**Instructions:** Please answer all of the following questions. You are encouraged to work with one another (at your discretion).

1. What are the similarities and differences between the characteristics of labor market equilibrium under perfect as compared with imperfect competition?

**ANSWER:** The answer should center around a discussion of Fig. 2.12.

2. Show the likely effects on price- and/or wage-setting behavior as reflected in the WS/PS diagram of the following:

(a) workers become more worried about losing their jobs at any given level of employment.
(b) the government intervenes to protect domestic firms from foreign competition.
(c) higher social security contributions paid by employers.
(d) a reduction in the proportion of employees covered by union wage agreements (e.g. as the result of a decline in industries in the economy that are heavily unionized).

**ANSWER:** a) WS curve shifts downwards: workers will bargain for a lower wage ceteris paribus and therefore the wage-setting curve shifts down. b) PS curve shifts downwards, the mark up rises. c) PS curve shifts downwards; the tax wedge rises, reducing the real wage for workers (see also Chapter 4). d) WS curve shifts downwards. Lower bargaining power of unions.

3. Explain carefully all the assumptions that are being made in the claim that ‘disinflation is costly’.

**ANSWER:** Disinflation is costly since in order to achieve a lower level of inflation an unemployment rate above equilibrium is necessary as in Fig. 3.5. The reason is that inflation is inertial, i.e. the Phillips curve that faces the policy maker is fixed by past inflation: if the economy is at equilibrium, inflation will remain unchanged unless output is reduced. This will push the economy down the Phillips curve as a slacker labor market reduces the expected real wage that can be set by wage-setters. However, disinflation is not costly at all if there are no nominal rigidities and agents have rational forward looking expectations. In this case, the policy maker simply has to announce a lower inflation target.

4. Describe what happens in the economy following an inflation shock in the following cases:
(a) the central bank cares only about avoiding increased unemployment.
(b) the central bank cares only about its inflation target.
(c) the central bank cares about both increased unemployment and about achieving its inflation target.

ANSWER: The three different scenarios can be discussed as three different MR function coming from three different types of preferences. (a) If the CB only cares about unemployment the MR will be vertical (\( y = y_e \)) since the CB is willing to have any high rate of inflation in order to keep employment fluctuations to zero.
In case (b) the MR is horizontal so that the elimination of the inflation shock takes place in one period, irrespective of the cost in terms of lower output.
(c) is in between (a) and (b) with the slope of the MR reflecting inflation aversion compared to unemployment aversion. See also Chapter 3 Section 2.6 on gradualism versus cold turkey.

5. Make a case for the use of an interest-rate based monetary policy rule by evaluating the pros and cons of two other (alternative) monetary rules:
(a) maintaining a constant nominal interest rate and
(b) maintaining a constant growth rate of the money supply.

ANSWER: (a) Maintaining a constant nominal interest rate is problematic: consider a positive aggregate demand shock. This raises output and inflation, and in turn, expected inflation, assuming adaptive expectations. Since the nominal interest rate is fixed, and \( r = i + \pi_E \), a rise in \( \pi_E \) leads to a fall in \( r \) and hence a further increase in aggregate demand. This takes the economy further away from equilibrium.
(b) A constant money supply means that the central bank does not react to shocks, it only keeps the money supply growth rate fixed to deliver a certain level of inflation in the medium run. Adjustment occurs as described in Section 4 and in the appendix. However, as we have learnt from the 3-equation model, the central bank could intervene to bring the economy back on track and guide it towards the medium run equilibrium by using the interest rate tool. This avoids the protracted and complex adjustment path under a constant growth rate rule.

6. How might the observation that the productivity trend since 1820 has been upwards in Europe and that the trend of the unemployment rate has not been downward be reconciled with the WS-PS model?

ANSWER: One possible explanation is that while productivity had risen steadily, shifting the PS curve upwards in the meantime reservation wages have increased, shifting the WS curve up. As we shall see in the analysis of growth (see Chapter 13), real wages rise in line with productivity on a steady state growth path. This highlights the fact that changes in trend productivity growth may be difficult to detect and adjustments in wage expectations and wage claims slow to occur. The result is that over the medium-run horizon, changes in productivity growth can affect equilibrium unemployment.
7. In medium run equilibrium, the real rate of interest depends on fiscal policy but not on monetary policy. Do you agree? Does your answer apply to the nominal interest rate?

ANSWER: One way to think about this is to use the IS diagram placed above the Phillips diagram. The medium-run equilibrium output level is fixed by the supply side and this determines the vertical Phillips curve: draw a vertical line at equilibrium output in both diagrams. Monetary policy fixes the medium-run rate of inflation - either via an inflation target or via a money supply target. So we now have a vertical line at equilibrium output (supply side) and a horizontal line at target inflation (monetary policy) in the bottom diagram. Now go up to the IS diagram and ask what determines the real interest rate. It is the IS curve - i.e. where the IS curve cuts the vertical line at equilibrium output fixes the medium-run stabilizing real interest rate. So it is fiscal policy that determines the real interest rate in the medium run equilibrium. Do the experiment of changing fiscal policy ... the IS curve shifts. This changes the real interest rate consistent with medium run equilibrium. If the central bank changes its inflation target, this does not change the medium-run real interest rate. Think also at the composition of output in medium run, if there is an increase in government spending it means that one of the other components of aggregate demand has to fall given that output is unchanged in the medium run. Therefore the interest sensitive part of demand has to fall and this is due to the increase in the real interest rate.

What about the nominal interest rate? We now have the ingredients to answer this: given the real interest rate at the medium run equilibrium and the central bank’s inflation target, we know what the medium-run nominal interest must be: \( r + \pi \) since inflation expectations must be fulfilled in the medium-run equilibrium. For the economy to remain in medium-run equilibrium, this is the nominal interest rate that the central bank must set.

8. Why is equilibrium employment lower when wages are set at the industry rather than at the firm level? How would you expect this relationship to be affected, if at all, if the economy in question is open to international trade?

ANSWER: Industry level wage setting (in a model where the union sets the wage in a monopolistic way) can deliver a higher level of unemployment since the union can set higher wages because it believes that even if the prices for that industry’s products go up there is little substitutability between the industry’s products and other products and therefore the demand for that particular good will not be much affected. While a firm-level union fears that the substitutability between product within the same industry is high and too high wages/prices could drive the firm out of the market. These contrasting perceptions produce a higher WS curve in the case of industry-level wage-setting than in firm-level wage-setting. Hence in equilibrium when wages and prices have been set, the level of employment consistent with constant inflation is higher in the case of firm-level wage-setting. In an open economy competition happens in the international arena, and
therefore the above mentioned mechanism leading industry-level unions to high wage claims will be weakened or eliminated. Hence the employment equilibria will be closer together in an open economy.

9. Trace the effects on unemployment and inflation of a sudden and permanent rise in labor productivity due to a technological breakthrough.

Assuming to begin with that there is no impact of the technological breakthrough on consumption (e.g. upward revision of permanent income) or investment (e.g. increase in Tobin’s Q boosts investment), the IS curve remains fixed. The first sign of the rise in productivity is a fall in inflation (the rise in productivity cuts unit labor costs and hence prices; real wages rise above $w^m$ and wage inflation falls). Lower inflation signals to the central bank to cut the interest rate: there are two components to this - the stabilizing interest rate has fallen (since $ye$ is higher) and once inflation below target has occurred, the CB will have to boost activity above equilibrium in order to bring inflation back up to target so the interest rate will be lowered below the new stabilizing interest rate. Any boost in consumption or investment induced by the breakthrough will shift the IS to the right, reducing the interest rate response needed. The rapid incorporation of the rise in productivity into wage-claims will shift the WS up and reduce the increase in equilibrium employment.

10. Through what mechanisms can hysteresis in unemployment operate? What are its consequences for the time-path of the unemployment rate following (a) a period of disinflation? (b) an investment boom? Illustrate using a diagram in each case.

ANSWER: There are two mechanisms that operate through the labor market: i) the insider-outsider model; ii) long-term unemployment and persistence. The first one considers those who have lost their job as not important for the union anymore, therefore the union will only demand higher wages for the insiders. While the persistence model is focused on the role of skills, knowledge and labor force attachment that are lost in a long period of unemployment making the long-term unemployed only poor substitutes for current workers.

Insider-outsider: (a) a period of disinflation due to a contraction in demand (not balanced by the reaction of the CB) will raise the ERU since the unemployed former insiders become outsiders (this is only a stylized discussion) and the WS becomes vertical. (b) in an investment boom the increase in demand will be only translated in higher wages with no changes in employment (in the simplest model).

Persistence: (a) as in Fig. 4.9, (b) Given the boom in investment there is higher demand and if there is an immediate reaction to curb inflation by CB and no rigidities nothing happens to unemployment. If however the standard assumptions are made (rigidities and lagged reaction to interest rate changes), and there is an increase in employment this takes the unemployed off the dole and therefore this can effectively shift the WS curve down because there are fewer long-term unemployed and therefore a lower equilibrium rate of unemployment can be achieved. If the persistence mechanism works in reverse, a less inflationary boom would be observed.
11. How may unemployment be affected by (a) barriers to regional mobility; (b) poor information about jobs; (c) stronger employment protection legislation? Illustrate using a diagram in each case.

**ANSWER:** (a) Barriers to mobility have two main effects: i) on the Beveridge curve, the matching technology is worsened since it is not possible to match firms and the unemployed in different regions; ii) it might put unions in a stronger bargaining position by reducing the actual unemployment pool and therefore the WS curve can shift up. (b) Poor information: has basically the same effects as in point (a); (c) There are several routes through which employment protection could have an effect on the PS or WS curves. Since firms have to take into account the costs of hiring, this additional cost may shift the PS curve down. The WS may shift up since workers and unions are now in a stronger position. If the effects go in these ways, the result is higher equilibrium unemployment. However, it might also be that tighter legislation could act as a way for the unions to accept lower wages since more protection is granted to their members and this would therefore lower the WS(floor) as described in Chapter 4.