CHAPTER 6 Unemployment

Questions for Review

1. The rates of job separation and job finding determine the natural rate of unemployment. The rate of job separation is the fraction of people who lose their job each month. The higher the rate of job separation, the higher the natural rate of unemployment. The rate of job finding is the fraction of unemployed people who find a job each month. The higher the rate of job finding, the lower the natural rate of unemployment.

2. Frictional unemployment is the unemployment caused by the time it takes to match workers and jobs. Finding an appropriate job takes time because the flow of information about job candidates and job vacancies is not instantaneous. Because different jobs require different skills and pay different wages, unemployed workers may not accept the first job offer they receive.

   In contrast, structural unemployment is the unemployment resulting from wage rigidity and job rationing. These workers are unemployed not because they are actively searching for a job that best suits their skills (as in the case of frictional unemployment), but because at the prevailing real wage the supply of labor exceeds the demand. If the wage does not adjust to clear the labor market, then these workers must wait for jobs to become available. Structural unemployment thus arises because firms fail to reduce wages despite an excess supply of labor.

3. The real wage may remain above the level that equilibrates labor supply and labor demand because of minimum wage laws, the monopoly power of unions, and efficiency wages.

   Minimum-wage laws cause wage rigidity when they prevent wages from falling to equilibrium levels. Although most workers are paid a wage above the minimum level, for some workers, especially the unskilled and inexperienced, the minimum wage raises their wage above the equilibrium level. It therefore reduces the quantity of their labor that firms demand, and an excess supply of workers—that is, unemployment—results.

   The monopoly power of unions causes wage rigidity because the wages of unionized workers are determined not by the equilibrium of supply and demand but by collective bargaining between union leaders and firm management. The wage agreement often raises the wage above the equilibrium level and allows the firm to decide how many workers to employ. These high wages cause firms to hire fewer workers than at the market-clearing wage, so structural unemployment increases.

   Efficiency-wage theories suggest that high wages make workers more productive. The influence of wages on worker efficiency may explain why firms do not cut wages despite an excess supply of labor. Even though a wage reduction decreases the firm's wage bill, it may also lower worker productivity and therefore the firm's profits.

4. Depending on how one looks at the data, most unemployment can appear to be *either* short term or long term. Most spells of unemployment are short; that is, most of those who became unemployed find jobs quickly. On the other hand, most weeks of unemployment are attributable to the small number of long-term unemployed. By definition, the long-term unemployed do not find jobs quickly, so they appear on unemployment rolls for many weeks or months.

5. Economists have proposed at least two major hypotheses to explain the increase in the natural rate of unemployment in the 1970s and 1980s, and the decrease in the natural rate in the 1990s and 2000s. The first is the changing demographic composition of the labor force. Because of the post–World-War-II baby boom, the number of young workers

rose in the 1970s. Young workers have higher rates of unemployment, so this demographic shift should tend to increase unemployment. In the 1990s, the baby-boom workers aged and the average age of the labor force increased, thus lowering the average unemployment rate.

The second hypothesis is based on changes in the prevalence of sectoral shifts. The greater the amount of sectoral reallocation of workers, the greater the rate of job separation and the higher the level of frictional unemployment. The volatility of oil prices in the 1970s and 1980s is a possible source of increased sectoral shifts; in the 1990s and early 2000s, oil prices were more stable.

The proposed explanations are plausible, but neither seems conclusive on its own.

Problems and Applications

1. a. In the example that follows, we assume that during the school year you look for a part-time job, and that on average it takes 2 weeks to find one. We also assume that the typical job lasts 1 semester, or 12 weeks.

   b. If it takes 2 weeks to find a job, then the rate of job finding in weeks is:

   $$f = (1 \text{ job}/2 \text{ weeks}) = 0.5 \text{ jobs/week}.$$

   If the job lasts for 12 weeks, then the rate of job separation in weeks is:

   $$s = (1 \text{ job}/12 \text{ weeks}) = 0.083 \text{ jobs/week}.$$

   c. From the text, we know that the formula for the natural rate of unemployment is

   $$(U/L) = (s/(s+f)),$$

   where U is the number of people unemployed and L is the number of people in the labor force.

   Plugging in the values for f and s that were calculated in part (b), we find:

   $$(U/L) = (0.083/(0.083 + 0.5)) = 0.14.$$

   Thus, if on average it takes 2 weeks to find a job that lasts 12 weeks, the natural rate of unemployment for this population of college students seeking part-time employment is 14 percent.

2. To show that the unemployment rate evolves over time to the steady-state rate, let's begin by defining how the number of people unemployed changes over time. The change in the number of unemployed equals the number of people losing jobs (sE) minus the number finding jobs (fU). In equation form, we can express this as:

   $$U_{t+1} - U_t = \Delta U_{t+1} = sE_t - fU_t.$$

   Recall from the text that $L = E_t + U_t$, or $E_t = L - U_t$, where L is the total labor force (we will assume that L is constant). Substituting for E_t in the above equation, we find:

   $$\Delta U_{t+1} = s(L - U_t) - fU_t.$$

   Dividing by L, we get an expression for the change in the unemployment rate from t to $t + 1$:

   $$\Delta U_{t+1}/L = (U_{t+1}/L) - (U_t/L) = \Delta[U/L]_{t+1} = s(1 - U_t/L) - fU_t/L.$$

   Rearranging terms on the right-hand side of the equation above, we end up with line 1 below. Now take line 1 below, multiply the right-hand side by $(s + f)/(s + f)$ and rearrange terms to end up with line 2 below:

   $$\Delta[U/L]_{t+1} = s - (s + f)U_t/L$$
   $$= (s + f)[s/(s + f) - U_t/L].$$

The first point to note about this equation is that in steady state, when the unemployment rate equals its natural rate, the left-hand side of this expression equals zero. This tells us that, as we found in the text, the natural rate of unemployment $(U/L)^n$ equals $s/(s + f)$. We can now rewrite the above expression, substituting $(U/L)^n$ for $s/(s + f)$, to get an equation that is easier to interpret:

$$\Delta[U/L]_{t+1} = (s + f)[(U/L)^n - U_t/L].$$

This expression shows the following:

- If $U_t/L > (U/L)^n$ (that is, the unemployment rate is above its natural rate), then $\Delta[U/L]_{t+1}$ is negative: the unemployment rate falls.
- If $U_t/L < (U/L)^n$ (that is, the unemployment rate is below its natural rate), then $\Delta[U/L]_{t+1}$ is positive: the unemployment rate rises.

This process continues until the unemployment rate U/L reaches the steady-state rate $(U/L)^n$.

3. Call the number of residents of the dorm who are involved I, the number who are uninvolved U, and the total number of students $T = I + U$. In steady state the total number of involved students is constant. For this to happen we need the number of newly uninvolved students, $(0.10)I$, to be equal to the number of students who just became involved, $(0.05)U$. Following a few substitutions:

$$\begin{aligned}(0.05)U &= (0.10)I \\ &= (0.10)(T - U),\end{aligned}$$

so

$$\begin{aligned}\frac{U}{T} &= \frac{0.10}{0.10 + 0.05} \\ &= \frac{2}{3}.\end{aligned}$$

We find that two-thirds of the students are uninvolved.

4. Consider the formula for the natural rate of unemployment,

$$\frac{U}{L} = \frac{s}{s + f}.$$

If the new law lowers the chance of separation s, but has no effect on the rate of job finding f, then the natural rate of unemployment falls.

For several reasons, however, the new law might tend to reduce f. First, raising the cost of firing might make firms more careful about hiring workers, since firms have a harder time firing workers who turn out to be a poor match. Second, if searchers think that the new legislation will lead them to spend a longer period of time on a particular job, then they might weigh more carefully whether or not to take that job. If the reduction in f is large enough, then the new policy may even increase the natural rate of unemployment.

5. a. The demand for labor is determined by the amount of labor that a profit-maximizing firm wants to hire at a given real wage. The profit-maximizing condition is that the firm hire labor until the marginal product of labor equals the real wage,

$$MPL = \frac{W}{P}.$$

The marginal product of labor is found by differentiating the production function with respect to labor (see Chapter 3 for more discussion),

$$\begin{aligned} MPL &= \frac{dY}{dL} \\ &= \frac{d(K^{1/3}L^{2/3})}{dL} \\ &= \frac{2}{3} K^{1/3}L^{-1/3}. \end{aligned}$$

In order to solve for labor demand, we set the MPL equal to the real wage and solve for L:

$$\begin{aligned} \frac{2}{3} K^{1/3}L^{-1/3} &= \frac{W}{P} \\ L &= \frac{8}{27} K\left(\frac{W}{P}\right)^{-3}. \end{aligned}$$

Notice that this expression has the intuitively desirable feature that increases in the real wage reduce the demand for labor.

b. We asume that the 1,000 units of capital and the 1,000 units of labor are supplied inelastically (i.e., they will work at any price). In this case we know that all 1,000 units of each will be used in equilibrium, so we can substitute them into the above labor demand function and solve for $\frac{W}{P}$.

$$\begin{aligned} 1{,}000 &= \frac{8}{27} 1{,}000\left(\frac{W}{P}\right)^{-3} \\ \frac{W}{P} &= \frac{2}{3}. \end{aligned}$$

In equilibrium, employment will be 1,000, and multiplying this by 2/3 we find that the workers earn 667 units of output. The total output is given by the production function:

$$\begin{aligned} Y &= K^{1/3}L^{2/3} \\ &= 1{,}000^{1/3}1{,}000^{2/3} \\ &= 1{,}000. \end{aligned}$$

Notice that workers get two-thirds of output, which is consistent with what we know about the Cobb–Douglas production function from Chapter 3.

c. The congressionally mandated wage of 1 unit of output is above the equilibrium wage of 2/3 units of output.

d. Firms will use their labor demand function to decide how many workers to hire at the given real wage of 1 and capital stock of 1,000:

$$\begin{aligned} L &= \frac{8}{27} 1{,}000(1)^{-3} \\ &= 296, \end{aligned}$$

so 296 workers will be hired for a total compensation of 296 units of output. To find the new level of output, plug the new value for labor and the value for capital into the production function and you will find $Y = 444$.

e. The policy redistributes output from the 704 workers who become involuntarily unemployed to the 296 workers who get paid more than before. The lucky workers benefit less than the losers lose as the total compensation to the working class falls from 667 to 296 units of output.

f. This problem does focus the analysis of minimum-wage laws on the two effects of these laws: they raise the wage for some workers while downward-sloping labor demand reduces the total number of jobs. Note, however, that if labor demand is less elastic than in this example, then the loss of employment may be smaller, and the change in worker income might be positive.

6. a. The labor demand curve is given by the marginal product of labor schedule faced by firms. If a country experiences a reduction in productivity, then the labor demand curve shifts to the left as in Figure 6–1. If labor becomes less productive, then at any given real wage, firms demand less labor.

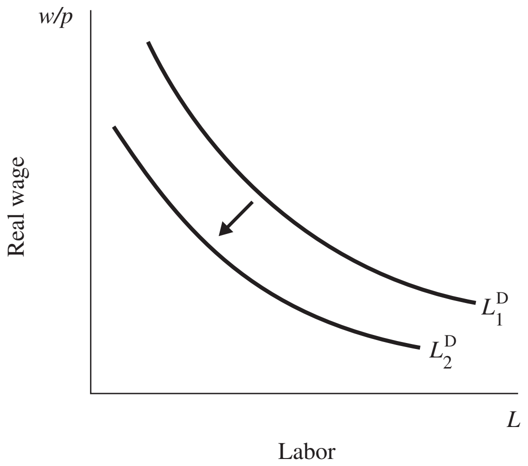

Figure 6–1

b. If the labor market is always in equilibrium, then, assuming a fixed labor supply, an adverse productivity shock causes a decrease in the real wage but has no effect on employment or unemployment, as in Figure 6–2.

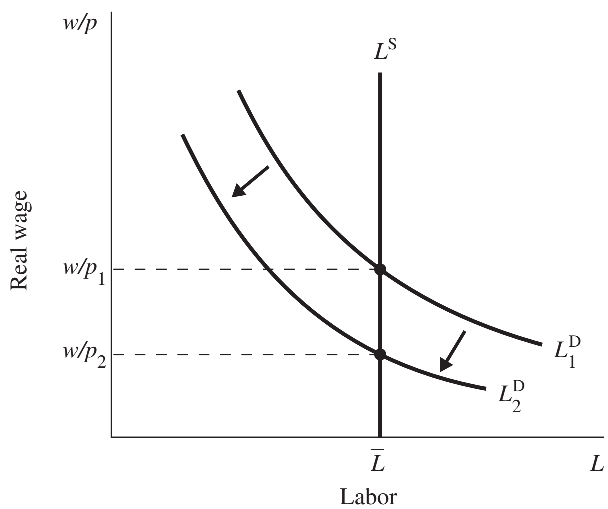

Figure 6–2

c. If unions constrain real wages to remain unaltered, then as illustrated in Figure 6–3, employment falls to L_1 and unemployment equals $\overline{L} - L_1$.

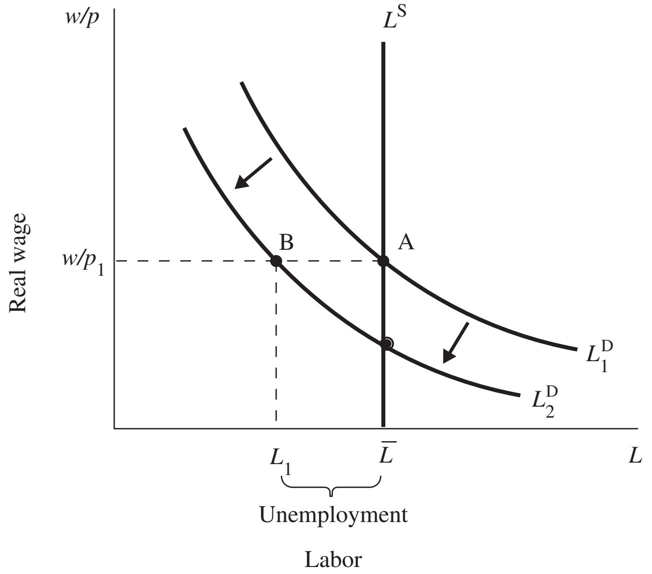

Figure 6–3

This example shows that the effect of a productivity shock on an economy depends on the role of unions and the response of collective bargaining to such a change.

7. Real wages have risen over time in both the United States and Europe, increasing the reward for working (the substitution effect) but also making people richer, so they want to "buy" more leisure (the income effect). If the income effect dominates, then people want to work less as real wages go up. This could explain the European experience, in which hours worked per employed person have fallen over time. If the income and substitution effects approximately cancel, then this could explain the U.S. experience, in which hours worked per person have stayed about constant. Economists do not have good theories for why tastes might differ, so they disagree on whether it is reasonable to think that Europeans have a larger income effect than do Americans.

8. The vacant office space problem is similar to the unemployment problem; we can apply the same concepts we used in analyzing unemployed labor to analyze why vacant office space exists. There is a rate of office separation: firms that occupy offices leave, either to move to different offices or because they go out of business. There is a rate of office finding: firms that need office space (either to start up or expand) find empty offices. It takes time to match firms with available space. Different types of firms require spaces with different attributes depending on what their specific needs are. Also, because demand for different goods fluctuates, there are "sectoral shifts"—changes in the composition of demand among industries and regions—that affect the profitability and office needs of different firms.