IN THIS CHAPTER, YOU WILL LEARN:

...about the natural rate of unemployment:

- what it means
- what causes it
- understanding its behavior in the real world
Natural rate of unemployment

- **Natural rate of unemployment**: The average rate of unemployment around which the economy fluctuates.

- In a recession, the actual unemployment rate rises above the natural rate.

- In a boom, the actual unemployment rate falls below the natural rate.
## HOUSEHOLD DATA

### Table A-15. Alternative measures of labor underutilization [Percent]

<table>
<thead>
<tr>
<th>Measure</th>
<th>Not seasonally adjusted</th>
<th>Seasonally adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-1 Persons unemployed 15 weeks or longer, as a percent of the civilian labor force</td>
<td>2.1 1.9 2.0</td>
<td>2.0 2.0 1.8</td>
</tr>
<tr>
<td>U-2 Job losers and persons who completed temporary jobs, as a percent of the civilian labor force</td>
<td>2.7 2.3 2.7</td>
<td>2.3 2.5 2.3</td>
</tr>
<tr>
<td>U-3 Total unemployed, as a percent of the civilian labor force (official unemployment rate)</td>
<td>5.3 4.5 5.1</td>
<td>4.9 4.9 4.8</td>
</tr>
<tr>
<td>U-4 Total unemployed plus discouraged workers, as a percent of the civilian labor force plus discouraged workers</td>
<td>5.7 4.8 5.5</td>
<td>5.3 5.3 5.1</td>
</tr>
<tr>
<td>U-5 Total unemployed, plus discouraged workers, plus all other persons marginally attached to the labor force, as a percent of the civilian labor force plus all persons marginally attached to the labor force</td>
<td>6.5 5.5 6.2</td>
<td>6.2 6.0 5.9</td>
</tr>
<tr>
<td>U-6 Total unemployed, plus all persons marginally attached to the labor force, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all persons marginally attached to the labor force</td>
<td>10.5 9.1 10.1</td>
<td>9.9 9.7 9.5</td>
</tr>
</tbody>
</table>

NOTE: Persons marginally attached to the labor force are those who currently are neither working nor looking for work but indicate that they want and are available for a job and have looked for work sometime in the past 12 months. Discouraged workers, a subset of the marginally attached, have given a job-market related reason for not currently looking for work. Persons employed part time for economic reasons are those who want and are available for full-time work but have had to settle for a part-time schedule. Updated population controls are introduced annually with the release of January data.
A first model of the natural rate

Notation:

\( L \) = # of workers in labor force
\( E \) = # of employed workers
\( U \) = # of unemployed
\( U/L \) = unemployment rate
Assumptions:

1. \( L \) is exogenously fixed.

2. During any given month,
   
   \[ s = \text{rate of job separations}, \]
   fraction of employed workers that become separated from their jobs

   \[ f = \text{rate of job finding}, \]
   fraction of unemployed workers that find jobs

   \( s \) and \( f \) are exogenous
The transitions between employment and unemployment

- Employed
- Job separation (s)
- Job finding (f)
- Unemployed

Mankiw, Macroeconomics, 10e, © 2019 Worth Publishers
The steady state condition

Definition: the labor market is in steady state, or long-run equilibrium, if the unemployment rate is constant.

The steady-state condition is:

\[ s \times E = f \times U \]

- \# of employed people who lose or leave their jobs
- \# of unemployed people who find jobs
Finding the “equilibrium” U-rate

\[ f \times U = s \times E \]

\[ = s \times (L - U) \]

\[ = s \times L - s \times U \]

Solve for \( U/L \):

\[ (f + s) \times U = s \times L \]

SO,

\[ \frac{U}{L} = \frac{s}{s + f} \]
Example:

- Each month,
  - 1% of employed workers lose their jobs \( (s = 0.01) \)
  - 19% of unemployed workers find jobs \( (f = 0.19) \)
- Find the natural rate of unemployment:

\[
\frac{U}{L} = \frac{s}{s + f} = \frac{0.01}{0.01 + 0.19} = 0.05, \text{ or } 5\%
\]
Policy implication

- A policy will reduce the natural rate of unemployment only if it lowers $s$ or increases $f$. 
Why is there unemployment?

- If job finding were instantaneous \((f = 1)\), then all spells of unemployment would be brief, and the natural rate would be near zero.

- There are two reasons why \(f < 1\):
  1. job search
  2. wage rigidity
Job search & frictional unemployment

- **frictional unemployment**: caused by the time it takes workers to search for a job
- occurs even when wages are flexible and there are enough jobs to go around
- occurs because
  - workers have different abilities, preferences
  - jobs have different skill requirements
  - geographic mobility of workers not instantaneous
  - flow of information about vacancies and job candidates is imperfect
Sectoral shifts

- **def:** Changes in the composition of demand among industries or regions.

- **example:** *Technological change*
  more jobs repairing computers,
  fewer jobs repairing typewriters

- **example:** *A new international trade agreement*
  labor demand increases in export sectors,
  decreases in import-competing sectors

- These scenarios result in frictional unemployment
CASE STUDY: Structural change over the long run

1960

- 57.9% Agriculture
- 28.0% Manufacturing
- 9.9% Other industry
- 4.2% Services

2012

- 77.7% Services
- 8.0% Manufacturing
- 1.3% Other industry
- 13.0% Agriculture
More examples of sectoral shifts

- Industrial revolution (1800s): agriculture declines, manufacturing soars
- Energy crisis (1970s): demand shifts from larger cars to smaller ones
- Health care spending as % of GDP:
  - 1960: 5.2
  - 1980: 9.1
  - 2000: 13.8
  - 2010: 17.9

In our dynamic economy, smaller sectoral shifts occur frequently, contributing to frictional unemployment.
Public policy and job search

Govt programs affecting unemployment include:

- **Govt employment agencies**
  disseminate info about job openings to better match workers & jobs.

- **Public job training programs**
  help workers displaced from declining industries get skills needed for jobs in growing industries.
Unemployment insurance (UI)

- **UI pays part of a worker’s former wages for a limited time after the worker loses his/her job.**

- **UI increases frictional unemployment, because it reduces**
  - the opportunity cost of being unemployed
  - the urgency of finding work
  - $f$

- **Studies: The longer a worker is eligible for UI, the longer the average spell of unemployment.**
Benefits of UI

- By allowing workers more time to search, UI may lead to better matches between jobs and workers, which would lead to greater productivity and higher incomes.
Why is there unemployment?

The natural rate of unemployment: \[ \frac{U}{L} = \frac{s}{s + f} \]

- Two reasons why \( f < 1 \):
  
  **DONE** ✓ 1. job search

  **Next** 2. wage rigidity
Unemployment from real wage rigidity

If real wage is stuck above its eq’m level, there aren’t enough jobs to go around.

If real wage is stuck above its eq’m level, there aren’t enough jobs to go around.

Real wage

Supply

Demand

Unemployment

Labor

Amount of labor hired

Amount of labor willing to work

Rigid real wage
Unemployment from real wage rigidity

If real wage is stuck above its eq’m level, there aren’t enough jobs to go around.

Then, firms must ration the scarce jobs among workers.

**Structural unemployment**: The unemployment resulting from real wage rigidity and job rationing.
Reasons for wage rigidity

1. Minimum-wage laws
2. Labor unions
3. Efficiency wages
1. Minimum-wage laws

- The min. wage may exceed the eq’m wage of unskilled workers, especially teenagers.

- Studies: a 10% increase in min. wage reduces teen employment by 1–3%

- But, the min. wage cannot explain the majority of the natural rate of unemployment, as most workers’ wages are well above the min. wage.
1. Minimum-wage laws

Figure 1  Minimum Wage and Average Hourly Earnings, 1965–2014

Note: All figures are in dollars. Average hourly earnings is for production and nonsupervisory workers on private nonfarm payrolls.

Source: Department of Labor, Bureau of Labor Statistics.
2. Labor unions

- Unions exercise monopoly power to secure higher wages for their members.
- When the union wage exceeds the eq’m wage, unemployment results.
- **Insiders**: Employed union workers whose interest is to keep wages high.
- **Outsiders**: Unemployed non-union workers who prefer eq’m wages, so there would be enough jobs for them.
## Union membership and wage ratios by industry, 2013

<table>
<thead>
<tr>
<th>Industry</th>
<th># employed (1000s)</th>
<th>U % of total</th>
<th>Wage ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private sector (total)</td>
<td>104,737</td>
<td>6.9</td>
<td>122.6</td>
</tr>
<tr>
<td>Government (total)</td>
<td>20,450</td>
<td>37.0</td>
<td>121.1</td>
</tr>
<tr>
<td>Construction</td>
<td>6,244</td>
<td>14.0</td>
<td>151.7</td>
</tr>
<tr>
<td>Mining</td>
<td>780</td>
<td>7.2</td>
<td>96.4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>13,599</td>
<td>10.5</td>
<td>107.2</td>
</tr>
<tr>
<td>Retail trade</td>
<td>14,582</td>
<td>4.9</td>
<td>102.4</td>
</tr>
<tr>
<td>Transportation</td>
<td>4,355</td>
<td>20.4</td>
<td>123.5</td>
</tr>
<tr>
<td>Finance, insurance</td>
<td>6,111</td>
<td>1.1</td>
<td>90.2</td>
</tr>
<tr>
<td>Professional services</td>
<td>12,171</td>
<td>2.1</td>
<td>99.1</td>
</tr>
<tr>
<td>Education</td>
<td>4,020</td>
<td>13.0</td>
<td>112.6</td>
</tr>
<tr>
<td>Health care</td>
<td>15,835</td>
<td>7.5</td>
<td>114.9</td>
</tr>
</tbody>
</table>

Wage ratio = $100 \times \frac{\text{union wage}}{\text{nonunion wage}}$
3. Efficiency wages

- Theories in which higher wages increase worker productivity by:
  - attracting higher quality job applicants
  - increasing worker effort, reducing “shirking”
  - reducing turnover, which is costly to firms
  - improving health of workers (in developing countries)

- Firms willingly pay above-equilibrium wages to raise productivity.

- Result: structural unemployment.
The median duration of unemployment typically rises in recessions—but its rise in 2008–2010 was unprecedented.
The Median Duration of Unemployment

The median duration of unemployment measures one facet of the severity of unemployment. The median is the point that splits the distribution of unemployment duration in half. For example, in December 1998, half of all unemployed individuals had been without a job for 6.8 weeks or less, and half had been without a job for 6.8 weeks or more.

Figure 1 shows the unemployment rate and the median duration of unemployment over the past five decades. The unemployment rate exhibits a cyclical pattern—rising during economic contractions and falling (with a slight lag) during expansions. The median duration of unemployment has closely followed the path of the unemployment rate throughout most of this period. During the expansion of the 1990s, however, the duration of unemployment exhibited a clear break from this pattern. While the unemployment rate declined steadily after peaking at 7.8 percent in June 1992, the median duration of unemployment remained stuck at about eight weeks for nearly five years before declining to about six weeks by the turn of the century.

Why didn't the duration of unemployment fall in conjunction with the decline in the unemployment rate from mid-1992 through the end of 1997? What accounts for the drop in duration after September 1997? The answers to these questions can be found by examining more detailed statistics on the duration of unemployment.

The Bureau of Labor Statistics provides data on the number of individuals who have been unemployed for less than 5 weeks, 5 to 14 weeks, 15 to 26 weeks, and 27 or more weeks. When the economy is expanding, it becomes easier to find a job, and when the economy is contracting, it takes longer to find a job. Thus, the percentage of the unemployed who have been without jobs for less than 5 weeks generally falls during a recession and rises during an expansion while the percentage of the unemployed who have been out of work for 15 weeks or more follows the opposite pattern.

Source: Department of Labor, Bureau of Labor Statistics.
EXPLAINING THE TREND: The minimum wage

The real minimum wage and natural u-rate have similar trends.
EXPLAINING THE TREND: Union membership

<table>
<thead>
<tr>
<th>year</th>
<th>percent of labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>12.0</td>
</tr>
<tr>
<td>1945</td>
<td>35.0</td>
</tr>
<tr>
<td>1954</td>
<td>35.0</td>
</tr>
<tr>
<td>1970</td>
<td>27.0</td>
</tr>
<tr>
<td>1983</td>
<td>20.1</td>
</tr>
<tr>
<td>2013</td>
<td>11.3</td>
</tr>
</tbody>
</table>

Since early 1980s, the natural rate and union membership have both fallen.

But, from 1950s to about 1980, the natural rate rose while union membership fell.
EXPLAINING THE TREND: Sectoral shifts

1970–1986: volatile oil prices create jarring sectoral shifts

Price per barrel of oil, in 2011 dollars
EXPLAINING THE TREND: Sectoral shifts

1986–2005: oil prices less volatile, so fewer sectoral shifts

Price per barrel of oil, in 2011 dollars
EXPLAINING THE TREND:
Sectoral shifts

2006–2012: oil price volatility increases – will the natural u-rate rise again?

Price per barrel of oil, in 2011 dollars
EXPLAINING THE TREND: Demographics

- 1970s:
The Baby Boomers were young. Young workers change jobs more frequently (high value of $s$).

- Late 1980s through today:
  Baby Boomers aged. Middle-aged workers change jobs less often (low $s$).
Why unemployment rose in Europe but not the U.S.

Shock
Technological progress has shifted labor demand from unskilled to skilled workers in recent decades.

Effect in United States
An increase in the “skill premium” – the wage gap between skilled and unskilled workers.

Effect in Europe
Higher unemployment, due to generous govt benefits for unemployed workers and strong union presence.
Percentage of workers covered by collective bargaining, selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>7%</td>
</tr>
<tr>
<td>South Korea</td>
<td>12%</td>
</tr>
<tr>
<td>United States</td>
<td>12%</td>
</tr>
<tr>
<td>Poland</td>
<td>15%</td>
</tr>
<tr>
<td>Japan</td>
<td>17%</td>
</tr>
<tr>
<td>Israel</td>
<td>26%</td>
</tr>
<tr>
<td>Canada</td>
<td>29%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>30%</td>
</tr>
<tr>
<td>Greece</td>
<td>42%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>49%</td>
</tr>
<tr>
<td>Germany</td>
<td>58%</td>
</tr>
<tr>
<td>Australia</td>
<td>60%</td>
</tr>
<tr>
<td>Spain</td>
<td>78%</td>
</tr>
<tr>
<td>Italy</td>
<td>80%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>85%</td>
</tr>
<tr>
<td>Sweden</td>
<td>89%</td>
</tr>
<tr>
<td>Belgium</td>
<td>96%</td>
</tr>
<tr>
<td>France</td>
<td>98%</td>
</tr>
</tbody>
</table>