Productivity, Output, and Employment, Part 2

Agenda

- The Supply of Labor
- Labor Market Equilibrium
- Unemployment
- Okun’s Law

The Supply of Labor

- Supply of labor is determined by individuals:
  - Aggregate labor supply is the sum of individuals’ labor supply.
  - The labor supply of individuals depends on their labor-leisure choices.

The Supply of Labor

- The income-leisure trade-off:
  - Utility depends on consumption and leisure.
  - Compare costs & benefits of working another day.
    - Costs: Loss of leisure time.
    - Benefits: More consumption because of higher income.
  - Utility maximizing individuals will:
    - Work another day if the benefits exceed the costs and
    - Keep working additional days until benefits equal costs.
The Supply of Labor

- Real wages and labor supply:
  - An increase in the real wage has 2 effects:
    - A substitution effect: A higher real wage increases the reward for working so more labor is supplied.
    - An income effect: A higher real wage increases income for same amount of work time so a person can afford more leisure and will supply less labor.

The Supply of Labor

- Real wages and labor supply:
  - A pure substitution effect: a one-day rise in the real wage.
    - A temporary real wage increase has a pure substitution effect because the effect on wealth is negligible.
    - Consequently, an increase in labor supply.

The Supply of Labor

- Real wages and labor supply:
  - A pure income effect: winning the lottery.
    - Winning the lottery doesn’t have a substitution effect, because it doesn’t affect the reward for working.
    - But it makes a person wealthier, so a person will both consume more goods and take more leisure.
    - Consequently, a reduction in labor supply.

The Supply of Labor

- Real wages and labor supply:
  - The substitution effect and the income effect together: a long-term increase in the real wage.
    - The reward to working is greater so there is a substitution effect toward more work.
    - With higher wage, a person doesn’t need to work as much to consume the same basket of goods and services so there is an income effect toward less work.
The Supply of Labor

- Real wages and labor supply:
  - The substitution effect and the income effect together: a long-term increase in the real wage.
    - The longer the high wage is expected to last, the stronger the income effect.
    - Thus labor supply will increase by less (or decrease by more) than for a temporary increase in the real wage.

The Labor Supply Curve

- The labor supply curve, \( N_s \), relates the quantity of labor supplied to the current real wage.
  - Increases in the current real wage raise the quantity of labor supplied.
    - Some people work more hours.
    - Other people enter the labor force.
  - The labor supply curve slopes upward.

The Supply of Labor

- Real wages and labor supply:
  - Labor supply increases with a temporary rise in the real wage.
  - Labor supply decreases with a permanent rise in the real wage.
The Supply of Labor

- Factors that shift the labor supply curve:
  - **Wealth**: Higher wealth reduces labor supply, i.e., shifts the labor supply curve to the left.
  - **Expected future real wage**: Higher expected future real wage is like an increase in wealth and reduces labor supply, i.e., shifts the labor supply curve to the left.

Labor Market Equilibrium

- The labor market will be in equilibrium when labor supply equals labor demand.
  - Determines the full-employment level of employment, \( \bar{N} \), and the market-clearing real wage, \( \bar{w} \).
Labor Market Equilibrium

- Full-employment output:
  - **Full-employment output** is the level of output when the labor market is in equilibrium.
    - Also called **potential output**.
    
  \[ \bar{Y} = AF(K, \bar{N}) \]

Labor Market Equilibrium

- Factors that change full-employment output:
  - **Shifts** in the demand for labor and/or supply of labor that affects the full-employment level of employment.
  - **Shifts** in the production function from supply or productivity shocks.
    - Which will also shift the demand for labor.

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Full-Employment Output

- **Y** = \( AF(K_p, N) \)
Adverse Supply Shock and Labor Market

\[ W \]

N

\[ N_D \]

Unemployment

- Measuring unemployment:
  - Three Categories:
    - Employed,
    - Unemployed, or
    - Not in the labor force.
  - Labor Force = Employed + Unemployed

Adverse Supply Shock & Production Function

\[ Y = A_0 F(K_0, N) \]
Unemployment

- Changes in employment status:
  - Flows between categories.
    - Discouraged workers are people who have become so discouraged by lack of success at finding a job that they stop searching.
      - They are in “not in the labor force.”

Average monthly changes in employment status

<table>
<thead>
<tr>
<th>Category</th>
<th>Number (millions)</th>
<th>Share of labor force (percent)</th>
<th>Share of adult population (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed workers</td>
<td>144.0</td>
<td>95.4</td>
<td>63.2 (employment rate)</td>
</tr>
<tr>
<td>Unemployed workers</td>
<td>7.0</td>
<td>4.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Labor force (employed + unemployed)</td>
<td>151.0</td>
<td>100.0</td>
<td>66.1 (participation rate)</td>
</tr>
<tr>
<td>Not in labor force</td>
<td>77.4</td>
<td>37.8</td>
<td></td>
</tr>
<tr>
<td>Adult population</td>
<td>228.4</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Figures may not add up because of rounding.
Unemployment

• How long are people unemployed? Example:
  ➢ Labor force = 100.
  ➢ On the first day of every month, 2 workers become unemployed for one month each.
  ➢ On the first day of every year, 4 workers become unemployed for one year each.

Unemployment

• How long are people unemployed? Example:
  ➢ 28 spells of unemployment during a year.
    • 24 short spells of one month each
    • 4 long spells of one year each.
  ➢ Most spells of unemployment are short.

Unemployment

• How long are people unemployed? Example:
  ➢ On any given date, 6 people will be unemployed.
    • 4 have long spells of one year each.
    • 2 have short spells of one month each.
  ➢ Most unemployed people on a given date have long spells of unemployment.

Unemployment

• Why there are always unemployed people?
  ➢ Frictional unemployment:
    • Search activity of firms and workers due to heterogeneity of positions and workers.
    • Matching process can be time consuming and costly.
Unemployment

• Why there are always unemployed people?
  ➢ **Structural unemployment:**
    • Structural unemployment is the long-term and chronic unemployment that exists even when the economy is not in a recession.
    • **Chronically unemployed:** workers who are unemployed a large part of the time.

• The **natural rate of unemployment** ($\bar{u}$):
  ➢ The natural rate of unemployment is the level of unemployment that exists even when output and employment are at their full-employment levels.
    • The sum of frictional and structural unemployment.

Unemployment

• Why there are always unemployed people?
  ➢ **Structural unemployment:**
    • One cause: Lack of skills prevents some workers from finding long-term employment.
    • Another cause: Reallocation of workers out of shrinking industries or depressed regions; matching takes a long time.

• **Cyclical unemployment:**
  • Cyclical unemployment is difference between actual unemployment rate and natural rate of unemployment and is given by:
    $$ u - \bar{u} $$
Unemployment

- Labor market data:
  - BLS Employment Situation report:
    - Household survey: unemployment, employment.
    - Establishment survey: jobs

Okun’s Law

- **Okun’s Law** is the relationship between output (relative to full-employment output) and cyclical unemployment and is given by:

\[
\frac{\bar{Y} - Y}{\bar{Y}} = 2(u - \bar{u})
\]

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**Okun’s Law**

- Why is the Okun’s Law coefficient 2, not 1?
  - When cyclical unemployment rises:
    - The labor force falls,
    - Hours of work per worker decline, and
    - Average productivity of labor generally declines.
  - The result is a 2% reduction in output (relative to potential output) for even 1 percentage point increase in the unemployment rate.

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**Okun’s Law**

- If the economy’s average growth rate of full-employment output is 3%, then:

\[
\Delta \frac{Y}{Y} = 3 - 2 \Delta u
\]
**Okun’s Law**

\[
\frac{\Delta Y}{Y} \quad 0 \quad \Delta u
\]

**Figure 3.15 Okun’s Law in the U.S.**

**Key Diagram #2b: Supply of Labor**

- Factors that Shift the Supply of Labor:
  - Increases in wealth reduce labor supply and shift \( N_s \) left.
  - Increases in expected future real wages reduce labor supply and shift \( N_s \) left.
Key Diagram #2b

- Factors that Shift the Supply of Labor:
  - Increases in the working-age population increase labor supply and shift $N_s$ right.
  - Increases in the labor force participation rate increase labor supply and shift $N_s$ right.

Key Diagram #2: Labor Market Equilibrium

![Diagram of labor market equilibrium with supply and demand curves, showing equilibrium at point $N_0$ and $N_s$]