Chapter 17
Wages and Unemployment

工資與失業

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上課時間/地點: 週三上午9:10-12:00/海3006
Learning Objectives

1. Discuss the four important trends that have characterized labor markets in the U.S. since 1960
2. Apply a supply and demand model to understand the labor market
3. Explain how changes in the supply of and the demand for labor explain trends in real wages and employment since 1960
4. Define and calculate the unemployment rate and the participation rate
5. Differentiate among the three types of unemployment defined by economists and the costs associated with each
Wages and Unemployment

Four Trends

Labor Market

Demand for Labor

Supply of Labor

Unemployment

Types
1960年代以後的美國勞動市場：四個主要趨勢
Trend 1: Increasing Real Wages

• Common in industrialized countries in the 20th century

2010

• U.S. real earnings are about twice real earnings in 1960

2010

• U.S. real earnings are nearly five times real earnings in 1929
Trend 2: Slower Wage Growth Since 1973

- The annual rate of real wage growth is uneven
- Data on real wage growth:
  - 1960 – 1973 2.5% per year
  - 1973 – 1996 -1.1% per year
  - 1996 – 2010 2% per year
  - 1973 – 2010 0% per year
Trend 3: Increased Wage Inequality

• Between 1960 and 2010
  – Average real weekly earnings of production/unskilled workers decreased
  – Best-educated, highest-skilled workers' real wages increased

• Income with an advanced college degree is
  – Three times the income of a high school graduate
  – Four times the income of a worker who did not graduate from high school
Trend 4: Increasing Employment

- Between 1980 and 2007 employment in the US increased 46%
  - At the same time over-16 population increased 38%
Learning Objective 2

勞動市場的需求與供給
The Labor Market

• Labor market is an **input market** (生產要素市場)
  – Firms buy labor to produce goods and services

• Supply and demand analysis can be used to find the **price** of labor (wages 工資) and the **quantity** (employment 雇用量)
  – 本章定義”quantity”是雇用人數非工作時數(兩者都可以做為”量”的單位)

• Macroeconomics look at aggregate levels of employment and real wages
  – 總體經濟: 水平加總(產業)，看部分或一般均衡
  – 個體經濟: 水平加總範圍不超過產業，只看部分均衡
Wages and Demand for Labor

• The demand for labor depends upon

  (在給定名目工資的情況下)
  – The productivity of workers (生產力，或邊際產量)
    • Greater productivity increases employment
  – The price of the worker’s output (產品價格)
    • A higher real price increases employment

• Marginal product of labor (MP 或 MPL)

  勞動的邊際產量
  – The extra production gained by adding one more worker (實質變數)
Wages and Demand for Labor

• Diminishing returns to labor (or diminishing MP)

  労動邊際產量遞減
  – Assumes non-labor inputs (e.g. capital) are held constant
  – Adding one worker increases output but by less than the previous worker added

• Value of Marginal Product (VMP or VMPL)

  勞動的邊際產值
  – The extra revenue that an added worker generates
  – \( VMP = P_s \times MP \)  \( P_s \) 為商品價格
## Banana Computers (BCC)

- BCC can sell all its computers for $3,000 each (Table 17.1)

<table>
<thead>
<tr>
<th>Number of Workers</th>
<th>Computers per Year</th>
<th>Marginal Product</th>
<th>Value of Marginal Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>25</td>
<td>$75,000</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>23</td>
<td>69,000</td>
</tr>
<tr>
<td>3</td>
<td>69</td>
<td>21</td>
<td>63,000</td>
</tr>
<tr>
<td>4</td>
<td>88</td>
<td>19</td>
<td>57,000</td>
</tr>
<tr>
<td>5</td>
<td>105</td>
<td>17</td>
<td>51,000</td>
</tr>
<tr>
<td>6</td>
<td>120</td>
<td>15</td>
<td>45,000</td>
</tr>
<tr>
<td>7</td>
<td>133</td>
<td>13</td>
<td>39,000</td>
</tr>
<tr>
<td>8</td>
<td>144</td>
<td>11</td>
<td>33,000</td>
</tr>
</tbody>
</table>
Demand Curve for Labor

• Other conditions unchanged, the wage is lower, the number of workers the firm is willing to hire increases.
  – If the market nominal wage is $60,000, BCC will hire 3 people.
  – If the market nominal wage is $50,000, BCC will hire 5 people.

• Hire an extra worker if and only if the VMP exceeds the wage paid.

• Demand curve for labor = labor marginal revenue product curve (see textbook Chapter 12).

• Negative marginal productivity of labor reflects diminishing labor marginal productivity.
Demand Curve for Labor

• 注意: 課本例子 (Table 17.1-17.3) 和右圖都用名目工資 (W)。但課本有時也用實質工資 (W/P) (Fig.17.2-17.7)，此時勞動需求曲線要改成 VMP/P，或令 P=1。
• 名目方式表達
  \[ W = P_s \times MP = VMP \]
• 實質方式表達
  \[ \frac{W}{P} = \frac{P_s}{P} \times MP = VMP/P \]
Shifting Demand for Labor

- Demand shifts when the value of the marginal product of a worker changes – 任何增加勞動邊際產值的因素都會使勞動需求曲線右移

- Two factors determine the demand ($VMP$) for labor
  - The price of the company’s output ($P_s$)
    - An increase in market demand
  - The productivity of the workers (MP)
    - Greater quantity of non-labor inputs
    - Organizational change
    - Training and education
Price of Output Increases

- If the price of computers increases, demand for labor shifts to the right (Table 17.2)
  - There is a separate demand for labor curve for each possible output price
- An increase in the price of workers' output increases the demand for labor

<table>
<thead>
<tr>
<th>Wage ($000s)</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>30</td>
<td>8</td>
</tr>
</tbody>
</table>

Labor Demand ($P_s = $5,000)$

Labor Demand ($P_s = $3,000)$
Higher Productivity

- Increases in productivity increase VMP (\(P_s\) 不变)
- Demand curve shifts right
- Employers hire more workers at any given wage

(See Table 17.3)
Individual Labor Supply

- **Reservation wage** 保留工資 is the lowest wage a worker would accept for a given job
  - Opportunity cost of working is your leisure activity
  - Work compensates you for lost leisure
    - If working conditions are unpleasant or dangerous, a premium for that would be included in the wage
Aggregate Labor Supply

• Macroeconomic determinants of labor supply
  – **Size** of the working age population
    • Domestic birthrate
    • Immigration and emigration
    • Ages when people enter and retire from the workforce
  – **Share** of working-age population willing to work
The labor supply curve slopes up because at a higher real wage, more people are willing to work.
Shifts in Labor Supply

- A shift in labor supply is caused by any change in the number of workers willing to work at each wage (給定工資) 任何增加勞動人口的因素都會使勞動供給曲線右移
  - Increase in the working-age population
    - Baby Boom
    - Higher net immigration
    - Increasing age at retirement
  - Increase in the share of working-age population willing to work
    - Women's participation in the labor force has increased in the last 50 years
Learning Objective 3

以供需模型解释1960年代以后美国的劳动市场趋势
Trend 1: Increasing Real Wages

• Industrialized countries have had sustained growth in productivity in the 20th century
  – Increases demand for labor
  – Both real wages and employment increased

• Marginal productivity (MP) increases were due to
  – Technological progress
  – Increases in capital
  – Increases in other inputs
Trend 2: Slower Wage Growth Since 1970

- Slower growth in real wages is a combination of
  - Slower growth in demand for labor ($N↑ \ W/P↑$)
  - Faster growth in the supply of labor ($N↑ \ W/P↓$)
- Productivity growth and real wages move together

<table>
<thead>
<tr>
<th></th>
<th>Productivity</th>
<th>Real Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960 – 1970</td>
<td>2.74%</td>
<td>2.27%</td>
</tr>
<tr>
<td>1970 – 1980</td>
<td>1.71</td>
<td>1.23</td>
</tr>
<tr>
<td>1980 – 1990</td>
<td>1.60</td>
<td>0.71</td>
</tr>
<tr>
<td>1990 – 2000</td>
<td>2.04</td>
<td>1.50</td>
</tr>
<tr>
<td>2000 – 2010</td>
<td>2.60</td>
<td>0.92</td>
</tr>
</tbody>
</table>
Trend 2: Slower Wage Growth Since 1970

- Slower demand growth explains slower wage growth (D右移幅度沒有那麼多)
  - Does not explain rapid growth in employment (因為還需加上S右移)
- Supply of labor increased due to
  - Increased participation by women
  - Baby Boom
  - High rates of immigration
  - 解釋了Trend 4: Increasing employment
Trend 3: Increased Wage Inequality

- Benefit of globalization is increased specialization and efficiency
  - *Principle of Comparative Advantage (Ch2)*
- Globalization (導致工資不平等原因一) also means that some goods produced domestically are no longer competitive
  - 进口多的產業: 對國產品需求下降→(服飾)價格下降→D左移
  - 出口多的產業: 對國產品需求上升→(軟體)價格上漲→D右移
Trend 3: Increased Wage Inequality

Figure 17.6
Trend 3: Increased Wage Inequality

- When wages in importing industries fall and wages in exporting industries rise, wage inequality increases
  - Low-skill industries in the U.S. face the toughest international competition
  - Political resistance to free trade grows

- **Worker mobility** is the movement of workers between jobs, firms, and industries
  - Market incentives move workers out of textiles and into software
  - Transition aid by government can assist workers to make the change
Trend 3: Increased Wage Inequality

- **Technological change** (導致工資不平等原因二) can be a source of increasing wage inequality
  - Occurs if technical change favors higher-skilled or better-educated workers
- Some innovation renders old skills less valuable
  - Addition and the calculator and computer
- **Skill-biased technological change** affects the marginal products of higher skilled workers differently from those of lower-skilled workers
  - Recent changes favor higher skilled workers
  - Automobile production lines increasingly use robots
Skill-Biased Technological Change

Unskilled Workers

Skilled Workers

Employment

$W_{S/P}$

$W'_{S/P}$

$N'_U$ $N_U$

$S_U$

$D_U$

$D'_U$

$S_S$

$D'_S$

$D_S$

$N_S$ $N'_S$
Learning Objective 4

失業(率)的定義與衡量
Unemployment

- Bureau of Labor Statistics (BLS) estimates employment and unemployment monthly (只看勞動人口=16歲以上人口=A+B+C)

- 勞動力 Labor force = A+B
- 失業率 Unemployment rate = B / (A+B)
- 勞動參與率 Participation rate = A+B / (A+B+C)
# U.S. Employment Data, April 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>139.7 million</td>
</tr>
<tr>
<td>Unemployed</td>
<td>13.7 million</td>
</tr>
<tr>
<td>Labor Force</td>
<td>153.4 million</td>
</tr>
<tr>
<td>Not in the Labor Force</td>
<td>85.7 million</td>
</tr>
<tr>
<td>Working-Age Population</td>
<td>239.1 million</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>9.0%</td>
</tr>
<tr>
<td>Participation rate</td>
<td>64.2%</td>
</tr>
</tbody>
</table>
Duration of Unemployment

- Costs of unemployment are directly related to the length of time a person has been unemployed
  - **Unemployment spell** is the period during which an individual is continuously unemployed
  - **Duration of unemployment** is the length of the unemployment spell
- The unemployed population in April 2011

<table>
<thead>
<tr>
<th>Duration (weeks)</th>
<th>5 or less</th>
<th>5 – 14</th>
<th>More than 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of unemployed</td>
<td>20%</td>
<td>22%</td>
<td>58%</td>
</tr>
</tbody>
</table>
Duration of Unemployment

- Long-term unemployed have been out of work for 6 months or longer
- Short-term unemployed have several possible outcomes
  - Find a permanent job after searching a few weeks
    - Economic costs are low
  - Leave the labor force
  - Short-term or temporary job that leads to unemployment again
    - These chronically unemployed have costs similar to the long-term unemployed
Costs of Unemployment

• Economic costs
  – Lost wages and production
  – Decreased taxes and increased transfers

• Psychological costs
  – Individual self-esteem
  – Family stress of decreased income and increased uncertainty

• Social costs
  – Potential increases in crimes and social problems
    • Social resources spent to address these
Other Unemployment Issues

- **Discouraged workers** would like to have a job but they have not looked for work in the past four weeks
  - Counted as out of the labor force
  - Willing and ready to work
  - Could be counted as unemployed but they are not

- Involuntary part-time workers are people who like to work full-time but cannot find a full-time job
  - Counted as employed
Learning Objective 5

三種不同型態的失業
Types of Unemployment

• Frictional unemployment (摩擦性失業) occurs when workers are between jobs
  – Short duration, low economic cost
  – 轉換工作時發生，無可避免，不管任何時候都存在於經濟體內
  – 因為資訊不夠完每，找工作的人和職缺需要一段時間媒合
  – May increase economic efficiency
Types of Unemployment

- **Structural unemployment** (結構性失業) is long-term unemployment in a well-functioning economy
  - Lack of skills, language barriers, or discrimination
  - Structural shifts in production create a long-term mismatch between workers and market needs (e.g. steel vs. computer software) 技能不符產業需要
  - Barriers to employment such as (其他造成結構性失業因素)
    - Minimum wages
    - Labor Unions
    - Unemployment Insurance
  - High economic, psychological, and social costs
Minimum Wage Laws

- Setting a minimum wage ($W_{min}$) above equilibrium ($W$) creates ($N_B - N_A$) unemployment
- Workers who find a minimum-wage job get a higher wage
  - Others are unemployed
Types of Unemployment

• **Cyclical unemployment** (循環性失業) is the increase in unemployment during economic slow-downs
  – Usually **short duration**
  – Economic cost is the decline in real GDP 和景氣循環有關
• 長期失業=自然失業=摩擦性失業+結構性失業
• 短期失業=循環性失業