Chapter objectives

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.
U.S. Unemployment, 1958-2002

Graph showing the percent of labor force over the years 1955 to 2000, with data points for each year. The graph displays two lines: one for the unemployment rate and another for the natural rate of unemployment.
A first model of the natural rate

Notation:

\[ L = \text{# of workers in labor force} \]
\[ E = \text{# of employed workers} \]
\[ U = \text{# of unemployed} \]
\[ U/L = \text{unemployment rate} \]
Assumptions:

1. \( L \) is exogenously fixed.

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

\[ s = \text{rate of job separations} \]
\[ f = \text{rate of job finding} \]

(both exogenous)
The transitions between employment and unemployment

Employed \( \times E \) \( \rightarrow \) Unemployed

\( f \times U \)
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
Solving for the “equilibrium” \( U \) rate

\[
\begin{align*}
    f \times U &= s \times E \\
    &= s \times (L - U) \\
    &= s \times L - s \times U
\end{align*}
\]

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

$$\frac{U}{L} = \frac{s}{s + f} = \frac{0.01}{0.01 + 0.19} = 0.05, \text{ or } 5\%$$
A policy that aims to reduce the natural rate of unemployment will succeed 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 increases demand for computer repair persons, decreases demand for typewriter repair persons

- **example:** A new international trade agreement causes greater demand for workers in the export sectors and less demand for workers in import-competing sectors.

- It takes time for workers to change sectors, so sectoral shifts cause frictional unemployment.
Industry shares in U.S. GDP, 1960

- Agriculture: 9.9%
- Manufacturing: 57.9%
- Other industry: 4.2%
- Services: 28.0%
Industry shares in U.S. GDP, 1997

- Agriculture: 1.7%
- Manufacturing: 8.5%
- Other industry: 17.8%
- Services: 72.0%
Sectoral shifts abound

- more examples:
  - Late 1800s: decline of agriculture, increase in manufacturing
  - Late 1900s: relative decline of manufacturing, increase in service sector
  - 1970s energy crisis caused a shift in demand away from huge gas guzzlers toward smaller cars.

- In our dynamic economy, smaller (though still significant) sectoral shifts occur frequently, contributing to frictional unemployment.
Public Policy and Job Search

Govt programs affecting unemployment

- *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 losing his/her job.

- UI increases search unemployment, because it:
  - reduces the opportunity cost of being unemployed
  - reduces the urgency of finding work
  - hence, reduces $f$

- Studies: The longer a worker is eligible for UI, the longer the duration of 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: \[ \frac{U}{L} = \frac{s}{s + f} \]

- There are two reasons why \( f < 1 \):
  - 1. job search
  - 2. wage rigidity
Unemployment from real wage rigidity

If the real wage is stuck above the equilibrium level, then there aren't enough jobs to go around.

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Unemployment from real wage rigidity

If the real wage is stuck above the eq’m level, then 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
The minimum wage

- The minimum wage is well below the eq’em wage for most workers, so it cannot explain the majority of natural rate unemployment.

- However, the minimum wage may exceed the eq’em wage of unskilled workers, especially teenagers.

- If so, then we would expect that increases in the minimum wage would increase unemployment among these groups.
The minimum wage in the real world:

- In Sept 1996, the minimum wage was raised from $4.25 to $4.75. Here’s what happened:

<table>
<thead>
<tr>
<th>Unemployment rates, before &amp; after</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>3rd Q 1996</td>
</tr>
<tr>
<td>Teenagers</td>
</tr>
<tr>
<td>Single</td>
</tr>
<tr>
<td>mothers</td>
</tr>
<tr>
<td>All workers</td>
</tr>
</tbody>
</table>

- Other studies: A 10% increase in the minimum wage increases teenage unemployment by 1-3%.
Labor unions

- Unions exercise monopoly power to secure higher wages for their members.
- When the union wage exceeds the eq’m wage, unemployment results.
- Employed union workers are **insiders** whose interest is to keep wages high.
- Unemployed non-union workers are **outsiders** and would prefer wages to be lower (so that labor demand would be high enough for them to get jobs).
## Union membership and wage ratios by industry, 2001

<table>
<thead>
<tr>
<th>industry</th>
<th># employed (1000s)</th>
<th>U % of total</th>
<th>RBU % of total</th>
<th>wage ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>mining</td>
<td>531</td>
<td>12.3%</td>
<td>12.9%</td>
<td>103.4</td>
</tr>
<tr>
<td>construction</td>
<td>6,881</td>
<td>18.4</td>
<td>19.0</td>
<td>151.0</td>
</tr>
<tr>
<td>manufacturing</td>
<td>18,149</td>
<td>14.6</td>
<td>15.5</td>
<td>105.9</td>
</tr>
<tr>
<td>transportation</td>
<td>4,441</td>
<td>24.1</td>
<td>25.4</td>
<td>127.8</td>
</tr>
<tr>
<td>comm. and pub util</td>
<td>2,981</td>
<td>22.6</td>
<td>23.7</td>
<td>104.2</td>
</tr>
<tr>
<td>wholesale trade</td>
<td>4,540</td>
<td>5.5</td>
<td>5.9</td>
<td>105.8</td>
</tr>
<tr>
<td>retail trade</td>
<td>20,505</td>
<td>4.5</td>
<td>5.0</td>
<td>117.8</td>
</tr>
<tr>
<td>fin, insu, and real est</td>
<td>7,648</td>
<td>2.1</td>
<td>2.8</td>
<td>90.1</td>
</tr>
<tr>
<td>services</td>
<td>34,261</td>
<td>5.9</td>
<td>6.8</td>
<td>103.3</td>
</tr>
<tr>
<td>government</td>
<td>19,155</td>
<td>37.4</td>
<td>41.8</td>
<td>121.1</td>
</tr>
<tr>
<td><strong>all</strong></td>
<td><strong>119,092</strong></td>
<td><strong>13.6%</strong></td>
<td><strong>15.0%</strong></td>
<td><strong>118.0</strong></td>
</tr>
</tbody>
</table>

*RBU = nonunion workers represented by a union*  
*wage ratio = 100 × (union + RBU wage) / (nonunion wage)*
Efficiency Wage Theory

- Theories in which high wages increase worker productivity:
  - attract higher quality job applicants
  - increase worker effort and reduce “shirking”
  - reduce turnover, which is costly
  - improve health of workers
    (in developing countries)

- The increased productivity justifies the cost of paying above-equilibrium wages.

- The result: unemployment
Question for Discussion:

- Use the material we’ve just covered to come up with a policy or policies to try to reduce the natural rate of unemployment.

- Note whether your policy targets frictional or structural unemployment.
The duration of U.S. unemployment, average over 1993-2002

<table>
<thead>
<tr>
<th># of weeks unemployed</th>
<th># of unemployed persons as % of total # of unemployed</th>
<th>amount of time these workers spent unemployed as % of total time all workers spent unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>39%</td>
<td>6.5%</td>
</tr>
<tr>
<td>5-14</td>
<td>31%</td>
<td>20.5%</td>
</tr>
<tr>
<td>15 or more</td>
<td>30%</td>
<td>73.0%</td>
</tr>
</tbody>
</table>
The duration of unemployment

The data:
- More spells of unemployment are short-term than medium-term or long-term.
- Yet, most of the total time spent unemployed is attributable to the long-term unemployed.

This long-term unemployment is probably structural and/or due to sectoral shifts among vastly different industries.

Knowing this is important because it can help us craft policies that are more likely to succeed.
Actual & natural rates of unemployment in the U.S.

Unemployment rate
Natural rate of unemployment

% of labor force


CHAPTER 6 Unemployment
The trend in the real minimum wage is similar to the behavior of the natural rate of unemployment.
EXPLAINING THE TREND: Union membership

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

But, from 1950s to about 1980, the natural rate rose while union membership fell.

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of Labor Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>12%</td>
</tr>
<tr>
<td>1945</td>
<td>35%</td>
</tr>
<tr>
<td>1954</td>
<td>35%</td>
</tr>
<tr>
<td>1970</td>
<td>27%</td>
</tr>
<tr>
<td>1983</td>
<td>20.1%</td>
</tr>
<tr>
<td>2001</td>
<td>13.5%</td>
</tr>
</tbody>
</table>
EXPLAINING THE TREND: Sectoral shifts

Since mid-1980s, oil prices less volatile, so fewer sectoral shifts.

- In current dollars (nominal)
- In today's dollars (real)
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 $s$).
The rise in European Unemployment

Percent unemployed

Year


0 2 4 6 8 10 12
The rise in European Unemployment

Two explanations:

1. Most countries in Europe have generous social insurance programs.

2. Shift in demand from unskilled to skilled workers, due to technological change. This demand shift occurred in the U.S., too. But wage rigidity is less of a problem here, so the shift caused an increase in the skilled-to-unskilled wage gap instead of an increase in unemployment.
1. The natural rate of unemployment
   - the long-run average or “steady state” rate of unemployment
   - depends on the rates of job separation and job finding

2. Frictional unemployment
   - due to the time it takes to match workers with jobs
   - may be increased by unemployment insurance
Chapter summary

3. Structural unemployment
   - results from wage rigidity - the real wage remains above the equilibrium level
   - causes: minimum wage, unions, efficiency wages

4. Duration of unemployment
   - most spells are short term
   - but most weeks of unemployment are attributable to a small number of long-term unemployed persons
Chapter summary

5. Behavior of the natural rate in the U.S.
   - rose from 1950s to early 1980s, then fell
   - possible explanations: trends in real minimum wage, union membership, prevalence of sectoral shifts, and aging of the Baby Boomers

6. European unemployment
   - has risen sharply since 1980
   - probably due to generous unemployment insurance there and a technology-driven shift in demand away from unskilled workers