**Activity 1**

Consider country A, in which there are 10 million unemployed people. Over a month 1 million unemployed people find a job and 4 million become inactive. Country B has 10 million unemployed people and over the same period of time, 4 million unemployed people find a job and none becomes inactive. Compute the size of total flows out of unemployment (as a percentage of unemployment) and the average duration of unemployment in both countries.

**Activity 1**

This activity points out that a shorter average duration in unemployment does not necessarily imply that more unemployed people find a job. In country A the average flow is: $\frac{\Delta U}{U} = \frac{1+4}{10} = 0.5$; and the duration of unemployment is: 1/0.5=2 months. In country B the average flow is: $\frac{\Delta U}{U} = \frac{4}{10} = 0.4$; and the duration of unemployment is: 1/0.4=2.5 months. Therefore, even though more unemployed find a job in country B, the duration of unemployment is shorter than in country A.

**Activity 2**

Discuss which of the three types of unemployment – classical, frictional, and structural – each of the following policies can help to reduce: 1) increase number of job centres; 2) increase number retraining programmes; 3) reduce unemployment benefit; 4) reduce minimum wages and trade union power.

## Activity 2

The increase in the number of job agencies improves information about job vacancies. This facilitates the matching between unemployed people and jobs, thus reducing frictional unemployment. The increase in retraining programmes helps to reduce the mismatch between the skills of unemployed and those people required by new jobs, thus reducing structural unemployment. In principle, reduction in unemployment benefits, minimum wages, and trade union power, can help to reduce classical unemployment.

**Activity 3**

Consider an economy in which firms' markup over cost is 10 per cent and the WS relation is given by equation (5.5), with *z=0.01* and $\alpha = 1$. Assume that the marginal product of labour is constant.

a) Compute the real wage and the natural unemployment rate.
b) Calculate how the equilibrium real wage and the natural unemployment rate change if the markup increases to 15 per cent. Discuss your result.
c) Calculate how the equilibrium real wage and the natural unemployment rate change, if the bargaining power of unions increases so that *z=0.4*. Discuss your result.

**Activity 3**

a) The real wage is obtained from the PS relation as follows: $\frac{W}{P} = \frac{1}{1+\mu} = \frac{1}{1+0.1} = 0.91$. This can be substituted into the WS relation to compute the natural unemployment rate as follows: $\frac{W}{P} = 1 + z - \alpha u_n \Leftrightarrow u_n = \frac{1}{\alpha}\left(1 + z - \frac{W}{P}\right) = 1 + 0.01 - 0.91 = 0.1$

b) The increase in the markup reduces the equilibrium real wage to: $\frac{W}{P} = \frac{1}{1+\mu} = \frac{1}{1+0.15} = 0.87$. Consequently, the natural unemployment rate increases to: $u_n = \frac{1}{\alpha}\left(1 + z - \frac{W}{P}\right) = 1 + 0.01 - 0.87 = 0.14$. The increase in the markup reduces labour demand, as the PS curve shifts downward. Thus, the fall in labour demand increases unemployment and reduces the real wage.

c) Since the marginal product of labour is assumed to be constant, the increase in the unions' bargaining power does not affect the equilibrium real wage. However, the natural unemployment rate rises to $u_n = \frac{1}{\alpha}\left(1 + z - \frac{W}{P}\right) = 1 + 0.02 - 0.87 = 0.15$. The greater the unions' power the higher the wage set by wage setters, at any level of unemployment. However, labour demand is fixed at the level determined by the PS relation. For this reason labour demand falls as *z* raises and the natural unemployment rate increases.

**Activity 4**

Explain why the phenomenon of hysteresis implies the existence of a relation between natural and cyclical unemployment, so that macroeconomic policies that aim at reducing cyclical unemployment can also indirectly affect the natural rate of unemployment.

**Activity 4**

Hysteresis is the increase in the share of long term unemployed people during economic recessions. This may be the outcome of a loss of skills by the unemployed people, discouraged workers effect, or insider workers pressure to refrain from wage reductions during recession. The higher cyclical unemployment is, the higher the probability that unemployed lose skills, abandon searching for jobs, and reduce their bargaining power relative to the employed. Consequently, higher cyclical unemployment is, the greater the likelihood of hysteresis effects. For this reason, demand policies, which aim at reducing actual unemployment, may reduce unemployment persistency and thus, indirectly, reduce the natural rate of unemployment.

**Activity 5**

Is the following statement true or false: 'The aggregate supply curve is positively sloped because when the price level increases firms want to sell more goods?' Discuss your answer.

**Activity 5**

This activity clarifies the difference between the AS curve and the supply curve that you have encounterd in the microeconomics unit. The AS curve plots the combinations of price level and output consistent with equilibrium in the labour market, given the expected price level. It slopes upwards because higher output implies a lower unemployment rate, which leads to higher wages and, thus, to a higher price level. The AS curve does not slope upwards because firms desire to supply more goods when the price level is higher.

**Activity 6**

The empirical evidence in the United States suggests that real wages are mildly pro-cyclical, i.e. they tend to increase when the economy expands. Discuss whether or not the predictions of the sticky-wage model and the sticky-price model, about the correlation between real wages and output, are consistent with this evidence.

**Activity 6**

The sticky-wage model predicts that the real wage should be countercyclical. An unexpected increase in the price level reduces real wages as nominal wages are rigid. In turn, the reduction in the real wage raises labour demand and increases employment and output. In contrast, sticky-price theories suggest that the real wage should be pro-cyclical. Consider, for example, an increase in output caused by a positive technology shock. This shifts labour demand (the PS curve shifts upward) and increases employment and output. Since prices are sticky, labour supply (the WS curve) is unaffected. As a result, the real wage increases while output rises. The key difference between the two theories is in the assumption about the short run behaviour of the labour demand curve: the sticky-wage model assumes that labour demand is fixed over the business cycle, whereas the sticky-price model assumes that labour demand shifts over the business cycle.

**Activity 7**

Discuss the impact on the slope and/or the position of the AD curve of a change in (i) the marginal propensity to consume, and (ii) the sensitivity of money demand to the interest rate.

**Activity 7**

An increase in consumer confidence, as measured by the parameter $c_0$, increases autonomous spending thus shifting the IS curve to the right. At the existing price level, aggregate demand increases by the same amount as output in the IS-LM model at the existing interest rate.
The sensitivity of money demand to the interest rate, as measured by the parameter $h_2$, affects the slope of the LM curve. The less sensitive is money demand to the interest rate the flatter the LM curve. As shown in equation (AD curve), this parameter affects both the slope and the position of the AD curve: the less sensitive money demand is to the interest rate, the bigger the change in income implied by a given change in the price level, the steeper the AD curve. Consequently, the smaller $h_2$ is, the higher the intercept of the AD curve. An important special case occurs when the economy is in a liquidity trap so that LM curve is flat and the AD curve is entirely vertical. In this case, a change in the price level affects the real money balance but has no effect on output and the interest rate.

**Activity 8**

Consider an economy in which the Aggregate Demand (AD) relation is: $Y = 10 + G - P$; and the Aggregate Supply (AS) relation is $P - P^e = 0.5(Y - Y_n)$; where $G$ indicates government spending, $P$ is the actual price level, $P^e$ is the expected price level, $Y$ is actual GDP, and $Y_n$ is the natural level of GDP. In addition $G=50$ and $Y_n = 25$.

a) Calculate the expected price level at the long run equilibrium. Plot in the output – price space (i) the aggregate demand curve; (ii) the short-run aggregate supply curve (SRAS); (iii) and the long-run aggregate supply (LRAS) curves.

b) Suppose the economy starts from its equilibrium position, and an adverse demand shock reduces aggregate demand by 5 units at each price level. Compute the new AD curve and calculate the new short-run levels of output and price.
c) Briefly, describe why the economy adjusts to a new long run equilibrium, and calculate the expected price level at the new long run equilibrium.

**Activity 8**

a) In the long run $P = P^e$ and $Y = Y_n$. Imposing these conditions in the AD curve yields the expected price level:

$$Y_n = 10 + G - P^e$$

$$25 = 10 + 50 - P^e \Leftrightarrow P^e = 35$$

The AD curve is obtained from $P = 10 + G - Y$, which has slope -1 and intercepts the vertical axis at P=60. The LRAS is vertical at $Y_n = 25$. The SRAS passes through the point $(Y_n, P^e) = (25,35)$ and intercepts the vertical axis at P=22.5.

b) The new AD curve is obtained as:

$$P = 10 + G - Y - 5$$

$$P = 5 + G - Y$$

$$P = 55 - Y$$

The new short run equilibrium is computed by solving the system:

$$\begin{cases} SRAS: P = 35 + 0.5(Y - 25) \\ AD: P = 55 - Y \end{cases},$$

which yields:

$$\begin{cases} P = 33.4 \\ Y = 21.6 \end{cases}$$

c) The reduction in the price level increases Aggregate Demand for three reasons. The first is the Real Balance effect. When the price level reduces, the real value of money increases, in turn, increasing consumer spending. The second is the real exchange rate effect. When prices fall, the real exchange rate depreciates (if the nominal exchange rate is fixed). This leads to an increase in foreign demand. The third is the Keynes effect. When prices fall unexpectedly, people need more money for transactions and so they reduce bonds demand. This reduces the interest rate and, hence, increases demand for investment. The expected price level at the new long run equilibrium is computed by imposing $P = P^e$ and $Y = Y_n$ in the AD curve $P = 55 - Y$, which yields: $P^e = 55 - 25 = 30$.

**Activity 9**

Consider the economy described in the previous activity. Suppose that, as the economy is hit by the negative demand shock, the government reduces public spending by 2 units. Compute and discuss the effect of this policy in the short and in the long run.

**Activity 9**

The increase in public spending partially offsets the fall in demand due to the reduction in consumer confidence. As a result, the new AD curve is obtained as:

$$P = 10 + G - Y - 5 + 2$$
$$P = 7 + G - Y$$
$$P = 57 - Y$$

The new short run equilibrium is computed by solving the system:

$$\begin{cases} SRAS: P = 35 + 0.5(Y - 25) \\ AD: P = 57 - Y \end{cases},$$

which yields:

$$\begin{cases} P = 34 \\ Y = 23 \end{cases}$$

In the long run the economy converges to the natural level of output. The new expected price level is obtained from the AD curve $P = 57 - Y$, which yields: $P^e = 57 - 25 = 32$. Therefore, the government intervention contains the loss in output due to the adverse demand shock, and contributes to reducing the business cycle fluctuation. In principle, since the output deviation from its natural level is lower after the government intervention, the economy should recover more quickly from the recession.

**Activity 10**

Consider an economy that starts at the natural level of output. Assume that the economy is hit by a permanent adverse supply shock. What is the effect on the unemployment rate in the short and the long run? How is the real wage affected by the shock? Assume now that the adverse supply shock is temporary. What is the effect on the unemployment rate in the short and the long run? How is the real wage affected by the temporary adverse supply shock?

**Activity 10**

A permanent adverse supply shock raises the unemployment rate in the short run, and it also permanently increases the natural unemployment rate. Recall that as a result of the shock firms increase the costs markup and this shifts the PS curve downwards. Contemporaneously, the real wage permanently falls, following the adverse supply shock. If the shock is only temporary, the unemployment rate will increase only in the short run and in the long run it returns to the natural rate. The real wage behaves pro-cyclically and it falls only in the short run.