The Wealth of Nations: Employment and Unemployment

Alexander Quispe

May 6, 2022

Introduction

What happens to employment and unemployment if local employers go out of business?

Massive economic shocks sometimes sweep across the global economy. Falling stock prices, falling real estate prices, financial crises, and pandemics can slow growth in GDP or, in the most extreme cases, cause a sharp *drop* in economic output, generating *negative* growth in GDP.

Introduction

The recession of 2020 was a heartbreaking example of such an event. During this crisis COVID-19 infections rapidly spread across the globe, leading to a global pandemic, millions of deaths, and a sharp drop in economic activity. Firms suddenly had only online customers and demand for their output — especially services that involved in-person consumption, like restaurant meals, music concerts, hotel stays, or plane travel — temporarily vanished almost completely.

Introduction

How rapidly did employment fall? How rapidly did wages fall? What do these patterns of employment and wage changes tell us about how the labor market functions in an economic contraction?

In this lecture, we study the determinants of employment and unemployment.

Outline

Key ideas

- Potential workers fall into three categories: **employed, unemployed, and not in the labor force**.
- The level of employment and the level of wages are determined by firms' labor demand, workers' labor supply, and various wage rigidities.
- Frictional unemployment arises because it takes time for an unemployed worker to learn about the condition of the labor market and find a new job.
- Structural unemployment arises because wage rigidities prevent the quantity of labor demanded from matching the quantity of labor supplied.
- Cyclical unemployment is the difference between the unemployment rate and its long-term average.

1. Measuring Employment and Unemployment

For most people, enduring a long period of unemployment takes a terrible toll on their well-being. Long-term unemployment generates four simultaneous traumas: a loss of income, skills, social interaction, and perceived self-worth.
Because of its enormous economic and social costs, policymakers try to limit the amount of unemployment in an economy. To do so, they must have a way of measuring and tracking unemployment over time.

1. Measuring Employment and Unemployment

Unfortunately, just measuring unemployment is challenging.
For example, it seems reasonable that a 30-year-old without a job who is actively looking for work should count as unemployed. But should we also count another 30-year-old who has lost a job but has decided **not** to look for work?
What about full-time college students or stay-at-home parents: people who are busy and work hard but don't receive a paycheck for their labor?
Economists have agreed on a standard, though imperfect, way of defining employment and unemployment. In the United States, this standard is set by the Bureau of Labor Statistics in the Department of Labor, which tracks the official employment statistics for the U.S. economy. We describe the Bureau of Labor Statistics definition here

1. Measuring Employment and Unemployment

CLASSIFYING POTENTIAL WORKERS

- The first step in measuring unemployment is to determine the population of interest.
- The group typically tracked for this purpose includes everyone in the general population with three exceptions: children under 16 years of age, people on active duty in the military, and people who are living in institutions where the residents have restricted mobility (for instance, facilities that provide long-term medical care or prisons).
- The Bureau of Labor Statistics calls the remaining population as the population of **potential workers**. In January 2020, just before the onset of the 2020 recession, the United States had 259.5 million potential workers.

1. Measuring Employment and Unemployment

- In the population of potential workers, people are classified into one of three categories: “**employed**”, “**unemployed**”, or “**not in the labor force.**”

* **EMPLOYED**:
  - Those holding full-time or part-time paid jobs are officially classified as employed. In other words, as long as a person works for pay at least part-time, she is classified as employed. Using the official definition, in January 2020, there were 157.0 million employed workers in the United States.

1. Measuring Employment and Unemployment

* **UNEMPLOYED**:
  - Potential workers are classified as unemployed if they do not have a paid job, have actively looked for work in the prior four weeks, and are currently available for work.
  - This definition of unemployment makes it easy to classify the workers. Laid-off workers are only considered unemployed if they are actively looking for a new job.
  - Similarly, students and parents who don't have a paid job are only considered unemployed if they are **actively** looking for a job and are **currently** available to work (even part time).
  - In January 2020, there were 6.5 million unemployed workers in the United States.

1. Measuring Employment and Unemployment

* **LABOR FORCE**:
  - The labor force is the sum of all employed and unemployed workers:

$$Labor\ force = Employed + Unemployed$$

* **NOT IN THE LABOR FORCE**:
  - Finally, all potential workers who don't fit the criteria for being employed or unemployed are classified as "not in the labor force."
  - People in this category are potential workers who don't have a paid job and aren't looking for one, such as stay-at-home parents, disabled workers, many retirees, and many students.
  - In January 2016, 94.1 million potential workers were not in the labor force.

1. Measuring Employment and Unemployment

Figure: The Composition of the U.S. Population of Potential Workers (January 2020)

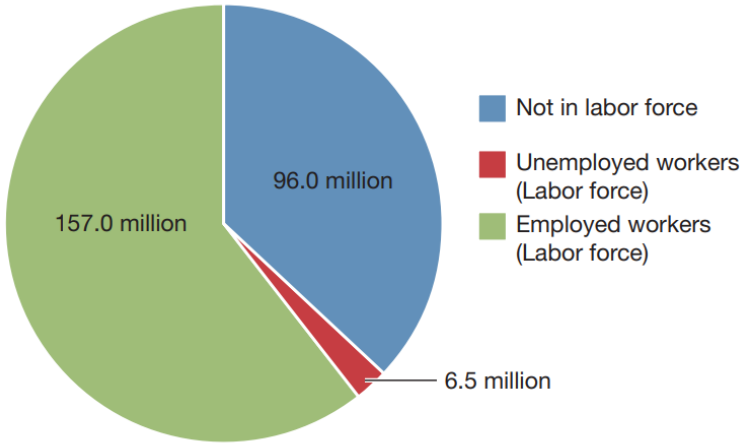


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 238

1. Measuring Employment and Unemployment

- In the Figure above, the number of potential workers is 259.5 million people—otherwise known as the civilian non-institutional population 16 years old and older.
- Potential workers can be divided into three subgroups: employed workers (157.0 million), unemployed workers (6.5 million), and those not in the labor force (96.0 million). The labor force is the combination of the employed and unemployed workers (163.5 million)

1. Measuring Employment and Unemployment

CALCULATING THE UNEMPLOYMENT RATE

- Using these classifications, economists calculate a number of statistics to describe the labor market.
- The **unemployment rate** is defined as the percentage of the labor force that is unemployed:

$$\begin{aligned} \textit{Unemployed rate} &= 100\% \times \frac{\textit{Unemployed}}{\textit{Labor force}} \\ &= 100\% \times \frac{\textit{Unemployed}}{\textit{Employed} + \textit{Unemployed}} \end{aligned}$$

1. Measuring Employment and Unemployment

- Similarly, the **labor force participation rate** is defined as the percentage of potential workers who are in the labor force:

$$\textit{Labor force participation rate} = 100\% \times \frac{\textit{Labor force}}{\textit{Potential workers}}$$

1. Measuring Employment and Unemployment

- Using these equations and our numbers from before, we can calculate what the labor force, unemployment rate, and labor force participation rate were in January 2020.

$$
\begin{aligned}
\textit{Labor force} &= \textit{Employed} + \textit{Unemployed} \\
&= 157.0\ \textit{million} + 6.5\ \textit{million} \\
&= 163.5\ \textit{million} \\
\textit{Unemployed rate} &= 100\% \times \frac{\textit{Unemployed}}{\textit{Labor force}} \\
&= 100\% \times \frac{6.5\ \textit{million}}{163.5\ \textit{million}} \\
&= 4.0\% \\
\textit{Labor force participation rate} &= 100\% \times \frac{\textit{Labor force}}{\textit{Potential workers}} \\
&= 100\% \times \frac{163.5\ \textit{million}}{259.5\ \textit{million}} \\
&= 63.0\%
\end{aligned}
$$

1. Measuring Employment and Unemployment

TRENDS IN THE UNEMPLOYMENT RATE

- As the overall economy fluctuates, so does the unemployment rate. When the overall economy suffers a recession—a period in which GDP falls—the unemployment rate tends to rise. During typical U.S. recessions, the unemployment rate reaches a level between 6 percent and 9 percent. When the economy is healthy and expanding, the unemployment rate eventually reaches a level between 3 percent and 5 percent.
- Severe recessions produce the largest increases in the unemployment rate. For example, in early 2007—before the start of the recession later that year—the U.S. unemployment rate hovered around 4.5 percent. The 2007–2009 recession led to a sharp rise in the unemployment rate and a peak rate of 10.0 percent in October 2009. During the Great Depression of the 1930s—the most severe contraction of the U.S. economy in the twentieth century—the unemployment rate reached 25 percent.

1. Measuring Employment and Unemployment

- During the COVID recession (which started in February 2020 in the United States), the unemployment rose from 3.5 percent in February to a peak of 14.7 percent in April. This extraordinarily steep increase in unemployment makes the COVID recession the deepest economic contraction since the Great Depression.

1. Measuring Employment and Unemployment

Figure: The U.S. Unemployment Rate Since 1948

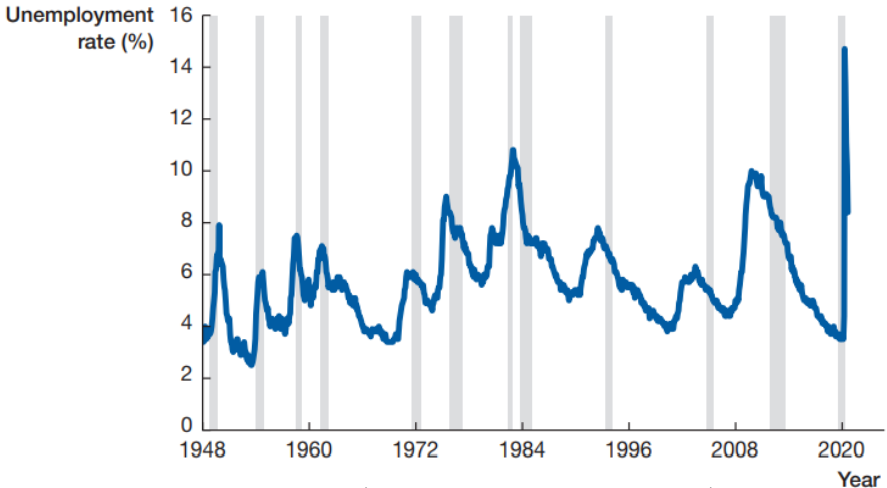


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 240

1. Measuring Employment and Unemployment

- The Figure above shows the evolution of the monthly unemployment rate in the U.S. economy since 1948.
- The unemployment rate is relatively high during and following recessions — the shaded areas on the figure correspond to recessions.
- For example, the unemployment rate was high following the oil price shocks in the mid-1970s and then again during the recession of 1981–1982.
- Since World War II, three economic contractions lifted the rate of unemployment to 10 percent or more: the 1981–1982 recession (10.8 percent), the 2007–2009 recession (10.0 percent), and the COVID recession that started in February 2020 (14.7 percent).
- It is also noteworthy that the unemployment rate is never close to zero. Since 1948, the U.S. unemployment rate has gone below 3 percent during only one period in the early 1950s. Even during the economic boom in the 1990s, the unemployment rate reached a low of only around 4 percent.

2. Equilibrium in the Labor Market

- To study how employment and unemployment are determined, we first need to understand how the labor market works.
- As with any other market, we can analyze it using a model of supply and demand, which will determine the wage rate — the price of labor.
- We develop the demand curve for labor and the supply curve for labor separately and then put them together to describe the labor market equilibrium.

2. Equilibrium in the Labor Market

THE DEMAND FOR LABOR

- In the labor market, households ***supply*** labor, and firms ***demand*** labor. Firms are now on the demand side because they need to hire workers for production.
- Optimizing firms try to maximize profits, so they demand the quantity of labor that produces the greatest feasible *profit* (defined as revenues minus costs). How does a firm determine the profit-maximizing quantity of labor? By comparing the revenue that a worker produces with the cost of employing that worker.

2. Equilibrium in the Labor Market

- To see how this works, consider a barbershop.
- If the barbershop has only one barber, let's assume that they will almost always be busy cutting hair and that they will generate revenue of $25 per hour.
- This $25 per hour is the **value of the marginal product of labor** of this worker, meaning their contribution to the firm's revenues.
- Recall that the marginal product is the amount of output that one additional worker produces and $25 is the value of this marginal product — *value* is measured not in terms of additional haircuts but in terms of revenue generated by these additional haircuts.
- For example, this barber may have a marginal product of two haircuts per hour, and if each costs $12.50, their value of marginal product will be $25 per hour.

2. Equilibrium in the Labor Market

- Let's also assume that the market wage for barbers is $15 per hour. So, by employing this first barber, the barbershop earns $10 per hour, which is the difference between the barber's value of marginal product and the barber's wage: $25 - $15 = $10 per hour.
- If the shop adds a second barber, the barbershop will sell more haircuts, but from time to time, there won't be enough customers to keep both barbers busy.
- So the addition of the second barber does not double sales at the barbershop. Suppose instead that the second barber increases sales by only $20 per hour, so that their value of marginal product is $20.
- Because the market wage for barbers is $15 per hour, employing the additional barber will still increase profits by $20 - $15 = $5 per hour.
- So an optimizing barbershop will also hire the second barber.

2. Equilibrium in the Labor Market

- Now consider what will happen if the barbershop adds a third barber.
- The third barber will increase sales a bit more but will do so by even less than the addition of the second barber because it will rarely be the case that the shop has enough customers to simultaneously keep all three barbers busy.
- Suppose that this third barber's value of marginal product is $10 per hour (they increase sales by only $10 per hour). Because the market wage is $15 per hour and is thus above their value of marginal product, hiring this third barber will actually *lower* the profits of the barbershop ($10 - $15 = - $5), so the shop will refrain from hiring a third barber.
- Summing up, the barbershop optimizes — in other words, maximizes its profits — by employing only two barbers.

2. Equilibrium in the Labor Market

- The barbershop example demonstrates two important facts about labor demand.
- First, firms typically experience *diminishing marginal product of labor*. Diminishing marginal product of labor means that each additional worker creates less marginal output than the workers who were hired before. For example, additional barbers will increase the number of haircuts that the barbershop offers, but each additional barber won't be as productive as the last one because there won't be enough customers to keep them all busy. If the barbershop faces a constant price for haircuts, the lower marginal output of additional workers also translates into diminishing value of marginal product of labor. In the barbershop, the first barber creates $25 of additional revenue (per hour), the second $20, and the third only $10.
- Because the value of the marginal product of each additional barber is diminishing, hiring more barbers increases the total revenue of the barbershop by less and less.

2. Equilibrium in the Labor Market

- The second important fact illustrated by the barbershop example is that a firm hires workers until it cannot increase profits by hiring an additional worker.
- The firm keeps hiring as long as the revenue that an additional worker brings in for the firm — *the value of the marginal product of labor* — is at least as great as the cost of employing that worker, which is the market wage.
- To see why this is the case, consider the Figure below, which plots the value of the marginal product of labor against the number of workers employed. Because the value of the marginal product decreases as the number of workers employed increases, the curve is downward-sloping.

2. Equilibrium in the Labor Market

Figure: The Value of the Marginal Product of Labor Is the Labor Demand Curve

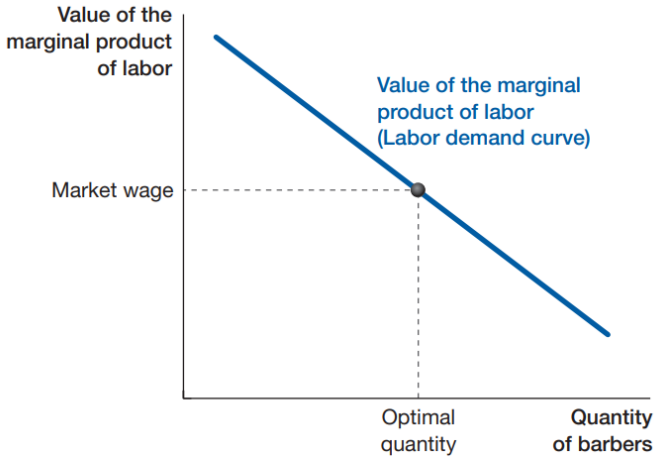


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 241

2. Equilibrium in the Labor Market

- If the firm employs fewer workers than the optimal quantity shown in the Figure above, then it can increase profits by hiring more workers because the revenue those workers bring in (the value of their marginal product) is greater than the cost of employing them (the market wage).
- Similarly, if the firm employs more workers than the optimal quantity, the firm can increase profits by laying off workers because the revenue those workers bring in is less than the market wage, the cost of employing them.
- Therefore, *the profit-maximizing firm will hire the amount of labor that makes the value of the marginal product of labor equal to the market wage*.
- As we change the market wage, the quantity of labor demanded moves along the curve depicting the value of the marginal product — the firm adjusts the number of workers it employs to make the value of the marginal product equal to the wage.
- Thus, the downward-sloping curve in the Figure, - the value of the marginal product of labor — is also the labor demand curve because it shows how the quantity of labor demanded varies with the wage.

2. Equilibrium in the Labor Market

SHIFTS IN THE LABOR DEMAND CURVE

- The labor demand curve depicts the relationship between the quantity of labor demanded and the wage.
- A movement along the labor demand curve occurs when the wage changes and no other economic variables change other than the quantity of labor demanded.
- In contrast, many factors can change the value of marginal product of labor at each quantity of labor and thus cause the entire labor demand curve to shift to the left or right. See the Figure below:

2. Equilibrium in the Labor Market

Figure: Downward-Sloping Labor Demand Curve

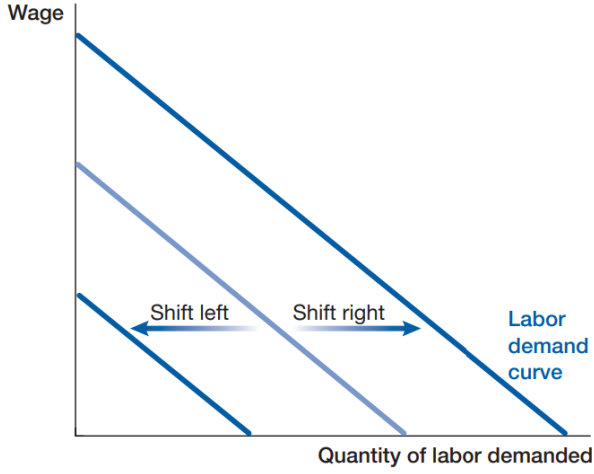


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 242

2. Equilibrium in the Labor Market

- Any change that affects the schedule relating the quantity of labor and the value of the marginal product of labor will shift the labor demand curve. We discuss some shifters in this section:

* **Changing output markets**: When the demand for haircuts shifts right, two consequences follow. The quantity of haircuts demanded at any given price rises, and this, in turn, causes the price of haircuts to rise. Accordingly, a rightward shift in the demand for haircuts causes a rise in the value of the marginal product of barbers and a rightward (upward) shift in the demand curve for barbers. Conversely, when the demand for haircuts shifts left, the labor demand curve for barbers shifts to the left.

2. Equilibrium in the Labor Market

* **Changing productivity**: When changes in productivity increase the value of the marginal product of labor, the labor demand curve shifts to the right. For example, thermal and chemical technology that was developed in the late nineteenth century first enabled hair stylists to “permanently” straighten or curl hair: “perms.” The ability to offer perms increased the marginal product of hair stylists and shifted the demand curve for hair stylists to the right. Technological progress and increases in the productivity of labor typically shift the labor demand curve to the right, but in rare cases the opposite can happen. For example, machines sometimes substitute for labor and shift the labor demand curve to the left.

2. Equilibrium in the Labor Market

* **Changing input markets**: Businesses use labor and other factors of production, like machines and tools, to produce goods and services. When the cost of these other factors goes down, businesses purchase more of them. This usually increases the marginal product of labor, shifting the labor demand curve to the right. For example, mechanical hair clippers enable barbers to cut hair more quickly. If the cost of hair clippers falls and the barbershop acquires more hair clippers, the barbers can serve more customers per hour. This will increase barbers' value of marginal product and shift the labor demand curve to the right.

2. Equilibrium in the Labor Market

THE SUPPLY OF LABOR

- The **labor supply curve** represents the relationship between the quantity of labor supplied and the wage.
- In this case, workers optimally allocate their limited time between paid work, leisure, and other activities, which might include home production like childcare, home maintenance, cooking, or cleaning.
- When market wages are higher, it makes sense for workers to spend more time working outside the home. For instance, if you are paid by the hour and your employer is running overtime shifts, you can get paid 1.5 times your normal hourly wage in those special shifts. For some workers this is a tempting arrangement, leading them to work more outside the home and accordingly have less time for leisure or chores at home.
- This kind of reasoning implies that as the wage increases, the quantity of labor supplied increases. Accordingly, the labor supply curve is upward-sloping.

2. Equilibrium in the Labor Market

Figure: Upward-Sloping Labor Supply Curve

Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 244

2. Equilibrium in the Labor Market

- In the Figure above, you will see that the labor supply curve changes slope as the wage increases. At a sufficiently high wage, the labor supply curve becomes (approximately) vertical.
- In reality, this change in slope occurs more smoothly than the kinked version you see in the figure.
- We use the kink to make the change in slope easier to visually recognize and analyze. The vertical portion of the labor supply curve captures the fact that it becomes much harder to further increase the quantity of labor supplied when almost all people who are interested in working have already found a full-time job.

2. Equilibrium in the Labor Market

SHIFTS IN THE LABOR SUPPLY CURVE

- As we have noted, the labor supply curve is the relationship between the quantity of labor supplied and the wage.
- A movement along the labor supply curve occurs when the wage changes and no other economic variables change (other than the quantity of labor supplied).
- In contrast, many factors can cause the entire labor supply curve to shift to the left or right. Any change that affects the entire schedule relating the quantity of labor supplied and the wage will shift the labor supply curve.

2. Equilibrium in the Labor Market

Figure: Upward-Sloping Labor Supply Curve

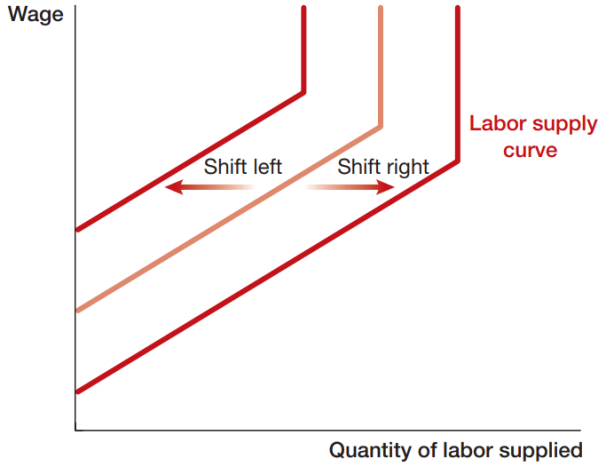


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 244

2. Equilibrium in the Labor Market

- We discuss three potential curve-shifting changes here.
* **Changing tastes**: Changing tastes or social norms affect people's willingness to take a paid job. For example, before World War II, working for pay outside the home was frowned on if you were a married woman. However, during World War II, most governments encouraged women to work in armaments factories as an act of patriotism. Factory work during the war was one early step in a worldwide shift toward acceptance of female labor force participation. As a result of this shift in social norms, female labor force participation in the United States rose from 25 percent in 1940 to almost 60 percent in the 1990s, corresponding to a large rightward shift in the labor supply curve. The previous Figure shows a shift of the labor supply curve to the right as a result of these changing societal norms. Note that the vertical portion of the labor supply curve also shifts to the right because of the entry of more women into the labor market.

2. Equilibrium in the Labor Market

* **Changing opportunity cost of time**: Devices like vacuum cleaners, dishwashers, laundry machines, and lawnmowers lower the opportunity cost of working outside the home by freeing up time that was previously needed for home production. This sort of technology-induced change in the opportunity cost of time has been a factor contributing to the rise in female labor force participation, and it also shifts the labor supply curve to the right, as shown in the Figure.

2. Equilibrium in the Labor Market

* **Changing population**: Increases in the size of the population, which increase the number of potential workers in the economy, also shift the labor supply curve to the right. One factor increasing population is immigration. For example, each year, the United States experiences a net immigration inflow of roughly 1 million people, implying that the population grows one-third of 1 percent per year due to immigration. This inflow shifts the domestic U.S. labor supply curve to the right.

2. Equilibrium in the Labor Market

EQUILIBRIUM IN A COMPETITIVE LABOR MARKET

- Recall that *equilibrium* is a situation in which nobody would benefit by changing his or her own behavior, and that a *competitive equilibrium* is given by the intersection of the supply and demand curves. Equilibrium in a competitive labor market works the same way: it is the point of intersection between the labor supply and labor demand curves.
- At the competitive equilibrium wage w^*, the quantity of labor supplied is equal to the quantity of labor demanded — all workers are able to work as many hours as they wish at this wage, and all firms are able to hire as many hours of labor as they find profitable.
- In contrast, at a wage above w^*, the quantity of labor supplied would exceed the quantity of labor demanded and push the wage down. At a wage below w^*, the quantity of labor demanded would exceed the quantity of labor supplied and push the wage up.
- Thus, w^* is the unique wage that equates the quantity of labor supplied and the quantity of labor demanded. This *labor market equilibrium*, shown by L^* in the Figure below, is also referred to as *equilibrium employment*.

2. Equilibrium in the Labor Market

Figure: Competitive Equilibrium in the Labor Market

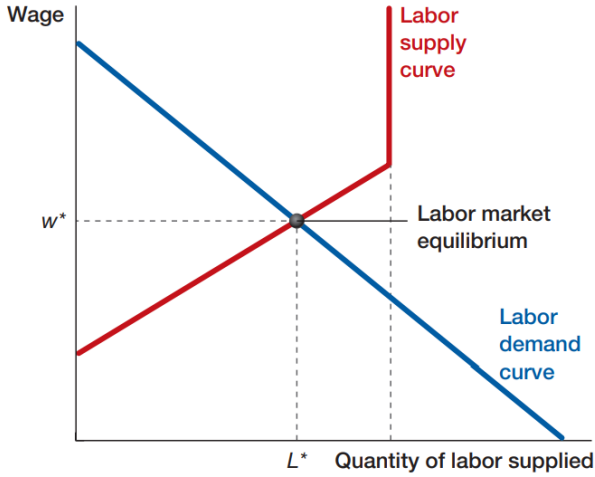


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 246

2. Equilibrium in the Labor Market

- We also refer to the competitive equilibrium wage as the **market-clearing wage**. The label “market-clearing” should remind you that every worker who wants a job can (eventually) find one: the wage has adjusted so that the quantity of labor demanded matches the quantity of labor supplied.

3. Why Is There Unemployment?

- At the market-clearing wage w^*, the labor supply and labor demand curves intersect.
- Accordingly, the quantity of labor demanded equals the quantity of labor supplied — every worker who wants to work at wage w^* has a job. There are people who are not working — represented by the segment of the labor supply curve that lies above the market-clearing wage.
- The people on this part of the labor supply curve are only willing to work for wages above the market-clearing wage w^*.

3. Why Is There Unemployment?

VOLUNTARY UNEMPLOYMENT

- In the economy depicted in the previous Figure, there are employed workers and workers who are not employed because they are unwilling to work at the market-clearing wage w^*.
- In a competitive equilibrium, there should be no workers looking for work. (They are either employed or unwilling to work at the market-clearing wage.)
- So in a competitive equilibrium, there shouldn't be people who are not employed and are looking for work.
- But then **how would we explain the fact that there were 6.5 million officially unemployed Americans in January 2020 who are thus counted as not employed and looking for work?**

3. Why Is There Unemployment?

- A first possibility is that the official unemployment statistics are probably counting some workers who are voluntarily unemployed.
- They are willing to work, but only for a wage above the market-clearing wage w^*.
- Therefore, at the equilibrium wage they are happy to remain unemployed. Because unemployment survey questions do not specify that the workers should be looking for work at the current prevailing market wage, some people might be counted as unemployed even though they are looking only for jobs that pay more than the current prevailing market wage.
- However, the available evidence suggests that most unemployed workers are not voluntarily unemployed. Rather, most unemployed workers would be willing to work at the prevailing market wage but are unable to find employers that are willing to hire them at this wage.
- Thus, we must find another way to explain why 6.5 million Americans couldn't find a job in January 2020.

3. Why Is There Unemployment?

- When economic models do not predict what we observe in the world, we must ask ourselves whether the assumptions made in our model are correct. In our model of the labor market, we made an assumption that might not actually hold.
- We assumed that workers and firms have full information about the job market. For instance, we assumed that they know what the equilibrium wage is, what qualifications employers are looking for, and where the jobs are.
- This means that workers can instantly find the right job for themselves whenever it is available and no open job will be left unfilled.
- However, when firms and workers lack important information about the labor market, workers cannot always be matched to open jobs, and this mismatch will cause unemployment.
- We next discuss this type of unemployment, which we call frictional unemployment.

3. Why Is There Unemployment?

JOB SEARCH AND FRICTIONAL UNEMPLOYMENT

- Any worker who wants a job at the market-clearing wage w^* can find one. Up until this point, our analysis of the labor market has assumed that the labor market is frictionless, which implies that the worker can instantly find an employer that is willing to hire her.
- Yet if you've ever looked for a job, you've probably discovered that finding the right job is not simple and might take a lot of legwork.
- To find the right job, you need to determine which firms are hiring and try to learn how pay, benefits, and other job characteristics vary among them. You need to set up interviews and survive them. Finally, you wait for the people who conduct those interviews to finish interviewing the other leading candidates. In most cases, someone else gets chosen, and then you start all over again.
- Economists refer to job-hunting activities as **job search**. Because each person has specific capabilities, experience, and job preferences, finding the right match between an unemployed person and a firm usually takes time.

3. Why Is There Unemployment?

- Unemployment resulting from imperfect information about available jobs and from the time-consuming process of job search is **frictional unemployment**.
- Though it might at first seem strange, you can think about the dating market in the same way that you think about the job market.
- It takes a long time to find a person who is a good match as a romantic partner. In this sense, people who are not in a relationship, but looking for one, are romantically unemployed. We don't expect single people to find a new romantic partner overnight, and we shouldn't expect unemployed workers to instantly find a job either.

4. Wage Rigidity and Structural Unemployment

- Frictional unemployment resulting from job-search activities is a normal feature of every labor market. However, unemployment also arises because wages are sometimes above the market-clearing level w^*, meaning that the quantity of labor supplied is greater than the quantity of labor demanded.
- When wages are held fixed above the competitive equilibrium level that clears the labor market, this is referred to as **wage rigidity**.
- **Structural unemployment** arises when the quantity of labor supplied persistently exceeds the quantity of labor demanded.
- Wage rigidity is a key factor in creating such a persistent gap. Wage rigidity can occur for many reasons, but the economic consequences are similar, regardless of the source of the wage rigidity: holding the market wage above the market-clearing wage causes some workers who would like to work at the market wage to be unemployed.
- To illustrate how wage rigidity impacts the labor market, we describe some causes of wage rigidity.

4. Wage Rigidity and Structural Unemployment

MINIMUM WAGE LAWS

- In most countries, legislation specifies a minimum level for the hourly wage. Such legislated wage floors, often called minimum wage laws, can prevent the market wage from falling to the market-clearing wage that equates the quantity of labor supplied with the quantity of labor demanded.
- In the United States, the federal government chooses a national minimum wage and state legislatures can choose higher minimum wages for in-state jobs.
- In January 2020, for example, the federal minimum wage was $7.25 per hour, while the highest state minimum wage was $13.50, which applied in the state of Washington. California was close behind, with a minimum wage of $13.00 per hour. Many U.S. cities and states are phasing in minimum wages that are much higher than the federal minimum wage.

4. Wage Rigidity and Structural Unemployment

Figure: Labor Supply and Labor Demand in a Market with a Minimum Wage

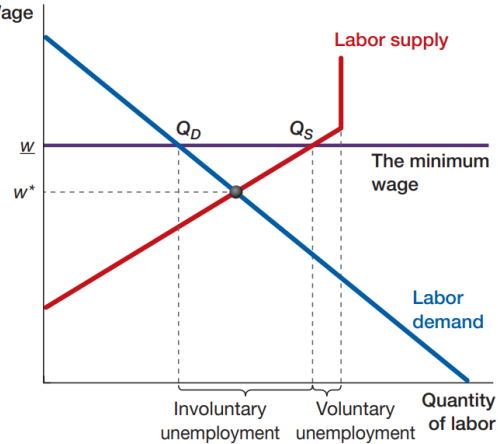


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 246

4. Wage Rigidity and Structural Unemployment

- Minimum wages might prevent the quantity of labor supplied from equaling the quantity of labor demanded.
- In the previous Figure, the minimum wage is labeled with a line beneath it to signify that the minimum wage is a wage floor: w.
- The point where the horizontal minimum wage line intersects with the labor demand curve determines the quantity of labor demanded, Q_D, which, in this situation, is also the quantity of labor employed. Because the minimum wage w is above the market-clearing wage w^*, the quantity of labor demanded by employers is less than the quantity of labor supplied by workers, Q_S.
- Consequently, in this minimum-wage equilibrium, some workers — represented by the gap between the quantity supplied and the quantity demanded at w — aren't able to find jobs.

4. Wage Rigidity and Structural Unemployment

- These unemployed workers are willing to work at the going wage w and would even be willing to work at wages lower than w. The minimum wage legislation prevents employers from hiring these unemployed workers at wages that would equalize the quantity of labor supplied and the quantity of labor demanded.
- Economists sometimes refer to these workers as involuntarily unemployed to contrast them with those who are voluntarily unemployed.
- In the Figure, we can see both involuntary and voluntary unemployment: those whose opportunity cost of labor is below w and who would thus be happy to work at this prevailing wage are involuntarily unemployed; those who would have been happy to work only at a wage above w and who are therefore choosing not to work at the prevailing wage are voluntarily unemployed.

4. Wage Rigidity and Structural Unemployment

- Minimum wage laws are an example of a policy that creates winners and losers.
- The winners are the workers who get jobs at wages above the wage that equates the quantity of labor supplied and the quantity of labor demanded.
- The losers are the firms that have to pay the higher wage and the unemployed who would like to work but can't find a job at the prevailing wage w.
- The costs and benefits of the minimum wage are actively debated, with economists divided on the question of whether the United States should raise its minimum wage.
- The minimum wage produces structural, involuntary unemployment, but it cannot be the only cause of unemployment.
- For example, in January 2020, 2 percent of college graduates were unemployed. The median hourly wage for a college graduate was almost five times the level of the minimum wage. Because almost all college graduates are paid more than the minimum wage, it is not the minimum wage that prevents the labor market for college graduates from clearing.

4. Wage Rigidity and Structural Unemployment

LABOR UNIONS AND COLLECTIVE BARGAINING

- Another source of wage rigidity is collective bargaining, which refers to the contract negotiations that take place between firms and labor unions.
- A labor union is an organization of workers that advocates for better working conditions, pay, and benefits for its members. Unions use the threat of going on strike — a mass work stoppage — as a bargaining chip in these negotiations.
- Collective bargaining often leads to equilibrium wages and benefits that are greater than what workers would have received under the market-clearing wage.
- Collective bargaining has the same effect on unemployment as the minimum wage laws. If they can keep the equilibrium wage above the market-clearing wage, unions can cause the quantity of labor supplied to be greater than the quantity of labor demanded, thus creating structural unemployment.
- Through such collective bargaining, unions benefit their members but make it difficult for nonmembers to find work.

4. Wage Rigidity and Structural Unemployment

EFFICIENCY WAGES

- In 1914, Henry Ford, founder of the Ford Motor Company, seemed to go bonkers. Out of the blue, Ford increased the daily wage of most of his employees from $2.34 to $5.00.
- Why would a profit-maximizing employer double his employees' pay without any external pressure to do so?
- Ford explained the wage of $5 per day as an act of self-interest. There was "no charity in any way involved," he said. "We wanted to pay these wages so that the business would be on a lasting foundation. We were building for the future."

4. Wage Rigidity and Structural Unemployment

- In a frictionless, competitive labor market, paying an above-market wage (or above the wage that workers would accept) would not be optimal for a firm—in other words, it would not maximize the firm's profits.
- In such a "perfect" market, the firm knows everything about its workers and observes everything that they do at work. In this idealized environment, there is no need to pay workers more than the market wage to obtain their labor. But in actual markets, where workers can shirk (slack off) on the job, paying more than the going wage can have benefits for the firm. Ford's wage premium is an example of what economists call **efficiency wages**.
- By paying wages above the wage that workers were willing to accept (and in fact above the market wage), Ford was able to increase the productivity and profitability of his company.

4. Wage Rigidity and Structural Unemployment

- Efficiency wages increase productivity and firm profitability for a number of reasons.
- First, efficiency wages reduce worker turnover. Working on an assembly line is monotonous, causing a relatively high level of turnover. Recruiting and training new workers is costly to the company. If workers are paid more than the prevailing market wage by their employer, they are more motivated to keep their job because they would face lower wages if they tried to find a job elsewhere.
- Second, the fear of losing a high-paying job motivates employees to work harder than they otherwise would, increasing their hourly output.
- Third, some employees are grateful for an above-market wage, leading them to reciprocate this apparent generosity by working harder—another boost to their hourly output.
- Finally, efficiency wages also improve the quality of the pool of workers who apply for a job in the first place.

4. Wage Rigidity and Structural Unemployment

- If efficiency wages increase productivity, employers like Henry Ford might find it profitable to pay a higher wage than the market-clearing wage.
- Like minimum wage laws and collective bargaining, this results in a form of wage rigidity. As before, this will cause the quantity of labor supplied to be greater than the quantity of labor demanded, leading to structural unemployment.
- One difference is worth noting, however. The minimum wage and collective bargaining force employers to pay a wage above the market-clearing wage level, whereas with efficiency wages, the equilibrium wage is above the market-clearing level because profit-maximizing firms prefer to pay such wages.

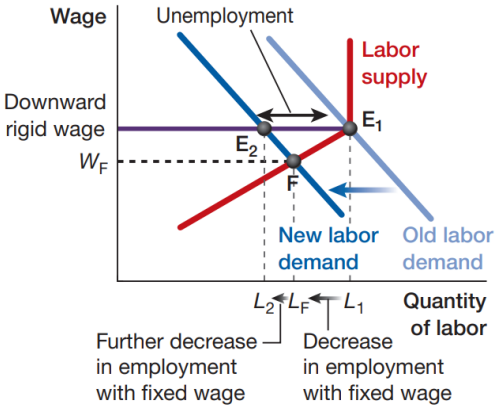
4. Wage Rigidity and Structural Unemployment

DOWNWARD WAGE RIGIDITY

- Another type of wage rigidity results from the fact that workers are highly averse to reductions in their wage, resulting in what economists call downward wage rigidity.
- Cuts in the wage hurt worker morale and lower productivity. As a result, many firms would rather fire workers than cut their wages. Typically, only firms on the brink of bankruptcy attempt to talk their workers into accepting wage reductions.
- Downward wage rigidity, like the other forms of wage rigidity we have studied so far, causes wages to remain above the market-clearing level, leading to structural unemployment.

4. Wage Rigidity and Structural Unemployment

Figure: Shifts in Labor Demand Affect Equilibrium in the Labor Market



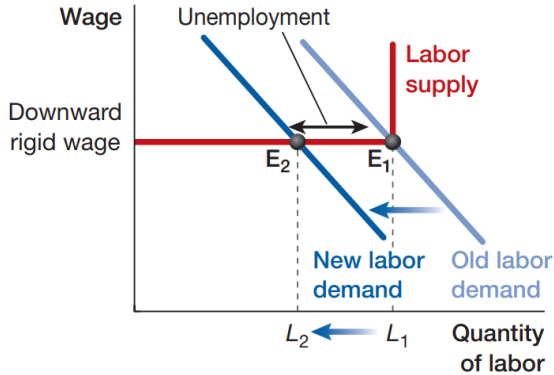


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 254

4. Wage Rigidity and Structural Unemployment

- Consider the following scenario, depicted in panel (a) of the Figure above. Assume that the labor market begins in a competitive equilibrium with no unemployment (at the point labeled E_1).
- Next, imagine that the labor demand curve shifts to the left, for example, because there are new robots replacing workers at lower cost or because there are inexpensive imports from another country (like imports from China).
- When the wage is flexible, the leftward shift in labor demand moves the market to a new equilibrium (point F) in which the equilibrium wage is w_F, and the quantity of labor demanded falls to L_F.
- The Figure also shows that at this new equilibrium, the quantity of labor supplied is equal to the quantity of labor demanded and so unemployment is still equal to zero.

4. Wage Rigidity and Structural Unemployment

- However, when the wage is rigid, it won't fall to its market-clearing level and will instead stay at its initial level, which is labeled with a horizontal line in panel (a) of the Figure: the "downward rigid wage."
- This downward wage rigidity causes the quantity of labor supplied, which is still at L_1, to be greater than the quantity of labor demanded, which has now fallen to L_2, thus leading to structural unemployment, as shown in the Figure.
- Panel (b) in the Figure provides a simplified version of panel (a). The labor market functions as if the labor supply curve were equal to the downward rigid wage until the point where the original labor supply curve rises above the downward rigid wage.
- Because a downward rigid wage has the effect of preventing the nominal wage from falling, we have redrawn the labor supply curve in panel (b) so it begins as a horizontal line at the downward rigid wage. We use this effective labor supply curve to simplify analysis of the labor market equilibrium.

4. Wage Rigidity and Structural Unemployment

- The effect of downward wage rigidity can be seen in the Figure below, which shows the wage growth of workers in a large company for 2008, right in the middle of the 2007–2009 recession.
- Each bar shows the fraction of workers whose wage grew by the percentage depicted on the horizontal axis.
- We see a large bulge in the distribution at zero, meaning that wages were frozen instead of being cut.
- Wage cuts were so infrequent (only 46 out of 15,000 employees) that they are not even visible on the graph. Although the extent of downward wage rigidity does vary from company to company and industry to industry, this type of rigidity is quite pervasive throughout labor markets and can have a significant effect on unemployment, especially during recessions.

4. Wage Rigidity and Structural Unemployment

Figure: The Distribution of Wage Increases at One Large Firm in 2008

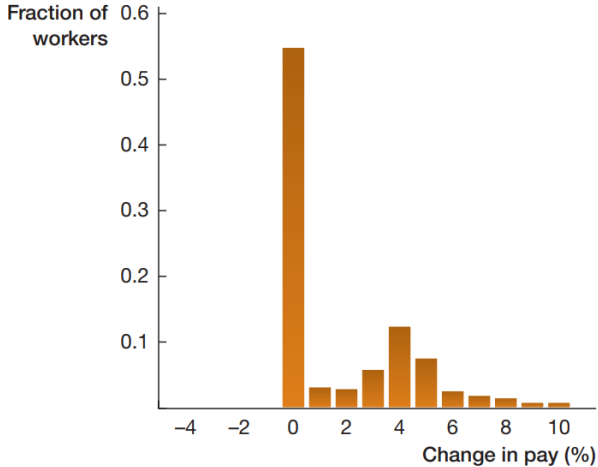


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 254

5. Cyclical Unemployment and the Natural Rate of Unemployment

- Unemployment is highly cyclical, increasing during recessions and declining during economic expansions.
- The labor market diagram helps us analyze this cyclical behavior. As noted earlier, the U.S. economy always has some unemployment. In addition, the unemployment rate fluctuates considerably.
- To distinguish the “normal” rate of unemployment from fluctuations around that normal rate, economists use the concept of the **natural rate of unemployment.**
- The natural rate of unemployment is the rate of unemployment around which a healthy economy fluctuates. By contrast, the long-run rate of unemployment is the average historical rate of unemployment, which typically tends to be higher than the natural rate of unemployment.
- For example, economists tend to believe that the natural rate of unemployment in the United States is around 4 percent. However, U.S. unemployment has averaged 5.8 percent from January 1948 to July 2020.

5. Cyclical Unemployment and the Natural Rate of Unemployment

Figure: Cyclical Variation in the Rate of Unemployment

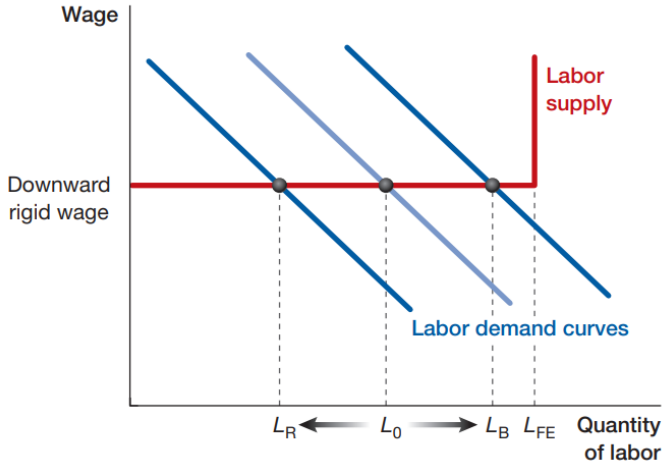


Figure: Macroeconomics (Acemoglu, Laibson, List 2022), Page 255

5. Cyclical Unemployment and the Natural Rate of Unemployment

- The Figure above illustrates how employment fluctuations happen in an economy with downward wage rigidity.
- In this analysis we assume that the economy starts with the middle labor demand curve. We have drawn this exhibit to reflect pre-existing (structural) unemployment at this middle/starting labor demand curve.
- The initial level of unemployment is $L_{FE} - L_0$.
- During a recession (cyclical downturn), the labor demand curve will shift to the left, and unemployment will increase to $L_{FE} - L_R$.
- Conversely, during an economic boom (cyclical expansion), the labor demand curve will shift to the right, and unemployment will decrease to $L_{FE} - L_B$.
- Assume that the "average" unemployment rate coincides with the unemployment rate at the start, when the labor demand curve was in its middle position.
- We can think of this as the long-run rate of unemployment, around which the actual unemployment rate fluctuates as labor demand shifts left and right during the economic cycle.

5. Cyclical Unemployment and the Natural Rate of Unemployment

- **Cyclical unemployment** is defined as the deviation of the unemployment rate from its long-run rate. Cyclical unemployment rises in recessions and falls in economic booms.
- The long-run rate of unemployment includes frictional unemployment, which is a necessary part of any well-functioning labor market. But the long-run rate of unemployment also includes long-term structural unemployment, which is generally considered to be economically inefficient.
- Accordingly, the long-run rate of unemployment should not be confused with the rate of unemployment that is socially optimal or desirable.
- To see this, consider an economy that is subject to a significant level of downward wage rigidity. This economy will have a relatively high level of structural unemployment, and this will increase the long-term average rate of unemployment.
- This is not a desirable state of affairs because many potential workers who could have been gainfully employed are out of work and are unable to use their labor productively.
- This example illustrates that the long-run rate of unemployment includes some inefficient sources of unemployment

Summary

- Potential workers are defined as the civilian non-institutional population aged 16 and older. Those holding a paid full-time or part-time job are classified as employed, while those without a paid job who have actively looked for work in the prior 4 weeks and are currently available for work are unemployed. Potential workers who are employed and unemployed make up the labor force, while the rest of the potential workers are classified as out of the labor force. The unemployment rate is the percentage of the labor force that is unemployed.
- The unemployment rate fluctuates significantly over time. It is higher during and in the immediate aftermath of recessions.
- Employment is determined by labor demand and labor supply. The labor demand curve is downward-sloping because of the diminishing marginal product of labor and profit maximization by firms. In contrast, the labor supply curve tends to be upward-sloping because higher wages generally encourage workers to supply more hours to the labor market.

Summary

- The competitive labor market equilibrium is given by the intersection of the labor demand and labor supply curves. The competitive equilibrium wage is also called the market-clearing wage.
- In a competitive labor market equilibrium in which all workers know the market-clearing wage, there will be very little unemployment because every worker willing to work at the market-clearing wage can find a job. Workers who are not willing to work at the market-clearing wage will stop searching and will therefore not be counted as unemployed.
- Frictional unemployment exists because workers need time to learn about the condition of the labor market and search for a job that suits them. Even in a healthy labor market, there will always be some unemployed workers in the process of changing jobs, or finding a new job after losing their previous one, or finding their first job after entry into the labor market.

Summary

- Structural unemployment results when the market wage is above the market-clearing level, causing the quantity of labor supplied to be greater than the quantity of labor demanded. This is often referred to as wage rigidity. It can result from institutional features of the labor market like minimum wage legislation or collective bargaining. More importantly, it can result from efficiency wages or from downward wage rigidity. Efficiency wages arise when employers pay wages higher than the market-clearing wage to increase worker productivity. Downward wage rigidity arises because of the unwillingness of workers to accept wage cuts, which prevents wages from immediately falling in response to a leftward shift of the labor demand curve.

Summary

- The most important cause of unemployment fluctuations is a shifting labor demand curve. When wages are flexible, a shift to the left of the labor demand curve reduces both employment and wages but does not increase unemployment because the labor market clears. When wages are rigid, the same leftward shift creates a larger decline in employment because the wage does not decline and, as a result, unemployment increases.
- The natural rate of unemployment is the rate of unemployment around which a healthy economy fluctuates. The long-run rate of unemployment is the average historical rate of unemployment, which tends to be higher than the natural rate of unemployment due to the presence of structural unemployment. Cyclical unemployment is the difference between the current rate of unemployment and the long-run rate of unemployment. Cyclical unemployment is positive in recessions and negative in economic booms.