce the need for workers in particular firms, while rising demand increases the need for workers in other firms. Some firms are bankrupted and close their doors even when times are generally good. And workers more readily leave their jobs voluntarily when they believe that it will be easier to find another.

Not all rooms can be adjacent. A worker searching for the right match may aim for an upper floor (a high-paying job). If the search goes on, the same worker might have to settle for a lower floor. The willingness to adjust one's reservation wage downward may depend on how crowded the halls are (the unemployment rate). When they are teeming, workers may take whatever they can get, even if it means going straight to the basement.

The search for employment is not quite like the game of musical chairs, since some workers do not fit some chairs. Workers look positions that match their skills. The unemployment that results when jobs remain vacant even though some workers are still unemployed because of mismatch is sometimes called **structural unemployment**. Structural unemployment is not a mutually exclusive category with respect to voluntary and involuntary unemployment. Rather, it is a form of extreme frictional unemployment in which the cause of the friction is highlighted. Structural unemployment is likely to be high in particular areas facing large-scale changes to dominant industries. When deep

coal mining declined in the eastern states, the unemployed miners, whose skills were now redundant or obsolete, could have been considered to be structurally unemployed, even though other jobs elsewhere in the country were vacant.

Employment Status and Job Flows

Statisticians can count the number of people in each employment state: *out-of-the-labor-force*, *unemployed*, *employed*. Such statistics fail to convey the fact that the labor market is never quiescent. People are constantly changing their employment state.

Ideally, we would like to record the flow of people in each direction between each state. Such statistics are available in detailed microeconomic studies of individual people. Unfortunately, macroeconomic statistics record only the number of people in each state, but from these data we can construct the *net* flows. Such net flows do not distinguish, for example, between a flow of 20,000 unemployed into employment accompanied by a flow of 19,000 employed into unemployment and a flow of 2,000 into employment accompanied by a flow of 1,000 into unemployment. Each is a net flow of 1,000 into employment. The net flows are interesting nonetheless.

The net changes for each state are always the sum of two net flows, which may change direction at different stages of the business cycle. In the recession, of course, employment falls and unemployment rises. The flows show that the fall in employment results *both* from workers joining the unemployed *and* leaving the labor force. The rise in unemployment results *both* from people entering the labor force *and* workers becoming unemployed. In the expansion, just as we expect, employment rises and unemployment falls. The rise in employment is the result of *both* the unemployed

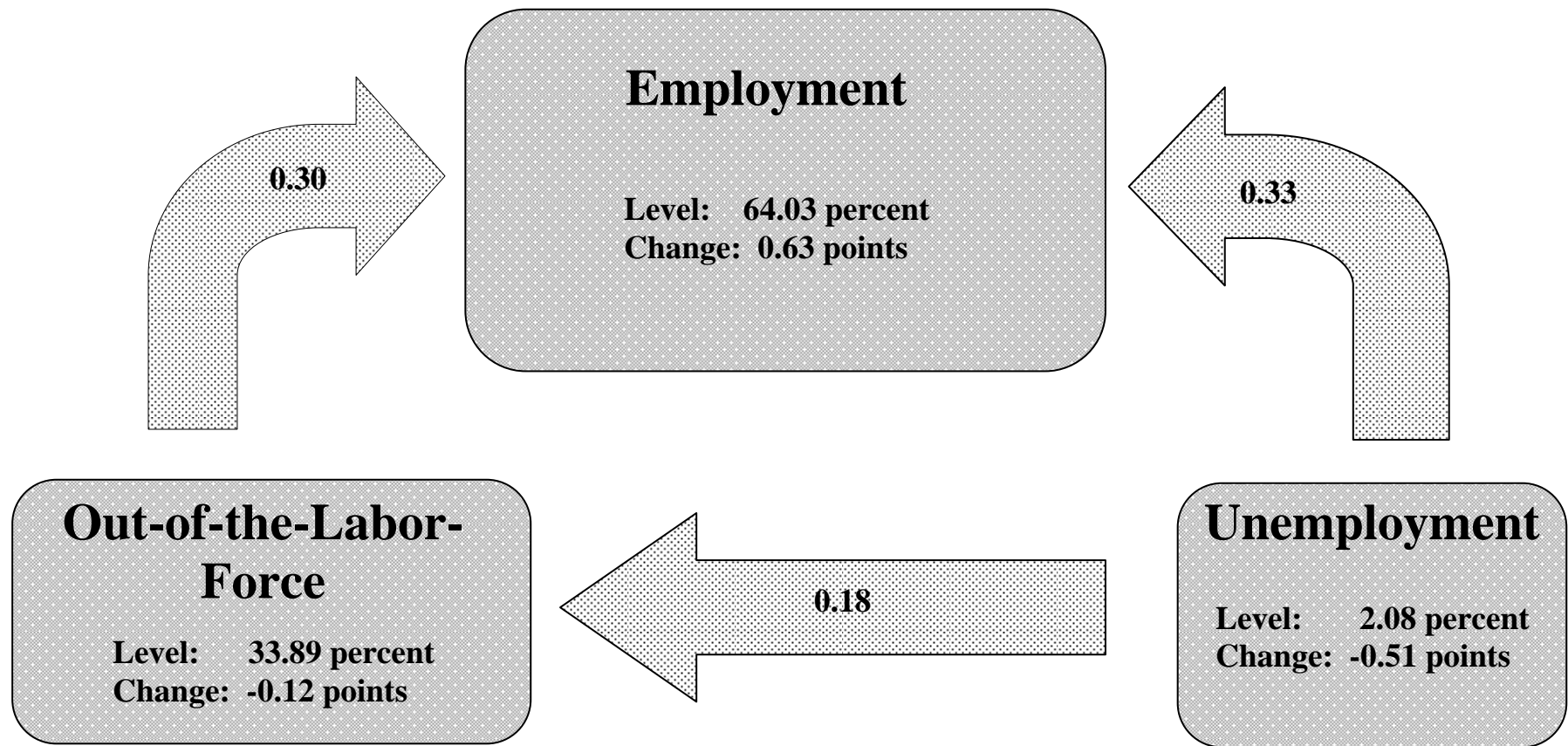
finding work *and* of workers moving directly from out-of-the-labor-force into employment. Yet, even well into the boom, some of the unemployed leave the labor force, rather than continue to search for employment.

For example, Figure 9.8 shows a schematic view of the U.S. labor market in a typical month in the middle of a business-cycle expansion. Unemployment (those milling in the hallways) is relatively low and falling. Some of the unemployed (1/3 percent) become employed during the month. About half that many cease to be unemployed because they move out of the labor force ((outside the labor-market house). They might do this, for example, because the improving conditions in the labor market may raise *family* income enough that one member can afford to enter higher education or to stay home to rear children. At the same time, a number of people (0.30 percent) nearly equal to those leaving unemployment for work enter the labor force and move directly to employment. These are previously voluntarily unemployed people for whom current real wages now exceed their reservation wage. An important thing to realize is that the arrows show only the net flows, and there are always workers moving in each direction between states no matter what the stage of the business cycle.

The picture changes considerably in Figure 9.9, which shows net job flows for a typical month in the middle of a recession. Every arrow is reversed. Now people leaving employment (0.39 percent) swells unemployment. Unemployment also increases because people join the labor force but fail to find employment (0.08 percent). This may result from an income effect: falling income encourages higher labor supply on the part of individuals to replace income lost to families. Some people leaving employment (0.33 percent) move out of the labor force rather than into (involuntary) unemployment. This

Figure 9.8

Typical Employment Flows in the Boom

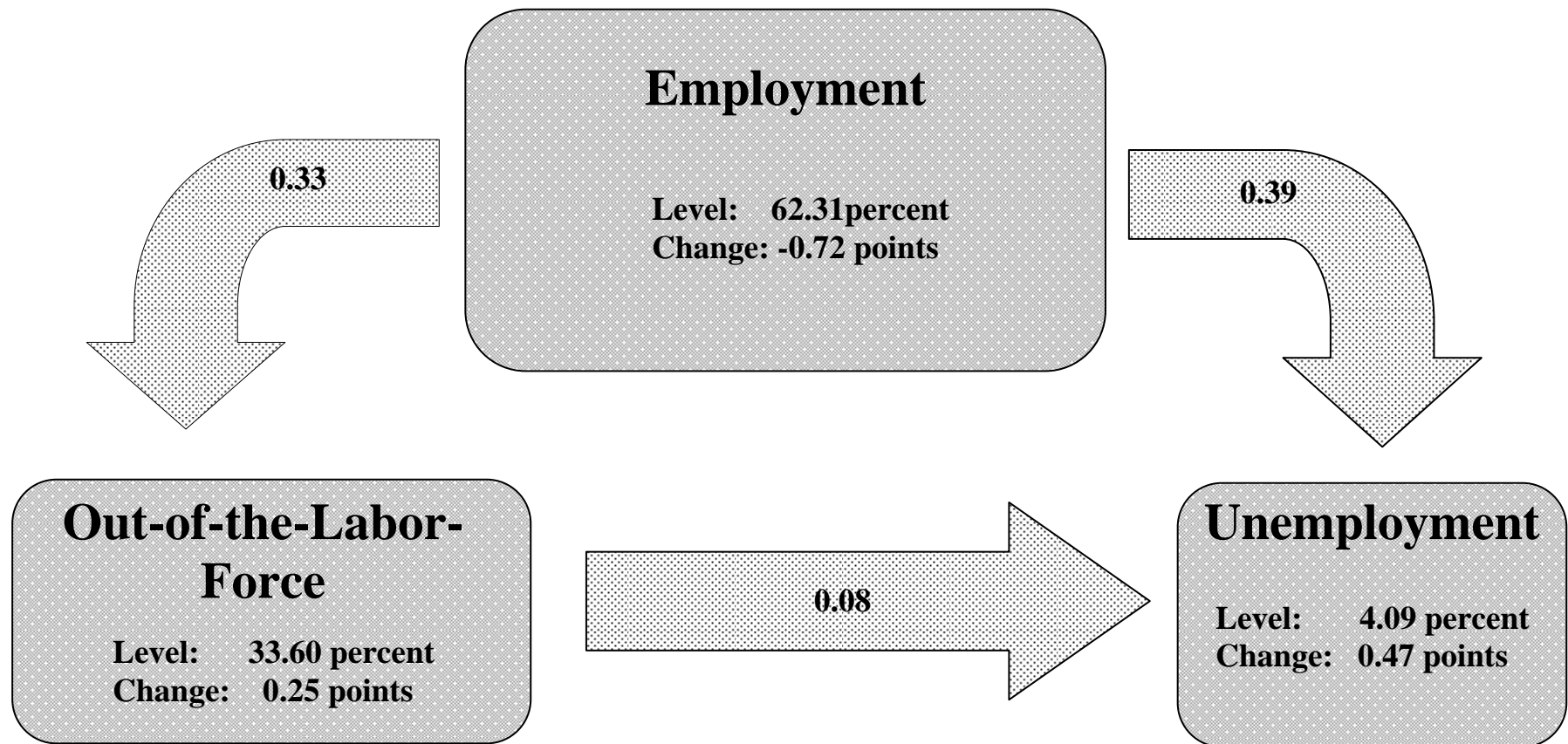


In a boom, employment is swelled both by the unemployed finding jobs and people moving directly from out of the labor force into employment, adding to the participation rate.

The data are for one month (November 1997) in the middle of the 1991-2001 expansion. Levels are expressed as a percentage of the civilian population over 16 years of age; changes are expressed in percentage points.

Source: Bureau of Labor Statistics, Household Survey.

Figure 9.9 Typical Employment Flows in the Slump



In a slump, unemployment is swelled both by the employed losing their jobs and by people entering the labor force in search of jobs, adding to the participation rate. On the other hand, some people who lose their jobs leave the labor force, reducing the participation rate. (In the case presented here, the net effect is a fall in participation rates.)

The data are for one month (November 1990) in the middle of the 1990-91 recession. Levels are expressed as a percentage of the civilian population over 16 years of age; changes are expressed in percentage points.

Source: Bureau of Labor Statistics, Household Survey.

may result from a substitution effect: a fall of real-wage rates below reservation-wage rates discourages participation.

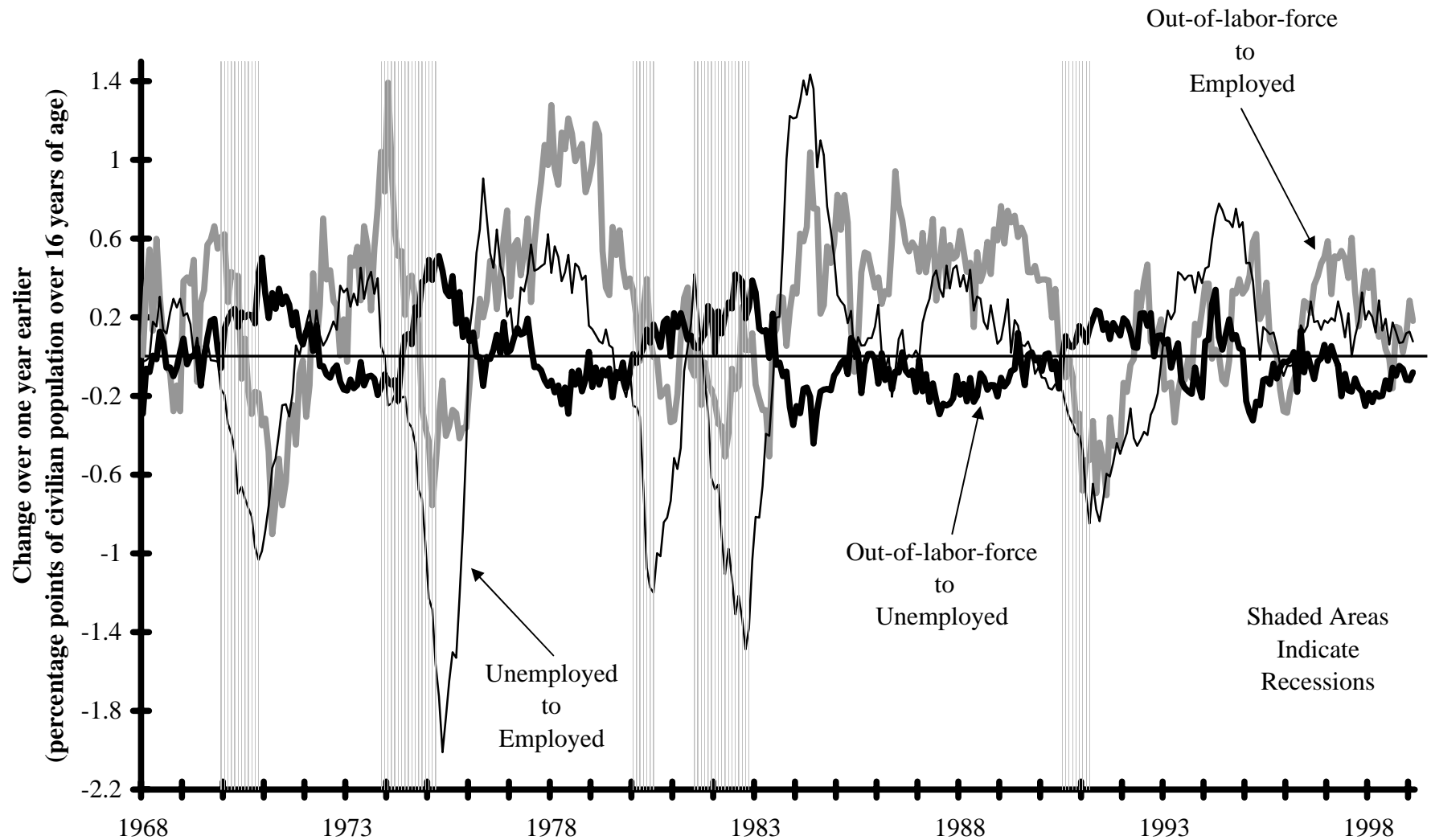
Figures 9.8 and 9.9 present snapshots of the labor market. To gain historical perspective, Figure 9.10 plots the time series for job flows against the business cycle. The figure confirms our picture of the labor market as continuously active. At every stage of the business cycle there are significant net flows among employment states. The net flows shift towards employment as the expansion develops. The net flow between unemployment and employment tends to be highest early in the expansion, while the net flow between out-of-the-labor-force and employment tends to be highest late in the expansion. Both turn sharply negative in the recession. In contrast, the net flow between out-of-the-labor-force and unemployment tends to rise sharply in recessions and to turn negative only in the middle of the subsequent expansion.

Notice that flows between out-of-the-labor-force and both unemployment and employment affect participation rates. In a typical recession flows from out-of-the-labor-force to unemployment, which *ceteris paribus* raises the participation rate; while flows from employment to out-of-the-labor-force also rise, which *ceteris paribus* lowers the participation rate. The net effect can go either way, so that it is hard to predict the cyclical behavior of participation rates. A look back at Figure 8.11 shows that they do not behave consistently among different recessions.

The Duration of Unemployment

Returning to the metaphor of the labor market as a mansion, the unemployment rate tells us how bustling the hallways are, but it does not tell us how fast the inflow or outflow is

Figure 9.10
Net Flows Between Employment Statuses in the United States



Source: Bureau of Labor Statistics, Household Survey and author's calculations.

nor how rapidly the denizens of the hallways turn over. At the same unemployment rate – even if it is relatively high – unemployment is less of a problem when the typical unemployed worker is out of work only for a short time than when he is out of work for a long time. In either case, the economy has some unused resources. But when unemployment spells are short, some of the costs are spread over more workers, so that each suffers less. A high turnover rate may also indicate that unemployment is largely frictional and, therefore, virtually impossible to eliminate.

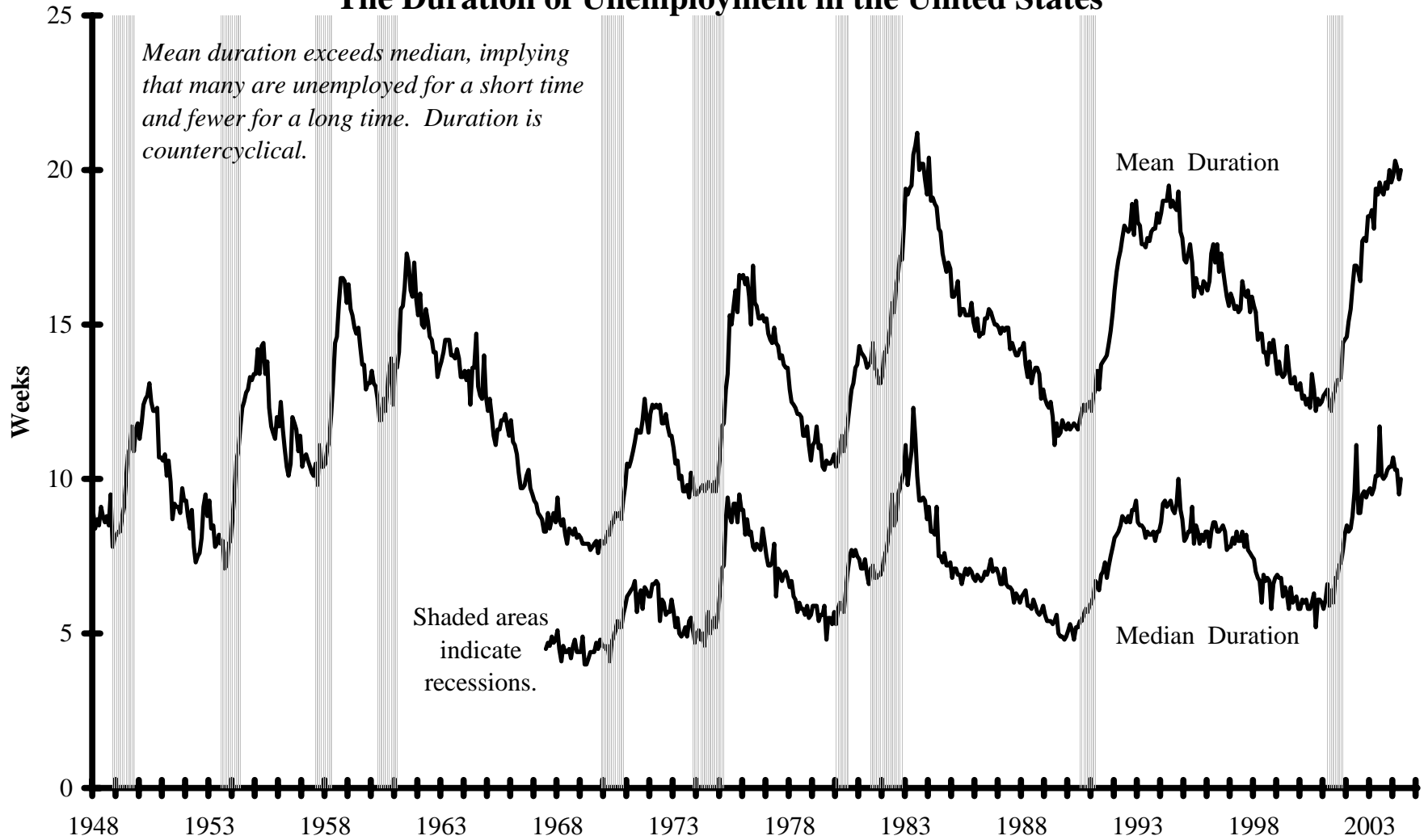
Figure 9.11 shows the mean and median duration of unemployment (measured in weeks) in relation to the business cycle. The mean is uniformly higher than the median, which implies that a lot of people are unemployed for a short time and a few for a *much* longer time (that is, the distribution of durations is positively skewed; see the *Guide*, section G.4.2). The duration of unemployment is a leading or coincident indicator of the recession, reaching its lowest level at or near the cyclical peak, and a lagging indicator of the recovery, peaking after the cyclical trough.

The lag is easily explained. In a recovery, the first to be hired are usually those who have been unemployed only a relatively short time – regular employees on temporary layoff and those whose skills are the freshest. This, in itself, skews the remaining pool of workers towards the longer-term unemployed, who themselves increase the lengths of their individual periods of unemployment, further skewing the pool, while they wait for the recovery to progress.

The number of those unemployed for more than 15 weeks reached a high of around 4 percent of the work force in the double-dip recessions of the early 1980s. In the 1950s it was sometimes lower than ½ percent, but in the last thirty years it has been

Figure 9.11

The Duration of Unemployment in the United States



substantially higher. Even in the strong recovery at the end of the century, it remained near 1 percent. The long-term unemployed workers are in special danger of losing their skills and becoming ever less employable. They represent a problem for economic policy somewhat different from that posed by the short-term unemployed.

Another measure of the inflexibility of European labor markets relative to those of the United States is shown by the incidence of long-term unemployment (Table 9.4). In the United States, only about 1/5 of the unemployed are out of work for more than six months, compared to about 45 percent for the OECD and 60 percent for Europe. Similarly, in the United States about 1/8 of the unemployed are without work for more than a year, compared to 30 percent in the OECD and 42 percent in Europe. The incidence of long-term unemployment is highest in Germany and Italy. A likely explanation is the relatively more generous unemployment benefits in Europe compared to the United States that keeps the opportunity cost of work high, encouraging workers to maintain high reservation wages.

9.3.3. THE LABOR-DEMAND PROCESS

Job Creation and Destruction

The net flows between employment states in the last section quantified the labor-market process from the point of view of the worker. Once again using the mansion as a metaphor for the labor market, we can take a different perspective. Instead of tracing the movements of people from rooms to hallways and out the door, let us trace the placement of chairs (that is, jobs) among the rooms (firms). Any time a firm opens a place for a worker (adds a chair to the room) a job is created. Anytime it eliminates a place

Table 9.4
Long-term Unemployment in Selected Countries, 2003

| Incidence of Long-term Unemployment (percentage of employment) | | |
|--|--------------------------|---------------------------|
| | 6 months and over | 12 months and over |
| The G-7 | | |
| Canada | 18.6 | 10.1 |
| France | 53.4* | 33.8* |
| Germany | 68.5 | 50.0 |
| Italy | 74.1 | 58.2 |
| Japan | 50.9 | 33.5 |
| United Kingdom | 37.3 | 23.0 |
| United States | 22.0 | 11.8 |
| Other Countries | | |
| Australia | 39.7 | 22.5 |
| Belgium | 64.7 | 46.3 |
| Ireland | 56.6 | 35.4 |
| Luxembourg | 46.8* | 27.4* |
| Mexico | 4.9 | 1.0 |
| Netherlands | 49.2 | 29.2 |
| Poland | 70.2 | 49.7 |
| South Korea | 10.1 | 0.6 |
| Spain | 59.6 | 39.8 |
| Turkey | 39.9 | 24.4 |
| OECD Europe | 60.4 | 42.3 |
| Total OECD | 45.2 | 30.1 |

*2002.

Source: Organization of Economic Cooperation and Development, *Employment Outlook, 2004*.

(removes a chair) a job is destroyed. **JOB CREATION (JOB GAINS)** and **JOB DESTRUCTION (JOB LOSSES)** may be incremental – add a job here, remove one there – or wholesale – open a new factory, shutdown an old one. The absolute magnitudes of job creation and job destruction determine how active the labor market is (whether the halls of the mansion are crowded or empty). The net balance between job creation and destruction determines whether employment is rising or falling (and, in large measure, whether the mood in the hallways is optimistic or dispirited).

The U.S. Census Bureau has recently begun publishing data on U.S. job gains and losses going back to 1992 (Figure 9.12). Earlier data are available, but only for manufacturing.

Considering manufacturing, several facts in Figure 9.12.. First, both job creation and destruction are high at all stages of the business cycle. The average level of job creation is just under 5 percent of employment, while the average level of job destruction is a little over 5 percent. Second, job creation is less variable than job destruction. Job creation ranges from a minimum of about 3 percent to a maximum of about 6 percent, while job destruction ranges from about 3 percent to about 10 percent. Third, job destruction is markedly countercyclical. It rises rapidly in recessions and falls rapidly in expansions. In contrast, job creation is probably best described as acyclical. It falls in some recessions and rises in others, and it shows little marked pattern in expansions.

The data paint a picture of the business cycle in manufacturing as waves of job destruction imposed on a background of steadier job creation. The fact that average rates of job destruction exceed those of job creation implies a secular decline in manufacturing

jobs as a share of total employment – although not, in must be emphasized, a decline in manufacturing output.

The picture describes the manufacturing sector well, but it may be misleading for the economy as a whole. Unlike manufacturing, job creation in the private sector exceeds job destruction on average. We do not have enough data to be sure, but the acyclicity of job creation may also be peculiar to manufacturing. The peculiarities of manufacturing may result from its relatively high rate of technological progress, which is related to its relative decline as a share of total output. It is worth thinking a little more deeply about this.

Technological Progress and the Reallocation of Labor

When using the common tools of macroeconomic analysis, it is easy to think of the economy in a much too neat and simple way. The aggregate labor-supply/labor-demand diagram encourages us to think of *the* labor market, and the production function with a single measure of productivity growth encourages us to think of *homogeneous* output produced by a *single* underlying technology. Yet, we know that both labor and output are heterogeneous and that technological progress varies widely among different sectors of production. The metaphor of the mansion is meant to emphasize the heterogeneity of the labor market.

Variable rates of technological progress encourage high rates of job destruction. The point can be clarified with a simple example. Imagine an economy in which there are two goods: massages and video games. All workers are alike. And initially each worker can deliver either 20 massages or 20 video games. The workers, who are also

consumers, always wish to consume equal numbers of massages and video games.

Starting with 1000 workers, 500 are devoted to giving massages and 500 to producing video games. Real GDP of the economy is 10,000 massages and 10,000 video games. Each worker's consumption bundle is 10 massages and 10 video games.

Massages are not subject to technological progress, since each requires the work of a masseuse for a fixed amount of time. In contrast, we find cleverer and more efficient ways to build video games, just as we have done for all electronic goods. Imagine that there is technological progress in the video-game industry so that each worker can produce 30 instead of 20 video games (a 50 percent increase in productivity). Since workers still wish to consume equal numbers of video games and massages, 500 workers can now produce more video games than the demand warrants. Some workers must shift from video game production to giving massages. What is the economic mechanism behind the shift?

The increased productivity in the manufacture of video games raises the marginal product of workers in that sector, as well as their wages and incomes. Video game workers do not themselves wish to buy all their potential new output. Some of the new demand spills over into the massage sector, raising wages there. The failure of the new demand to keep up with production encourages video-game firms to lay off some workers. (To boost their sales, they may lower the price of video games, which raises the product-real wage, so that firms must cut production to get a marginal product of labor to match the higher real wage.)

Massage firms raise wages to attract more workers to meet higher demand. Higher consumption-real wages are possible even though the marginal physical product

of workers in the massage sector did not rise, because massage firms raise their prices in the face of higher demand. If the nominal wage were not increased, then the higher price of massages would lower the product-real wage below the marginal product of labor. But of course, the fact that product-real wage would be lower is exactly the signal the firm needs both to expand production of massages and to hire more masseuses. In the face of higher demand, massages became more expensive, while video-games became cheaper (reflecting the higher productivity in their production). Workers in both industries ended up with the same real wage.

When all the adjustments are done, 600 workers will produce 12,000 massages and 400 workers will produce 12,000 video games. Each workers' consumption bundle will be 12 video games and 12 massages. Technological progress has in this case destroyed 100 jobs in the video-game industry and created 100 jobs in the massage industry.

The central message of this contrived example is important for understanding the growth of the economy. In general, jobs must flow from the sectors in which productivity grows quickly, such as manufacturing, into sectors in which productivity grows more slowly. It is not possible that productivity can grow perfectly evenly. For example, how could productivity grow in the child-care industry? All productivity growth could mean would be more children per child-care worker. But we would regard that as a degradation of quality rather than an increase in efficiency.

Nor is it possible that the patterns of demand will stay constant over time. Adam Smith (1723-1790), the father of modern economics, made this point in his famous book, *The Wealth of Nations*:

The desire of food is limited in every man by the narrow capacity of the human stomach; but the desire of the conveniences and ornaments of building, dress, equipage, and household furniture, seems to have no limit or certain boundary.¹¹

As people become richer, they devote a smaller proportion of their income to food.¹²

And while there may be no bound for goods in general, one can only use so many cars or stereos or shoes. A growing economy must shift production constantly from one product to another to reflect the changing patterns of demand.

Many people are puzzled over the fact that in the best of economic times, when unemployment rates are low, the television, radio, and newspapers frequently report massive layoffs. Some take this as evidence that there is a hidden weakness in the economy and that all is not as good as the unemployment statistics report. But, as we have seen, such job destruction is an essential part of adapting a more productive economy to patterns of demand that change as income per capita rises.

Job destruction is often dramatic and newsworthy. In a good economy it is most likely to take the form of an obsolete, unproductive factory being shut down in its entirety or a badly run business going bankrupt. Job creation in a booming economy will be a mixture of incremental additions to existing plants or firms and, from time to time, opening new facilities. Employment at new facilities generally starts off at a moderate level and grows slowly as the business prospers. Job destruction, then, is like the crash of an airliner: it affects a large number of people in a short time, generally in a highly unpleasant manner. Job creation is often like incremental improvements in airliner

¹¹ Adam Smith, *The Nature and Causes of the Wealth of Nations*, book I, chapter XI, part II.

¹² This regularity was formulated by the Prussian economist Ernst Engel (1821-96) and is known to economists as *Engel's Law*.

safety: it is hardly noticed at the time, but its cumulative effect is to raise employment steadily, just as airliners have become steadily safer. News reports of airline crash tend to convince people that flying is far more dangerous than it really is. News reports about the labor market tend to convince people that it works against the interest of workers far more than it really does.

Recall from Chapter 6 that the growth of real wages (and real incomes generally) depends on the growth of labor productivity. It is tempting to react to the fact that job destruction outweighs job creation in the high productivity sectors by wanting to stop the process (remember the history of the Luddites). At the same time, people often rail against what they regard as stagnant real wages. One cannot have it both ways. The growth of real wages and job destruction and creation are two aspects of the same growth process.

Wage gains owing to productivity growth are not uniform across all employment. Wage rates depend on education, job-specific skills, relative supplies and demands for specific types of labor, the risks involved in different occupations, and other factors. Still, productivity gains in one sector typically benefit workers in all sectors.

The parable of the video games and the massages applies generally in the actual economy. The prices of manufactured goods have tended to fall rapidly over time. A television in 1960 or a computer in 1980 may have had the same – or, sometimes, even higher – *nominal* price (and, therefore, a much higher *real* price) than the equivalent television or computer today. Yet, the services of a doctor, lawyer, or childcare worker may be much more expensive in real terms now than twenty or forty years ago. These relative price adjustments serve to match demand to unevenly increasing productive

capacities and to spread the benefits of those increasing productive capacities throughout the economy. The constant hum of job destruction and creation is the music to which economic growth marches.

Employment Policy

Once we understand how the labor market works, we can get an idea of what sort of policies are likely to be successful in improving economic outcomes. Policies that attempt to regulate job destruction are likely to be counterproductive, since moving workers between sectors is essential to economic growth. Macroeconomic policies that increase aggregate demand when there is cyclical involuntary unemployment may be helpful. Yet, despite pleas for expansionary monetary and fiscal policies during times of low unemployment, such policies cannot reduce voluntary unemployment and are likely to have little effect on true structural unemployment.

The key to reducing structural unemployment is to improve the match between workers and employers – through training to develop the skills most in demand, through better dissemination of information about where workers and jobs are to be found, and possibly through tax or other incentives to encourage firms to locate in areas with relatively high unemployment.

Even voluntary unemployment may sometimes be a policy concern. Among the voluntarily unemployed are the retired and women (and, increasingly, men) rearing children. A case could even be made that as a society we work too much, that it would be better to consume more leisure and fewer goods. Just as with structural unemployment, reducing voluntary unemployment is not a matter of increasing aggregate

demand. Instead, it requires changing incentives and opportunities for individual people – a more microeconomic than macroeconomic approach.

Summary

1. Workers are voluntarily unemployed when the real wage is lower than their reservation wage, so that they choose not to participate in the labor market. They are involuntarily unemployed when the real wage is at or below their reservation wage, so that they are willing to work but do not have a job.
2. The unemployment rate ideally is the ratio of involuntary unemployment to the labor force. In practice, the unemployment rate never falls to zero, even at the peak of the business cycle, because of measurement problems, workers in inevitable transitions between jobs, and real-wage floors (e.g., due to minimum-wage laws or to firms finding that workers paid above the market-clearing wage are more efficient).
3. The unemployment rate fails to measure all dimensions of employment. Workers may be employed part time or overtime. They may be loosely attached or discouraged (that is, not reported as unemployed, but easily drawn into the labor force when demand is high) or underemployed (that is, working at a job below their potential productivity).
4. The central puzzle of unemployment is why real-wages do not fall far enough or fast enough to eliminate unemployment.
5. The nominal efficiency-wage hypothesis explains the failure of wages to fall sufficiently through the observation that the efficiency of workers may depend on the nominal wage (either because they mistake nominal for real wages (money illusion) or they regard nominal wage cuts as a signal of disapproval from employers or because

- they care about relative economic position rather than just purchasing power). Firms may be reluctant to be the first to cut nominal wages in order to secure a fall in real wages, knowing that a cut will reduce worker efficiency.
6. Unions may inhibit wage adjustments. Insiders to unions may care more about the income effects to the employed (insiders to the union) than about the incentives to firms to hire the unemployed (outsiders).
 7. Government regulations – minimum-wage and prevailing-wage or comparable-worth laws – may inhibit wage adjustments.
 8. Workers and jobs are heterogeneous, so that the labor market is constantly engaged in a process of matching workers to appropriate jobs and workers are constantly moving between jobs and between labor market states: out-of-the-labor-force, employment, and unemployment. Recessions correspond to times when the net flows are into unemployment from the other two states. Expansions to times when the net flows are into employment. In a recession the time the unemployed must typically spend looking for work is longer, even for the same rate of unemployment, than in an expansion.
 9. Firms create and destroy jobs as they shift production to match changing demand and differential rates of productivity growth in different industries. Recessions are times when job destruction rises relative to job creation. Job destruction may also be high in expansions, but job creation is relatively higher.
 10. Workers must be constantly shifted from industries with high rates of technological progress to those with low rates. This process spreads the benefits of productivity

growth among all workers as demand grows disproportionately for the labor of workers in low productivity industries.

11. Macroeconomic (monetary and fiscal) policies may help to reduce involuntary unemployment, but they cannot eliminate voluntary unemployment. Policies that interfere with the process of job creation and destruction are likely to be counterproductive, since growth requires constant reallocation of labor.

Key Concepts

voluntary unemployment

involuntary

full employment

unemployment rate

real efficiency-wage hypothesis

frictional unemployment

underemployment

demand failure

nominal efficiency-wage hypothesis

insider/outsider model of unemployment

Job creation (job gains)

job destruction (job losses)

Suggestions for Further Reading

Bureau of Labor Statistics, *BLS Handbook of Methods*; Chapter 1, “Labor Force Data Derived from the Current Population Survey”

(<http://www.bls.gov/cps/home.htm#publications>); Chapter 2, “Employment, Hours and Earnings from the Establishment Survey”

(<http://www.bls.gov/ces/home.htm#publications>).

Truman F. Bewley, *Why Wages Don't Fall in a Recession*. Cambridge, MA: Harvard University Press, 1999.

George A. Akerlof and Janet L. Yellen, *Efficiency Wage Models of the Labor Market*. Cambridge: Cambridge University Press, 1986.

Steven J. Davis, John C. Haltiwanger, and Scott Schuh, *Job Creation and Destruction*. Cambridge, MA: MIT Press, 1996.

Problems

Data for this exercise are available on the course website under the link for Chapter 9 (**insert web link here**). Before starting these exercises, the student should review the relevant portions of the *Guide to Working with Economic Data*: sections G.8, and G.9.

Problem 9.1. The following are selected data for Australia:

| Year | Labor Force | Employment | Population |
|-------------|--------------------|--------------------|-------------------|
| | (thousands) | (thousands) | (millions) |
| 1986 | 7,588 | 6,974 | 16.02 |
| 1989 | 8,228 | 7,720 | 16.81 |
| 1996 | 9,127 | 8,344 | 19.29 |

- (a) Calculate the unemployment rate for 1996 and the participation rate for 1986.
- (b) If employment is converted to an index number for employment that takes the value of 100 in 1986. What is the value of this index in 1989?

Problem 9.2. Using the labor-supply/labor-demand diagram show how an economy that starts at full employment would generate unemployment through adopting a minimum wage above the market-clearing wage. Discuss how the quantitative effects of the minimum wage depend on the steepness of the labor-supply and labor demand curves. To what economic features of firms or workers do the relative steepnesses correspond? How might this simple analysis tell less than the whole story about minimum wage increases?

Problem 9.3. Starting with data for the minimum wage rate, the average hourly wage rate and the CPI, compute the *real* minimum wage rate and the *real* hourly wage rate. Calculate and plot the minimum wage rate as a share of the average hourly wage rate. Discuss their relationship over time. Is there anything in the data that would suggest that the importance of the minimum wage rate for unemployment might have changed over time?

Problem 9.4. Figure 9.3 showed involuntary part-time employment as a share of all part-time employment. Examine part-time employment in more detail by plotting involuntary and voluntary part-time employment as separate series against the NBER business cycle dates. Compare and discuss their cyclical and secular behavior.

Problem 9.5. Plot average overtime hours (available only for manufacturing industries) against the NBER business cycle dates. Discuss the cyclical and secular behavior of overtime.

Problem 9.6. Recently it has been argued that workers have fared poorly and that real wages have not grown much since the early 1970s. In particular, it has been claimed that workers have not shared in large increases in labor productivity. Let us investigate that claim. [The question has a number of steps: read it carefully before you start and follow the instructions carefully. Your work will be reflected in a single chart involving three series.] One complication is that firms pay workers benefits as well as wages and salaries. These benefits must be included to capture workers *total compensation*. In Figure 6.14 in Chapter 6 you saw that labor productivity increased substantially in the postwar period. And you know that profit maximization implies that real wages should be related positively to labor productivity. If firms raise wages proportionately to higher productivity their labor costs per unit of output will not rise. But this proposition is based on the *product*-real wage, while worker's complaints are based on the *consumption*-real wage. What difference does it make whether we take the firms' or the workers' point of view?

Using the Total Compensation Per Hour" (an index with 1996=100), calculated two real compensation series deflating by the CPI (to get the workers' point of view) and the PPI (to get the consumers' point of view). Rebase each series so that 1950.1 = 100. For productivity use the series Output Per Hour Of All Employees (again an index with 1996=100). Plot the three series on the same chart.

What might account for the difference in real wages using different deflators revealed in your chart? (Hint: think about the relationship of productivity to prices.)

Considering the data in your chart as well as the data on the distribution of factor incomes in the national income and product accounts (Problem 2.1 in Chapter 2) is the popular belief that workers have fared badly in the last 20 to 30 years justified? What aspects of income distribution not revealed in your work so far might bear on issue of how workers have fared?

Problem 9.7. Consider the three scenarios in which compare different annual wage increases under different rates of inflation are compared: (i) inflation is zero and wages fall by 5 percent; (ii) inflation is 5 percent and wages stay constant; (iii) inflation is 10 percent and wages rise at 5 percent.

- For each scenario, choose which wage change you would prefer. Comment on your reasons.
- Ask three friends to do the same.
- For each scenario, calculate the change in the *real* wage. Comment on the results of (a) and (b) in light of your calculations.

Problem 9.8. Plot the data on the unemployment by duration (unemployed for less than 5 weeks, 5-14 weeks, 15-26 weeks, and more than 27 weeks) against the NBER business cycle dates.

- How does turnover of the unemployment pool vary with the business cycle?
- Has the nature of unemployment experiences changed over time?
- What might these data suggest about the persistence of measured unemployment near the peak of a business cycle?

Problem 9.9. Diffusion indices compare the number of industries increasing to the number decreasing employment. Precisely the index is the percentage of industries increasing employment plus one-half the percentage with unchanged unemployment. An index of 50 means that increases and decreases exactly balance. Indices differ according to the period over which the change in employment is measured. Plot the diffusion index for a 12 month change in employment against the NBER business cycle dates. Comment on the cyclical behavior of the diffusion index. Compare the diffusion index to the data on job creation and destruction in Figure 9.12. Do these two variables tell essentially the same story about employment and the business cycle?

Problem 9.10. Section 9.3.3 discusses the relationship of employment to productivity and the relative prices of goods. Make three charts: (i) plot the productivity indices for nonfarm business, durable goods manufacturing, and nondurable goods manufacturing; (ii) plot the CPI for all items, durables, nondurables, and services; (iii) calculate and plot employment in durable, nondurable, and service industries as a share of employment in nonfarm establishments. (Hint: express shares in (iii) as percentages.) How well do the data conform to the analysis of Section 9.3.3?