HE2002 Macroeconomics II
Lecture 5 The Labor Market

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1 Lecture Outline

- A Tour of the Labor Market
- Movements in Unemployment
- Wage Determination
- Price Determination
- The Natural Rate of Unemployment

2 Today's Lecture

- Look at the labor market and the movements in unemployment.
- Know how the wage and the price are determined.
- Look at the wage-setting relation and the price-setting relation to understand the links between unemployment, firm's markup, and the real wage.

3 The Labor Market, Prices and Wages

- What happens when firms respond to an increase in demand by increasing production?
  - 1. Higher production leads to higher employment.
  - 2. Higher employment leads to lower unemployment.
  - 3. Lower unemployment leads to higher wages.
  - 4. Higher wages increase production costs and hence firms increase prices.
  - 5. Higher prices lead to workers asking for higher wages.
  - 6. Higher wages lead to further increase in prices, and so on.

4 From the Short Run to the Medium Run

- We have focused on the **short run** by assuming a **constant price level** in the IS – LM model.
- we now turn to the **medium run** and explore **how prices and wages adjust over time**, and how this in turn affects output.
- The **labor market** is the center of that sequence of events.

5 Labor Force, Employed and Unemployed

- In Singapore, each person who is 16 years or older is placed in one of the three categories:
  - **Employed** - A person is employed if he or she worked full-time or part-time during the past week or is on vacation or sick leave from a regular job.
  - **Unemployed** - A person is unemployed if he or she did not work during the preceding week but made some effort to find work.
  - **Out of the labor force** - A person is considered to be out of labor force if he or she did not work in the past week and did not look for work.

6 Unemployment Rate and Participation Rate

- **Labor force** includes those who are employed and unemployed.
- **Unemployment rate** is the ratio of unemployed to labor force, i.e.

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{\text{Labor force}} = \frac{\text{Unemployed}}{\text{Employed} + \text{Unemployed}}$$

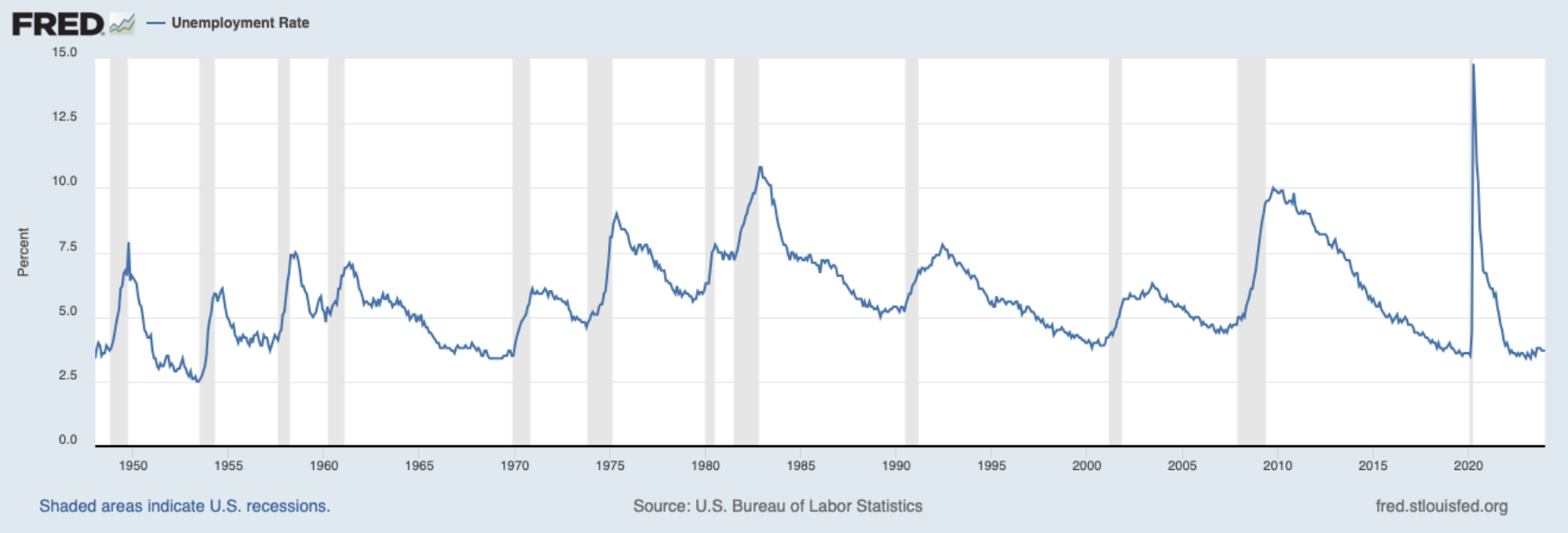
- **Participation rate** is the ratio of labor force to population of age 16+, i.e.

$$\text{Participation rate} = \frac{\text{Labor force}}{\text{Population age 16+}}$$

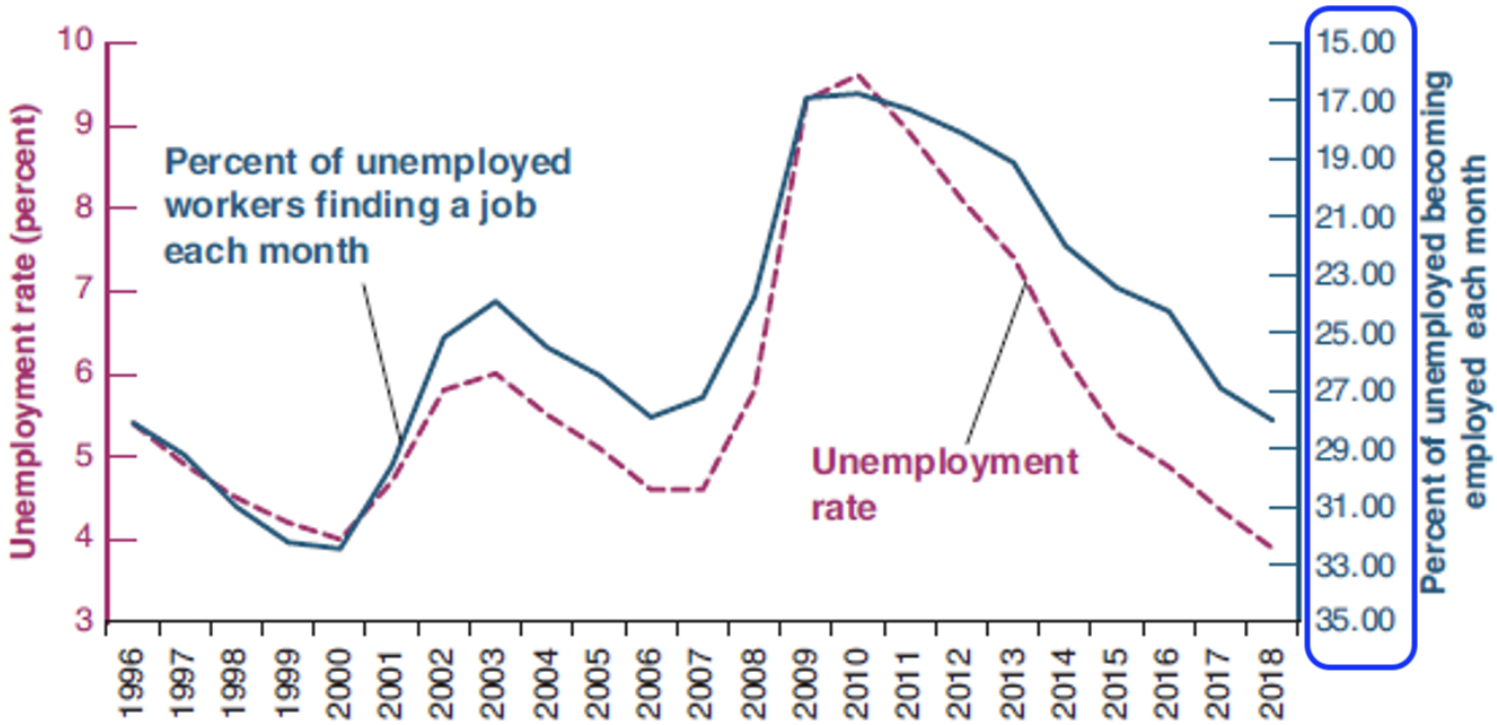
7 The US Labor Market in 2018

- The 2018 unemployment rate was $6.3/162.0 = 3.9\%$.

8 Movements in the US Unemployment Rate

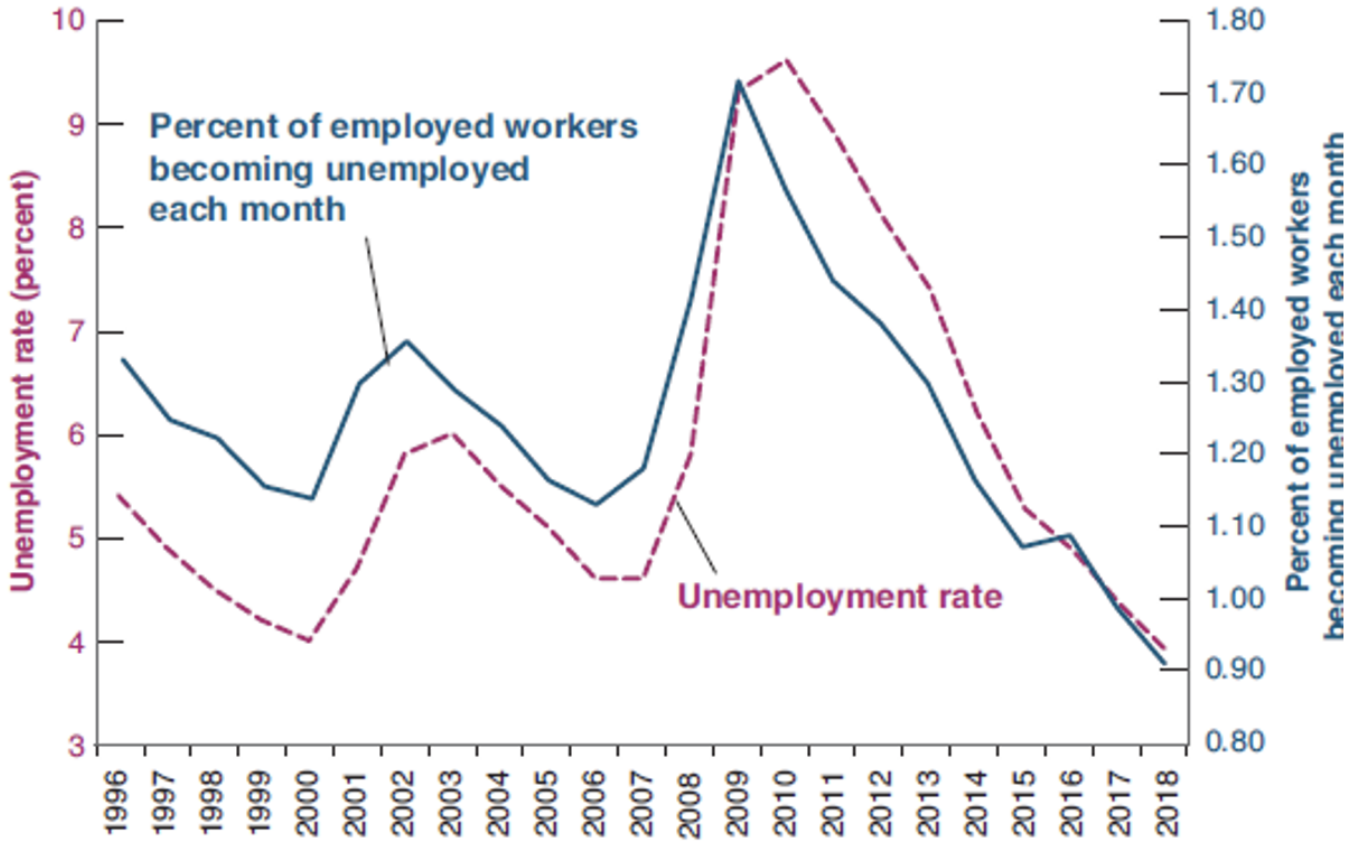


9 The Unemployment Rate and the Proportion of Unemployed Becoming Employed within a Month



- When unemployment is higher, the proportion of unemployed becoming employed within one month is lower. Note that the scale on the right is an inverted scale.

10 The Unemployment Rate and Proportion of Workers Becoming Unemployed



- When unemployment is higher, a higher proportion of workers become unemployed.

11 Movements in Unemployment and How the Movements Affect Individual Workers

- When unemployment is high, workers are worse off in two ways:
  - Employed workers face a higher probability of losing their job.
  - Unemployed workers face a lower probability of finding a job; or they can expect to remain unemployed for a longer time.

Sample Question 1 (vevox ID: 199-969-618)

When the unemployment rate is low, we would expect that

- A) the probability of losing a job is high.
- B) the probability of losing a job is low.
- C) the probability an unemployed individual will find another job is low.
- D) the separation rate will increase.

12 Wage Determination - Bargaining and Bargaining Power

- The higher the skills needed to do the job, the more likely there is to be bargaining between employers and individual employees.

- Workers' **bargaining power** depends on:
  - How costly for the firm to find other workers
  - How hard for workers to find another job if they were to leave the firm

- The costlier it is for firm to replace them and the easier it is for them find another job, the more bargaining power they will have.

Nobel Prize in Economic Sciences (2010)

13 Wage Determination - Some Facts

- Even though there are differences across workers and across countries in wage determination, two sets of facts stand out:
  - Workers are typically paid a wage exceeding their **reservation wage** – the wage that would make them indifferent between working or being unemployed. They may want their workers to be productive, and makes it more attractive for workers to stay.
  - Wages typically depends on **labor-market conditions**: the lower the unemployment rate, the higher the wages.

14 Efficient Wages

- Theories that link the productivity or the efficiency of workers to the wage they are paid are called the **efficiency wage theories**.
- Efficiency wage theories suggest that wages depend on both the nature of the job and labor market conditions.

15 Wages, Prices, and Unemployment

- We can capture our discussion of wage determination by using the following equation:

$$W = P^e F(u, \ z) \qquad (5.1)$$
$$(-, +)$$

- The **aggregate nominal wage** W depends on:
  - the expected price level, P^e
  - the unemployment rate, u
  - a catch-all variable, z

16 Expected Price Level P^e

- Both workers and firms care about **real wages** (W/P), not nominal wages.
- The nominal wage depends on the **expected price level**.
- Why do nominal wages depend on the expected price level, P^e rather than the actual price level, P?
- Because wages are set in nominal (dollar) terms and when they are set, the relevant price level is not yet known!

Note: A doubling in the expected price level leads to a doubling of the nominal wage chosen when wages are set.

17 Unemployment Rate u

- **Unemployment rate u**:
  - An increase in the unemployment rate u decreases wages.
  - Economic Intuition: Higher unemployment either weakens worker' bargaining power or allows firms to pay lower wages and still keep workers willing to work.

$$W = P^e F(u, \ z) \qquad (5.1)$$
$$(-, +)$$

18 The Other Factors z

- z stands for all the factors that affect wages given the expected price level and the unemployment rate, for example:
  - **unemployment insurance** as the payment of unemployment benefits to workers who lose their jobs
  - **employment protection** makes it more expensive for firms to lay off workers

$$W = P^e F(u, \ z) \qquad (5.1)$$
$$(-, +)$$

19 A Simple Firm's Production Function

- We assume that the prices set by firms depends on their costs, which in turn depends on the nature of the **production function**:

$$Y = AN$$

  Where Y is output, N is employment and A is **labor productivity** (output per worker).

- The production function is the relation between the inputs used in production and the quantity of output produced, and on the prices of these inputs.

20 Price Determination

- Assume that A is constant and $A = 1$, then:

$$Y = N \qquad (5.2)$$

  which implies that the cost of producing one more unit of output is the cost of employing one more worker at W.

- In other words, the marginal cost of production is equal to W.

- Now assume firms set their price according to a **markup** m over the cost so that:

$$\text{Price Determination :} \quad P = (1 + m)W \qquad (5.3)$$

21 The Natural Rate of Unemployment

- What are the implications of wage and price determination for unemployment?
- Suppose we assume that $P^e = P$.
- With this assumption, wage setting and price setting determine the equilibrium rate of unemployment (**natural rate of unemployment**).

22 The Natural Rate of Unemployment (Preview)

Wage determination $\Longrightarrow$ Wage-setting relation

Price determination $\Longrightarrow$ Price-setting relation

Wage-setting relation + Price-setting relation + $(P^e = P) \Longrightarrow$
The Natural Rate of Unemployment

23 Wage-setting Relation

- Suppose we assume that $P^e = P$, then W depends on the actual price level (P), equation (5.1) becomes:

$$\frac{W}{P} = F(u, \ z) \qquad (5.4)$$
$$(-, +)$$

- It implies a negative relation between the real wage, W/P and the unemployment rate: the higher the unemployment rate, the lower the real wage chosen by wage setters.

- The **wage-setting relation** is the relation between the **real wage** and the rate of **unemployment**.

24 Price-setting Relation

- Let's look at the implication of price determination. Now divide both sides of the price-determination equation (5.3) by the nominal wage:

$$\frac{P}{W} = 1 + m \qquad (5.5)$$

- Inverting both sides gives the implied real wage, or the **price-setting relation**:

$$\frac{W}{P} = \frac{1}{1+m} \qquad (5.6)$$

- Price-setting decisions determine the real wage paid by firms. It is drawn as the horizontal PS implying that price setting does not depend on the unemployment rate.

Sample Question 2 (vevox ID: 199-969-618)

Based on price setting behavior, we know that a reduction in the unemployment rate will cause

- A) no change in the real wage.
- B) a reduction in the real wage.
- C) an increase in the real wage.
- D) an upward shift of the PS curve.

25 Wages, Prices, and the Natural Rate of Unemployment

- The natural rate of unemployment is the unemployment rate such that the real wage chosen in wage setting is equal to the real wage implied by price setting (equilibrium is satisfied).

26 The Natural Rate of Unemployment

- The equilibrium unemployment rate u_n can be derived by eliminating W/P between equations (5.4) and (5.6):

$$F(u_n, \ z) = \frac{1}{1+m} \qquad (5.7)$$

- u_n is also called the **natural rate of unemployment** or the **structural rate of unemployment**.

- The position of WS depends on z, and the position of PS depends on m, and hence u_n depend on both z and m.

27 Change in Unemployment Benefits and the Natural Rate of Unemployment

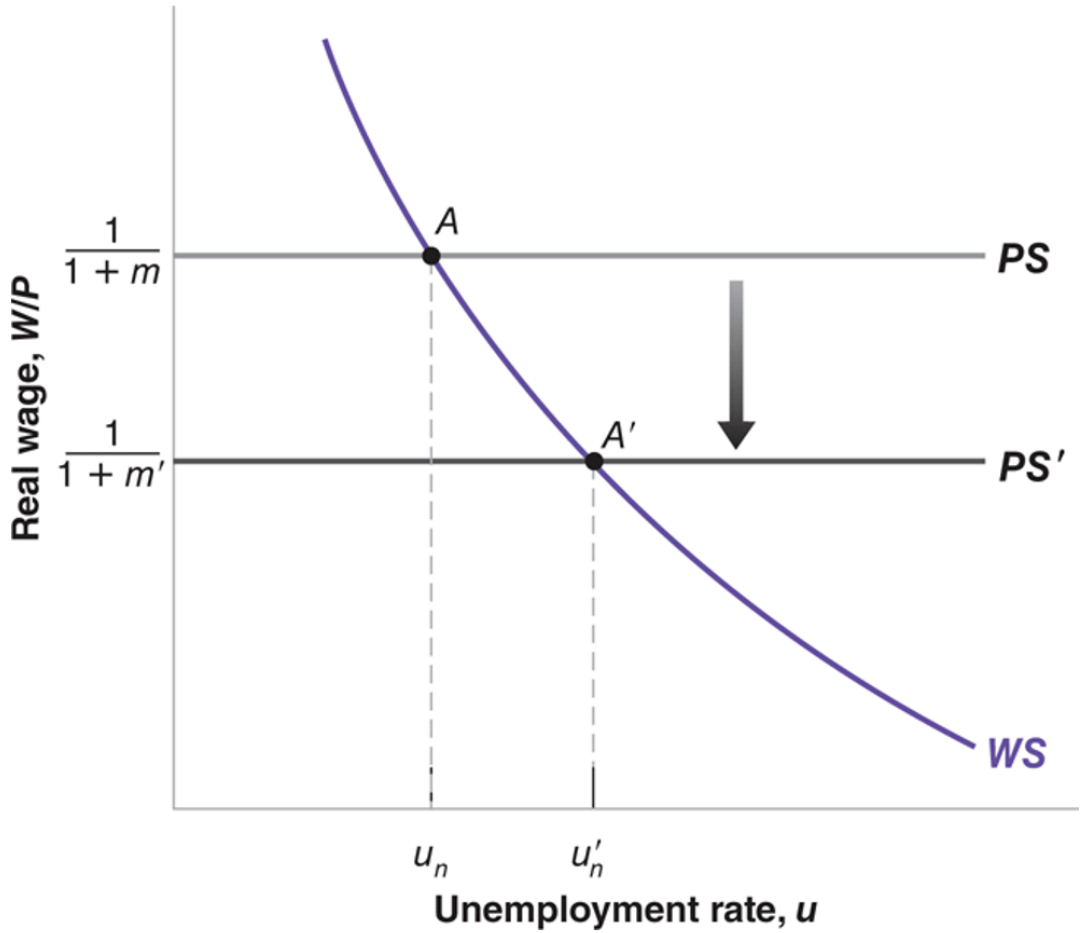
- An increase in z: An increase in unemployment benefits leads to an increase in the natural rate of unemployment.

28 An Increase in Unemployment Benefits

- An increase in unemployment benefits makes the prospect of unemployment less painful.
- It increases the wage set by wage setters at a given unemployment rate, therefore, the WS curve shifts up.

  (An increase in z)
- This leads to an increase in the natural rate of unemployment as shown in the figure of Slide 27.

29 Change in Markups and the Natural Rate of Unemployment



- An increase in m: An increase in the markup leads to an increase in the natural rate of unemployment.

30 An Increase in the Markup

- An increase in the markup m implies a decrease in the real wage paid by firms and so it shifts the PS curve down as shown in the figure of Slide 29.

- The economy moves along WS and this leads to an increase in the natural rate of unemployment.

Sample Question 3 (vevox ID: 199-969-618)

For this question, assume that $Y = N$. Based on our understanding of the labor market model presented in Lecture 5, we know that an increase in the minimum wage will cause

- A) an increase in the natural level of output.
- B) a reduction in the natural level of output.
- C) no change in the natural level of output.
- D) an increase in the natural level of employment.

31 Where We Go from Here

- We have assumed that the price level is equal to the expected price level (in Lecture 5).
- In the short run, the price level may well turn out to be different from what is expected when nominal wages are set, so that unemployment is not necessarily equal to the natural rate.
- Because expectations are unlikely to be systematically wrong, in the medium run, unemployment tends to return to its natural level.
- The next lecture will relax the assumption that the price level is equal to the expected price level.

32 Exit Ticket (vevox ID: 142-121-462)

- One idea you learned today that was surprising or interesting to you.
- Are there topics you wish had been covered in more detail, or questions you feel are unanswered?

- **Any questions?**

You can find me at guangzhi.ye@ntu.edu.sg or by scheduling an in-person meeting through https://calendly.com/guangzhiye24.