

# Wage setting and price setting curves

See BAG-chapter 8

# Wages, Prices, and Unemployment

$$W = P^e F(u, z)$$

(−, +)

The aggregate nominal wage,  $W$ , depends on three factors:

- The expected price level,  $P^e$
- The unemployment rate,  $u$
- A catchall variable,  $z$ , that stands for all other variables that may affect the outcome of wage setting.

# Wage Determination

## The Expected Price Level

Both workers and firms care about *real wages* ( $W/P$ ), not nominal wages ( $W$ ).

- Workers do not care about how many dollars they receive but about how many goods they can buy with those dollars. They care about  $W/P$ .
- Firms do not care about the nominal wages they pay but about the nominal wages,  $W$ , they pay relative to the price of the goods they sell,  $P$ . They also care about  $W/P$ .

# Wage Determination

## The Unemployment Rate

Also affecting the aggregate wage is the unemployment rate,  $u$ .

If we think of wages as being determined by bargaining, then higher unemployment weakens workers' bargaining power, forcing them to accept lower wages. Higher unemployment allows firms to pay lower wages and still keep workers willing to work.

# Wage Determination

## The Other Factors

The third variable,  $z$ , is a catchall variable that stands for all the factors that affect wages, given the expected price level and the unemployment rate.

**Unemployment insurance** is the payment of unemployment benefits to workers who lose their jobs.

# Price Determination

- The production function is the relation between the inputs used in production and the quantity of output produced.
- Assuming that firms produce goods using only labor, the production function can be written as:

$$Y = AN$$

$Y$  = output

$N$  = employment

$A$  = **labor productivity**, or output per worker

# Price Determination

- Firms set their price according to:

$$P = (1 + \mu) \frac{W}{A}$$

The term  $\mu$  is the **markup** of the price over the cost of production. If all markets were perfectly competitive,  $\mu = 0$ , and  $P = W/A$  (i.e. price=marginal cost)

# The Natural Rate of Unemployment

- In this section we will look at the implications of wage and price determination for unemployment.

Let's assume that nominal wages depend on the actual price level,  $P$ , rather than on the expected price level,  $P^e$ .

$$W = PF(u, z)$$

( $-$ ,  $+$ )

Wage setting and price setting determine the equilibrium rate of unemployment.



# The Natural Rate of Unemployment

## The Wage-Setting Relation

- Since  $P^e$  equals  $P$ , then:

$$W = PF(u, z)$$

We can divide both sides by the price level:

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

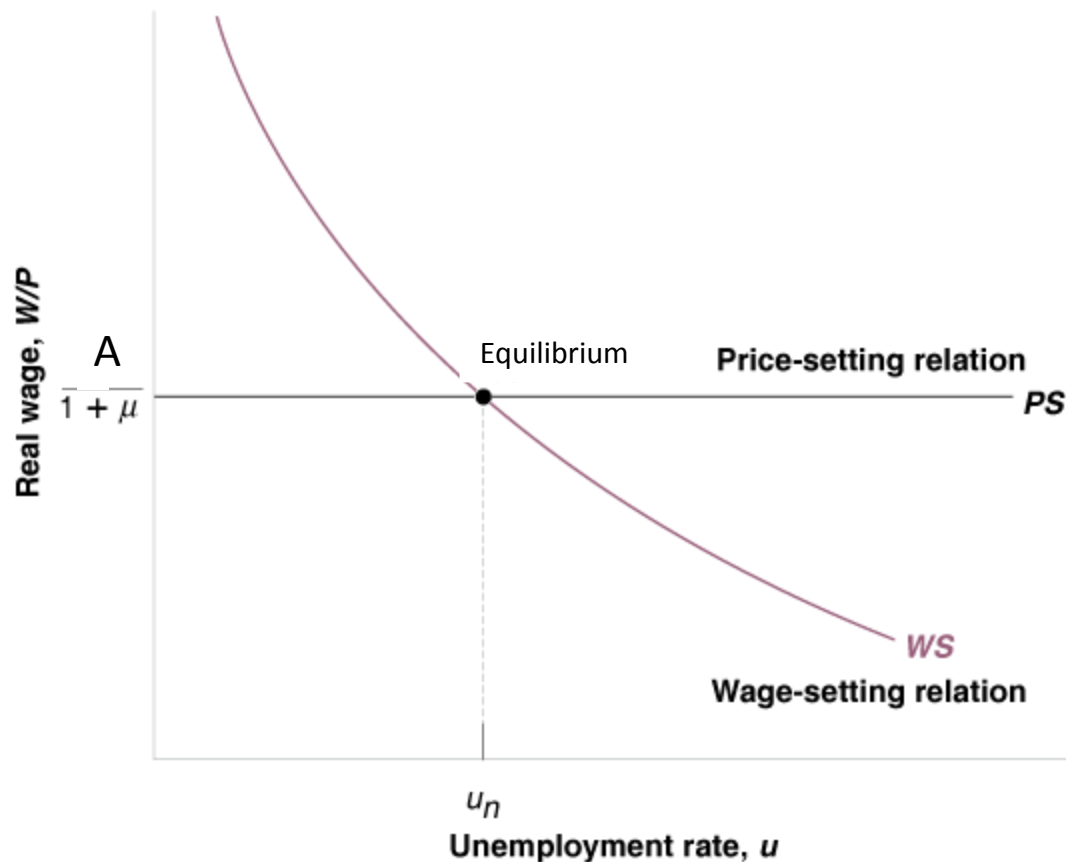
This relation between the real wage and the rate of unemployment—**wage-setting relation**.

# The Natural Rate of Unemployment

## The Wage-Setting Relation

### *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.




# The Natural Rate of Unemployment

## The Price-Setting Relation

- The price-determination equation is:

$$P = (1 + \mu) \frac{W}{A}$$

We can easily state this equation in terms of the wage rate, as follows

$$\frac{W}{P} = \frac{A}{(1 + \mu)}$$


The price-setting relation

# The Natural Rate of Unemployment

## Equilibrium Real Wages and Unemployment

- Eliminating  $W/P$  from the wage-setting and the price-setting relations, we can obtain the equilibrium unemployment rate, or natural rate of unemployment,  $u_n$ :

$$F(u_n, z) = \frac{A}{1 + \mu}$$

The equilibrium unemployment rate ( $u_n$ ) is called the **natural rate of unemployment**.

# The Natural Rate of Unemployment

## Equilibrium Real Wages and Unemployment

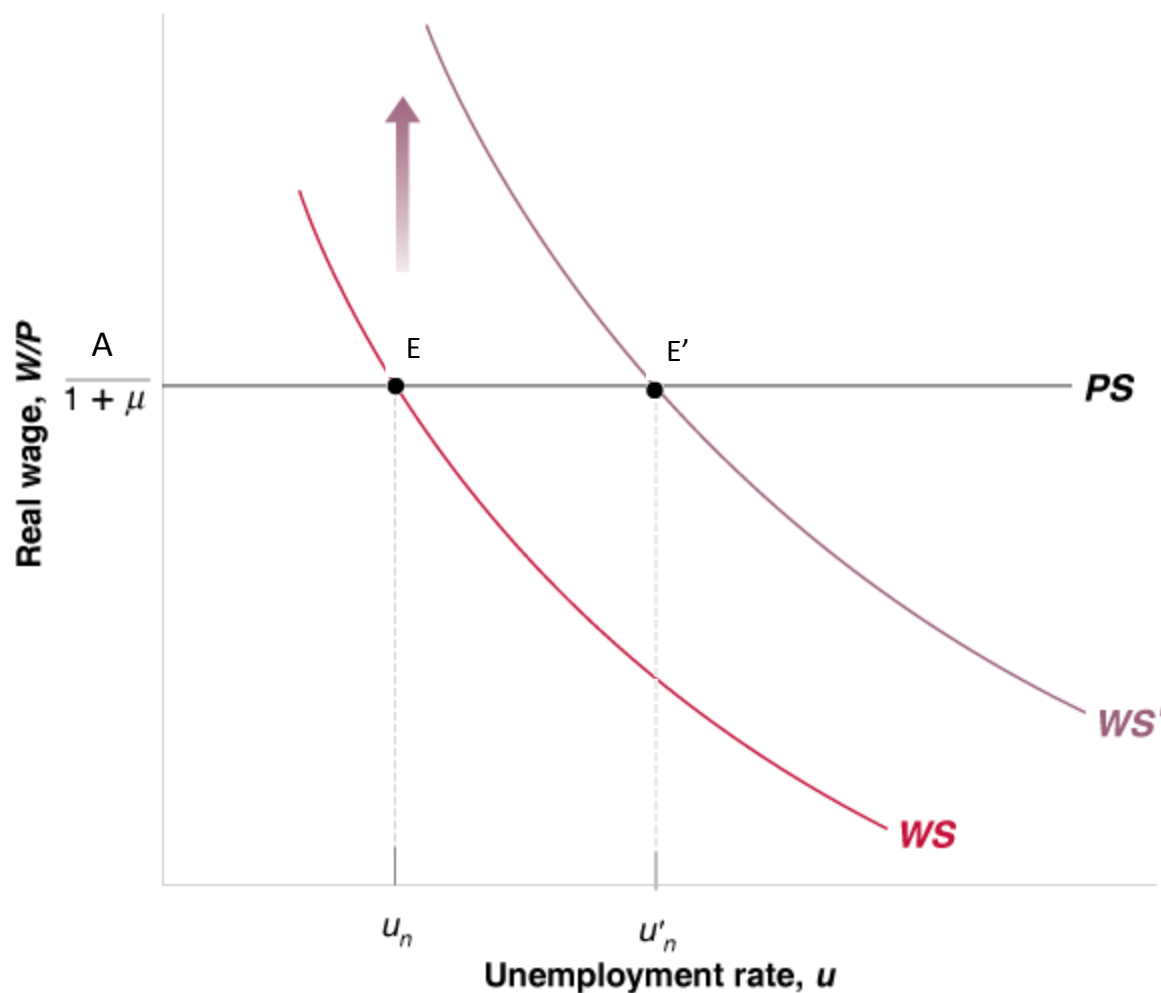
- The positions of the wage-setting and price-setting curves, and thus the equilibrium unemployment rate, depend on  $A$ ,  $z$  and  $\mu$ .
  - If productivity  $A$  increases, then the real wage increases and the unemployment rate decreases.
  - At a given unemployment rate, higher unemployment benefits lead to a higher real wage. A higher unemployment rate is needed to bring the real wage back to what firms are willing to pay.
  - By letting firms increase their prices given the wage, less stringent enforcement of antitrust legislation leads to a decrease in the real wage.

# The Natural Rate of Unemployment

## Equilibrium Real Wages and Unemployment

### *Unemployment Benefits and the Natural Rate of Unemployment*

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

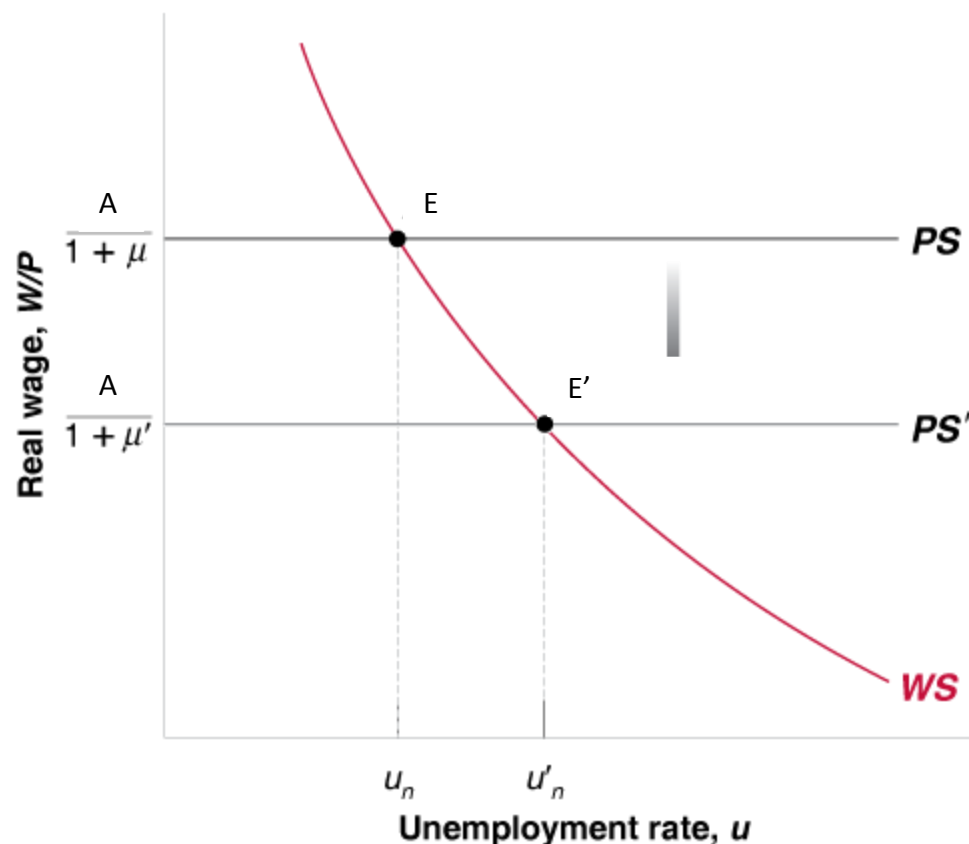


# The Natural Rate of Unemployment

## Equilibrium Real Wages and Unemployment

### *Markups and the Natural Rate of Unemployment*

An increase in markups (or a decrease of productivity) decreases the real wage and leads to an increase in the natural rate of unemployment.



# The Natural Rate of Unemployment

## From Unemployment to Employment

- Associated with the natural rate of unemployment is a natural level of employment.

$$u = \frac{U}{L} = \frac{L - N}{L} = 1 - \frac{N}{L}$$

Employment in terms of the labor force and the unemployment rate equals:

$$N = L(1 - u)$$

The natural level of employment,  $N_n$ , is given by:

$$N_n = L(1 - u_n)$$



# The Natural Rate of Unemployment

## From Employment to Output

- Associated with the natural level of employment is the natural level of output, and since ( $Y=AN$ ):

$$Y_n = AN_n = A(1 - u_n)$$

The natural level of output satisfies the following:

In words, the natural level of output is such that, at the associated rate of unemployment, , the real wage chosen in wage setting is equal to the real wage implied by price setting.

# The Role of Structural Reforms

- From the above analysis it clearly emerges what follows:
  1. Labour market reforms aimed at reducing the market power of trade unions and at increasing efficiency tend to decrease the natural level of unemployment and so to increase the natural level of output;
  2. Pro-competitive reforms in the goods markets tend to decrease the natural level of unemployment and so to increase the natural level of output;
  3. Structural reforms aimed at improving the overall productivity of the economy (i.e. more efficient PA, reduction of the red-tape burden, more friendly business environment etc...) tend to decrease the natural level of unemployment and so to increase the natural level of output.