ECON 222
Macroeconomic Theory I
Winter Term 2010

Assignment 4
Due: Drop Box 2ⁿᵈ Floor Dunning by **noon Thursday 1 April 2010 (remember,**
Friday 2 April is a holiday)
No late submissions will be accepted
No group submissions will be accepted
No "Photocopied" answers will be accepted

Remarks: Write clearly and concisely. Devote some time to any graphs you are asked to produce. Note: the way that you present your answers matters for your grade – be clear and concise.

Question 1: Money and inflation (25 Marks)

Suppose that a typical country's money demand function, M^d, is given by the following:

(1) $M^d = PY^{0.5}$

Where P stands for the price level and Y for the level of output.

a) Derive the income elasticity of money demand, described in equation (1). (**7 Marks**)

b) Assume that in the current year the price level is P = 1, find the level of money supply (M^s) and the level of output if the velocity of money was 2. (**7 Marks**)

c) Assume that the money supply had been growing at 4% per year, while output has been growing at 5% per year. What would be the predicted rate of inflation? (**7 Marks**)

d) Which of the following money demand functions are consistent with the Quantity Theory of Money and why. (**4 Marks**)

     i. $M^d = PY^2 + Y$

     ii. $M^d = 2^{0.5}Y$

     iii. $M^d = \frac{1}{4}Y - i^2$ (i = nominal rate of interest)

Question 2: Deriving and solving the IS-LM-AD model – closed economy version (25 Marks)

The economy, which is closed, is described by the following key relationships:

(1) $C^d = 0.6(Y - T) - 50r$ (desired consumption)
(2) $I^d = 310 - 150r$ (desired investment)
(3) $M^d = P(0.5Y - 400i)$ (money demand which equals money supply, M)
(4) $i = r + \pi^e$ (nominal interest rate)
(5) $GBB = T - G$ (government's budget balance)

Where Y is real output, T is the level of taxation, G is government expenditures, GBB is the government budget balance, P is the price level, π^e is expected inflation and r is the real rate of interest.

a) Use the equations that you need from above to derive an algebraic expression for the IS and LM curves for this economy in terms of r and Y as well as the variables that would shift the curves. Show your results in a graph. As you move along these curves, explain what is going on. Describe what happens to the LM curve when the money supply (M) is increased. (**4 Marks**)

b) Use the complete IS-LM model to derive an algebraic expression for aggregate demand for this economy as a function of the price level. Illustrate your results with a graph and explain the mechanisms at work as you move along this curve. In particular does a lower price level imply that more output is demanded because goods and services would cost less? (**7 Marks**)

c) You are given the following information:

     $G = T = 250$; $\pi^e = 0$; $M/P = 480$.

     Find the level of the real interest rate and output that will be consistent with equilibrium in the goods and money markets. Use your results to estimate the price level, assuming M = 720. (**7 Marks**)

d) Suppose that the level of real output that you found in Part c) was equal to the full-employment level. From this position, suppose further that the money supply was increased by 5 per cent. Calculate both the short- and long-run affects of this policy. Calculate as well the expected rate of inflation, assuming that it is equal to the actual rate. Show graphically what is happening in both the short run and long run. (**7 Marks**)

Question 3: Some policy implications of the IS-LM-AD model (25 Marks)

Start with the economy described in Question 2, and the values in Part c). Assuming that the real interest rate and level of output that you calculated in Question 2, Part c) are consistent with full employment, suppose that this economy is hit by a negative, long-lasting demand shock. In particular, the investment functions (equation 2 above) shifts down by 5 per cent. At the same time, bear in mind that there is a limit as to how far the real interest rate can fall which is determined by the zero floor on the nominal rate. For simplicity, you can assume in your calculations that any changes in the price level do not affect inflation expectations (π^e remains at zero).

a) First calculate the new <u>short-run</u> levels of output and the real interest rate that clears the market for goods and services in the wake of the shock. By how much have output and the real interest rate changed in the short run in response to the shock? (**4 Marks**)

b) Next, use monetary policy to return the economy back towards full employment output. In particular, proceed by:

   i)   First calculating what is <u>needed</u> in terms of an increase in the money supply and the implications for the real interest rate.

   ii) Then calculating what is <u>possible</u>, given the constraint on the real interest rate mentioned above.

   iii) Finally determining whether or not the economy would return to equilibrium automatically. (**7 Marks**)

c) Start from the initial real rate of interest rate and output level following the shock to investment (that is, the short-run equilibrium position) and now use fiscal policy to move the economy back to equilibrium. In particular:

   i)   By how much would government spending have to increase in order to restore output to its full-employment level?

   ii) If the government had decided to rely solely on taxes, by how much would they have to be cut to achieve the same effect?

   iii) Calculate the implications of each policy instrument for the government's budget balance. If the results are different, explain why. (**7 Marks**)

d) Compare the results using fiscal policy with those of monetary policy. Was one more effective than the other and if so explain why? (**7 Marks**)

Question 4: Solving the open economy version of the model as well as policy implications (25 Marks)

Assume now that the economy that you have been studying is now open to trade. In particular, assume that the relationships (1) through (5) in Question 2 still hold and, because capital is perfectly mobile, that the world rate of interest is given and is equal to 5 per cent. The additional equation needed is for net exports (NX), which are determined by income (Y) and the real exchange rate (e). The complete model is now:

(1) $C^d = 0.6(Y - T) - 50r$ (desired consumption)
(2) $I^d = 310 - 150r$ (desired investment)
(3) $M^d = P(0.5Y - 400i)$ (money demand which equals money supply, M)
(4) $i = r + \pi^e$ (nominal interest rate)
(5) $GBB = T - G$ (government's budget balance)
(6) $NX = 140 - 0.1Y - e$ (net exports)

Assume for now that the nominal exchange rate is flexible.

a) Derive the new IS, LM and AD equations that result when the economy is opened to trade. (**4 marks**)

b) What is the value of Y given a real exchange rate of 40 and G = T = 250? What is the level of net exports in this economy? Is this economy a user of or a supplier to world-savings? If the foreign price level (P^F) were 0.9, what would be the level of the nominal exchange rate (e_{nom}) in this economy? (**7 Marks**)

c) Assume that the economy is hit with the same shock as in Question 3; that is, the investment function shifts down by 5 per cent and the shock is long lasting. Calculate the fall in output in the short run and then determine whether or not the economy would return to equilibrium on its own. Would the levels of the real and nominal exchange rates change and if so by how much? Compare this situation with what you found in Part b) of Question 3 above. (**7 Marks**)

d) Suppose now that the central bank is committed to maintaining the <u>nominal exchange rate fixed</u> at the level you calculated in Part b) of this Question. Describe, using the diagrams you have studied (that is, you do not have to show calculations), how this would change your results when the economy was hit by the shock described in Part c) above. Be sure to indentify both the short- and long-run equilibrium positions of the economy. If you were charged with returning the economy to its original full employment level of output, what would be your recommendation? (**7 Marks**)