Chapter 14
Unemployment

Summary

As will be discussed in Chapter 15, the widespread introduction of new technology has brought new employment opportunities and rising relative wages to those with the highest levels of human capital. However, this new technology has also helped to bring about higher than normal job losses, particularly among unskilled workers, and has put a premium on being able to adapt to new workplace challenges. The result has been that unemployment, or the fear of unemployment, has touched the lives of more and more people. While the national unemployment rate is often viewed as being determined solely by macroeconomic forces, it clearly has a number of important microeconomic determinants. The purpose of Chapter 14 is to present an analysis of the phenomenon of unemployment from a microeconomic perspective.

The national unemployment rate is one of the most visible and closely-watched indicators of aggregate economic well-being. To understand its microeconomic determinants, it is first necessary to understand how it is measured. As noted in Chapter 2, the population (POP) aged 16 or over can be divided into those in the labor force (L) and those not in the labor force (N). The labor force consists of all those who are employed for pay (E), actively seeking work, or waiting to be recalled from layoff. Those actively seeking work or waiting to be recalled from layoff are classified as unemployed (U). Therefore, if the population can be defined as the sum of L and N, the labor force can be defined as the sum of E and U. The unemployment rate (u) is defined as the ratio of U to L. The data on U and L come from the Current Population Survey, a national survey of over 60,000 households conducted monthly.

As a measure of economic hardship, the unemployment rate has a number of drawbacks, some of which have been discussed in previous chapters. For example, the unemployment rate actually decreases when those who search unsuccessfully for work give up the search. The rate also does not distinguish between part-time and full-time work, nor does it distinguish whether the unemployed person is the primary source of their family’s income. The unemployment rate may also give very little indication as to the employment rate (e)—the fraction of the total population that is employed. The reason is that the employment rate is related to the unemployment rate via the equation

\[ e = \text{lfp} \ (1 - u), \]

where \( \text{lfp} \) denotes the labor force participation rate, the ratio of the labor force to the population. If the labor force participation rate is growing rapidly, the employment rate can increase at the same time the unemployment rate is rising. If one keeps in mind these limitations, the unemployment rate can still be a useful indicator of labor market conditions.

The microeconomic determinants of the unemployment rate are best understood within the context of the flows of people over any given period between different labor market categories. Letting \( P_{ij} \) represent the proportion of individuals in labor market state \( i \) that flow to labor market state \( j \) during the period, where the labor market states are employment (e), unemployment (u), and not in the labor force (n), under certain conditions the unemployment rate can be expressed as a function (F) of these flows where

\[ u = F(P_{en}, P_{ne}, P_{ue}, P_{ue}, P_{un}, P_{ue}). \]
The sign over each proportion indicates the effect of an increase in that particular proportion on the unemployment rate, holding all else constant. An intuitive understanding for each of the effects can be obtained by using the definition of the unemployment rate. For example, an increase in the flow from $e$ to $n$ raises the unemployment rate because it leaves the numerator of the unemployment rate unchanged but reduces the denominator. The stock flow model shows that even when the unemployment rate is not changing, significant changes are still taking place in the labor market.

The values of $P_{ij}$, if computed using monthly data, are also referred to as average monthly transition probabilities. Data on the proportions for particular demographic groups can be useful in understanding why unemployment rates vary across groups. For example, the relatively high unemployment rate for teenagers is due to relatively high flows from $e$ to $n$ and from $e$ to $u$. This suggests that the unemployment problem is not so much a lack of jobs but an inability or unwillingness to keep a job. By using the stock flow model to pinpoint the cause of a group’s unemployment rate, it may be possible to design a more appropriate policy for lowering the group’s unemployment rate. For example, since teenagers have trouble holding jobs, not finding them, a program of job search assistance would have little impact on that group. Such a program would be more appropriate for a group that has a relatively low probability of moving from unemployment to employment. Teenagers would be better served by attempts to promote on-the-job training (perhaps by lowering the minimum wage for teens).

The stock flow model can also be helpful in understanding the various types or categories of unemployment. **Frictional** unemployment occurs because labor market information is imperfect. Even when labor markets are in equilibrium, it may take time for job seekers to fill the available job vacancies. These market imperfections reduce the proportion of people flowing from $u$ to $e$ and so raise the unemployment rate.

Additional insights into the determinants of unemployment can be obtained using a model of the job search process. The following example illustrates one such model.

**Example**

Consider a labor market where employers differ in the level of skill ($K$) that they require, where $K$ ranges from 1 to 3. Each employer then pays a wage equal to the skill level of the job multiplied by 10. Assuming for simplicity that there is an equal proportion of employers at every wage level, the distribution of wage offers can be represented by the function $f(W)$ in Figure 14-1. Such a probability distribution is called a **uniform distribution** since the wage offers are spread evenly over the range $10$ to $30$. A wage drawn at random from this distribution would be equally likely to take on any of the values between $10$ and $30$. Note that the height of the distribution is constant at $1/(30 − 10)$ or $0.05$. This ensures that the area under the distribution equals one, a requirement of any probability distribution.
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Note that the probability distribution need not (and is probably not) uniform; the text illustrates the same model with a non-uniform distribution. The uniform distribution is used in this example for simplicity.

Now consider an unemployed individual with a skill level of $K^* = 2$. Since no firm will hire a worker that does not meet its requirements, the highest wage this worker can expect to be offered is $20. This also means that if the person does not know the skill level associated with any particular employer, and instead searches randomly over all the firms in this labor market, the probability of receiving an offer is only 50%. The other 50% of the distribution (the area of the distribution to the right of $W = 20$) represents positions that are unattainable. Note that the total or cumulative probability associated with any particular wage range on the graph can be found by computing the area under $f(W)$.

Given the applicant’s situation, the ideal result would be to instantly receive a job offer of $20. In such a situation, the applicant would receive his or her highest attainable wage without incurring the costs associated with job search. But what if the first offer is not $20 but something lower? Assuming offers cannot be accumulated, rejecting the offer means that there is still the chance of receiving an offer closer to $20$, but the person will have to bear the costs of additional job search for at least another period. One way to proceed in such a situation is to adopt a reservation wage strategy. In such a strategy, the person picks a lower bound below which any offers will be rejected. Note that deliberately ruling out a certain range of lower wage offers will further reduce the probability of receiving any offer, and so increase the likelihood a person would have to incur additional job search costs. However, such a lower bound will also increase the wage that the person can eventually expect to receive. In general then, the reservation wage ($W_R$) should be set at the level where the expected benefit from additional job search just equals the additional cost.

Given the distribution of wage offers in Figure 14-1, what is the expected benefit from additional job search? The expected benefit can be thought of as the probability that a new offer will exceed $W_R$ multiplied by the average gain that can be expected when it does. Using $W_R$ as the reference point, what is the probability that a new offer will exceed $W_R$? Note that if $W_R$ were set at $10$, the probability of getting a better offer on the next job search attempt is 50%. On the other hand, if the reservation wage were set at $20$, the probability of getting a better offer is zero (given the skill level of this individual). Hence, for reservation wages between $10$ and $20$ the probability ($P$) of getting a better offer can be written as

$$P = \frac{20 - W_R}{20}.$$

What is the average gain that can be expected from such an offer? Since the average wage in the interval between $W_R$ and $20$ can be written as $(W_R + 20)/2$, this wage would represent a gain ($G$) over $W_R$ of

$$G = \frac{W_R + 20}{2} - W_R \Rightarrow G = \frac{W_R + 20 - 2W_R}{2} \Rightarrow G = \frac{20 - W_R}{2}.$$

Multiplying $G$ by $P$ yields the expected gain from additional job search ($EG$)

$$EG = (P)(G) = \frac{20 - W_R}{20} \times \frac{20 - W_R}{2} \Rightarrow EG = \frac{(20 - W_R)^2}{40}.$$

Assuming for simplicity that the marginal cost of an additional period of job search is constant at $2$, the optimal value for the reservation wage occurs where

$$\frac{(20 - W_R)^2}{40} = 2 \Rightarrow W_R = 20 - \sqrt{80} = \$11.06.$$
A few implications follow directly from this exercise. Note that by setting a reservation wage of $11.06, the individual deliberately reduces his or her chances of a job offer from 0.5 to \((20 - 11.06) (0.05) = 0.447\). If everyone did this, it would reduce the proportion of people flowing from unemployment to employment in any period (lower \(P_{ue}\)) and so raise the unemployment rate. Once the reservation wage is set, the actual wage drawn from the acceptable range is a matter of luck. Virtually every individual, however, will ultimately be underemployed in the sense that the job offer accepted will involve a hiring standard less than the individual’s skill level.

Anything that decreases the marginal cost of another period of job search will tend to increase the reservation wage and reduce the probability of a job offer. Hence unemployment insurance benefits can be expected to increase the duration of unemployment and slow the proportion of people flowing from \(u\) to \(e\). On the other hand, an increased reservation wage does lead, on average, to higher post-unemployment wages less underemployment. Over time, better job matches help to reduce employee turnover and so reduce the proportion of people flowing from \(e\) to \(u\), thus reducing the unemployment rate.

An increase in an individual’s skill level will have an ambiguous effect on the probability of a job offer. On one hand, a higher skill level increases the proportion of jobs for which the individual is qualified. On the other hand, a higher skill level will also induce the person to raise the reservation wage. While higher skill levels clearly lead to higher expected wages, the effect on the probability of flowing from unemployment to employment is unclear.

The job search model serves as a reminder that a certain amount of unemployment is a normal part of any dynamic labor market where there is imperfect information.

The proportion of people flowing from \(u\) to \(e\) is also reduced in the case of structural unemployment. This type of unemployment stems from changing patterns of demand that occur in the context of both rigid real wages and high costs of occupational or geographic mobility. For example, if the demand for labor is high in one state and low in another, both wages and unemployment rates with vary between the states. Workers will eventually move in response to this wage gap, but this will take time. The same thing is true about demand for labor and wages between different industries. Workers will eventually retrain and “move” between industries, but it will take time.

Structural unemployment can also arise when some firms follow efficiency wage strategies. In such situations, some workers may choose to wait for jobs in the high-wage sector as opposed to filling vacancies in the low-wage sector. Empirical support for the efficiency wage theory can be found in the empirical finding known as the wage curve. This robust empirical relationship shows a negative relationship between local unemployment rates and the level of wages, not the positive relationship predicted by the standard supply and demand model. The efficiency wage theory is consistent with this finding because when unemployment is high, shirking tends to fall, thus reducing the need for wage premiums that exceed the market wage.

Demand deficient (cyclical) unemployment refers to the excess supply of labor that is created when the aggregate demand for labor declines and the real wage is inflexible downward. Note that as firms cut back on employment in response to the demand shift, the proportion of workers flowing from \(e\) to \(u\) in the stock flow model increases and the unemployment rate rises. As firms reduce the rate at which they replace those who quit and retire, the proportion flowing from \(u\) to \(e\) and from \(n\) to \(e\) will also be reduced, further increasing the unemployment rate.

While real wages will fall when prices rise, all other things equal, nominal wages tend to be very inflexible downward. This in turn means that if prices are not rising, the real wage cannot fall. There are many reasons why nominal wages are inflexible downward. Unions resist nominal wage cuts (and may be more concerned with insiders, those within the union or with seniority than outsiders, nonmembers or those who have been laid off). Firms have an incentive to lay off less-experienced workers rather than cut wages across the board and risk losing workers with more specific human capital. There is asymmetric information,
and workers may view layoffs as a more credible signal that the firm is really in trouble than a claim by management that wages must be cut for the good of the firm. Risk aversion by workers may mean that they prefer a constant income stream with greater risk of layoffs to the variable income stream that would result from nominal wage cuts. Additionally, workers who care about status may prefer unemployment for some period to accepting a job at a low-wage firm, and thus there may not be downward pressure on wages.

Firms pay a payroll tax in order to finance unemployment insurance, and the tax payment is based on the worker’s income, the state the firm is in, the industry the firm is in, and the firm’s layoff experience. One reason employers may prefer temporary layoffs to wage reductions is the imperfect experience rating of the unemployment insurance (UI) payroll tax. Firms with a history of frequent layoffs would be expected to have to offer workers a compensating wage differential to equate their expected earnings with those from lower paying jobs that do not have frequent spells of unemployment. The availability of unemployment benefits helps fill this gap, reducing the necessary compensating differential. With imperfect experience rating—most notably, maximum tax rates—the unemployment taxes paid by employers who frequently lay off workers will be inadequate to cover benefit claims of their employees. In effect, these employers (and indirectly, their employees) are subsidized by those employers with less frequent layoffs. Therefore, the structure of the UI tax system enhances the attractiveness of layoffs and should be expected to increase the proportion of people flowing from \( e \) to \( u \) over any given period, thus increasing the unemployment rate.

Unemployment resulting from a demand decrease and downwardly rigid real wages is often categorized as seasonal unemployment if the decrease in demand follows a systematic and predictable pattern over the course of a year. If these periods of unemployment cause workers to consume more leisure than desired, Appendix 8A showed that firms using predictable but excessive temporary layoffs would have to pay a compensating differential to attract workers. Again, the size of those differentials is muted by the availability of unemployment insurance benefits. The existence of such differentials makes seasonal unemployment difficult to evaluate from a normative perspective since one could argue that it is the result of voluntary choice.

The level of unemployment that tends to prevail in “normal” times is called the full-employment or natural rate of unemployment. The full-employment rate refers to the rate of unemployment associated with zero excess demand for labor. The full-employment rate was considered to be in the 5.5% to 6% range until fairly recently. But recent experience with unemployment consistently below 5% and no significant inflation is causing economists to reconsider what the natural rate might be. Reasons for changes in the natural rate include demographic shifts, such as the number of teenagers in the work force, as well as institutional factors.

Unemployment rates above the full-employment rate lead to significant reductions in national output. One estimate, generally known as Okun’s Law, states that every one percentage point decline in the aggregate unemployment rate is associated with a 3 percentage point increase in the output of the United States. More recent estimates suggest that a 2 percentage point increase in output is more accurate, but regardless, it is clear that unemployment results in a large cost due to forgone output.

### Review Questions

Choose the letter that represents the **BEST** response.

#### The Measurement of Unemployment

1. If the number of unemployed workers equals 15 and the number of employed workers equals 135, the unemployment rate equals
   a. 10%.
   b. 11.1%.
   c. 12.5%
   d. 15%.