

Course in Macroeconomics and Global Economics  
University of Rome 'Tor Vergata'  
Academic year 2015/2016

Instructor: Prof. Barbara Annicchiarico  
Teaching Assistants: Francesca Diluiso, Matilde Giaccherini

10/13/2016

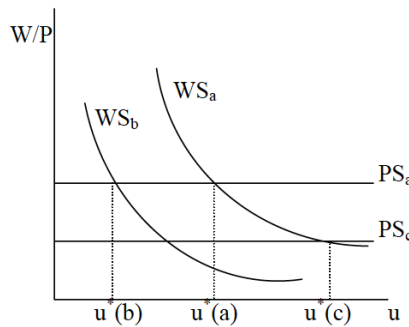
## Practice 5 - Solution

### Exercise 1

1. The wage determination equation is  $W = P^e F(u, z)$  where  $P^e$  is the expected price level,  $u$  is the rate of unemployment and  $z$  includes all variables that can influence wage formation. Price determination equation is:  $P = (1 + \mu)W$ , where  $\mu$  is the mark up. When the expected price levels is equal to the effective price level  $P^e = P$ , we obtain:  
 $WS_a \longrightarrow \frac{W}{P} = F(u, z)$

$$PS_a \longrightarrow \frac{W}{P} = \frac{1}{1+\mu}$$

The natural rate of unemployment is the one for which the two curves intersect ( $u^*(a)$  in the graph).



2. • A reduction in the unemployment subsidy implies a reduction in worker's bargaining power ( $z$  reduces). The WS curve shifts downwards in  $WS_b$  and the new natural rate of unemployment becomes  $u^*(b)$ .

- An increase in production costs (non labor costs) leads to an increase in prices and hence in the real wage. It can be graphically represented as an increase in the *markup*. In fact it leads to a downwards shift in the  $PS$  relation in  $PS_c$ . With respect to the equilibrium in point 1) the natural rate of unemployment increases and becomes  $u^*(c)$ .

3. In this case:

$$PS \longrightarrow \frac{W}{P} = \frac{1}{1.7}$$

$$WS \longrightarrow \frac{W}{P} = \lambda - u$$

Equating the two curves:

$$\lambda - u = \frac{1}{1.7}$$

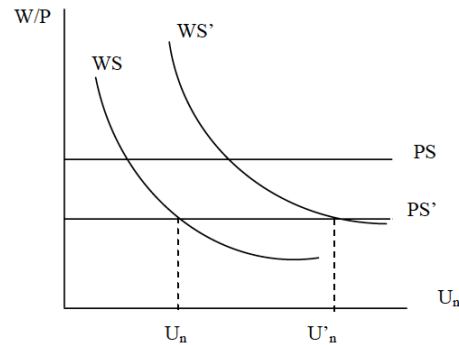
$$u = \lambda - \frac{1}{1.7}$$

$$\text{if } \lambda = 0.7 \longrightarrow u_n \cong 0.11$$

$$\text{if } \lambda = 0.9 \longrightarrow u_n \cong 0.24$$

There is a positive relation between the natural rate of unemployment and the participation rate. A higher participation rate implies a greater real wage for a given unemployment rate. But because of the price setting relation (with  $\mu$  constant), the real wage cannot vary and so the effect of a higher participation goes to the natural rate of unemployment.

## Exercise 2



The increase in worker's bargaining power leads to an increase in  $z$ , while the increase in the markup leads to an increase in  $\mu$ . So, the increase in  $z$  makes  $WS$  shift upwards, while the increase in  $\mu$  makes  $PS$  move downwards. The two effects together lead to an increase in the unemployment rate  $u_n$  and to a decrease in real wages  $W/P$ .

### Exercise 3

1. Recall that price setting equals the wage setting equation via the real wage:

$$\frac{1}{(1+\mu)} = \frac{W}{P} = F(u, z) = 1 - u$$

$$\frac{1}{1+0.05} = 0.952$$

2. Solving for  $u$ :  $\frac{1}{(1+\mu)} = 1 - u$

$$\frac{1}{1+0.05} = 1 - u \longrightarrow u = 0.0476$$

3.  $\frac{1}{1+0.1} = 1 - u$

$$0.909 = 1 - u \longrightarrow u = 0.0909$$

A 5% increase in the mark-up from 5% to 10% raises the natural rate of unemployment to 9% and lowers the real wage to 0.91. A higher mark-up reflects a reduced degree of competition in the market. We can think about a situation in which is easier for firms to collude so that they are able to set a lower wage. Usually a decrease in competition lowers the total amount of output produced in the economy thus raising the rate of unemployment.

### Exercise 4

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

$$\frac{1}{1+0.02} = 1 - u_n \longrightarrow u_n = 2\%.$$

$$Y_n = L(1 - u_n) = 98$$

2. After an increase in the unemployment benefits, the new level of natural unemployment rises to  $u_n = 52\%$  and the natural level of output declines from 98 to 48, or  $\Delta Y_n = -50$ .

### Exercise 5

- The unemployment rate is defined as the ratio of the unemployed to the labour force, is therefore  $6/25 = 24\%$ .
- The employment rate is defined as the ratio of the employed to the labour force, is therefore  $19/25 = 76\%$ .
- The participation rate is defined as the ratio of the labour force to the population in working age, is therefore  $25/35 = 71.4\%$ .
- The non-participation rate is defined as the number of people out of the labour force divided by the population in working age, is  $(35 - 25)/35 = 28.6\%$