ECON 222
Macroeconomic Theory I
Winter Term 2011
Assignment 4
Due: Drop Box 2nd Floor Dunning Hall by noon Friday, April 1st 2011
No late submissions will be accepted
No group submissions will be accepted
No "Photocopy" answers will be accepted

Question 1: Money and inflation (20 Marks)

You are given the following money demand (M^d) equation:

$M^d/P = 36 + 0.5Y$,

Y = real output; and P = the price level.

a) When economists say money is neutral over the long run, what do they mean? Would the functional form of M^d above imply that money is neutral? Explain your reasoning. (**5 marks**)
b) Suppose that the potential, or long-run, rate of growth of the economy is 3 per cent per year. In addition, the central bank has an inflation target of 2 per cent per year. Moreover, **assume that velocity of money is equal to one**. Based on the above equation, calculate what the central bank would have to do to achieve this result. (**5 Marks**)
c) Assume that the price level is 1.0. Derive an expression for the income elasticity of money demand for this money demand function. Under what conditions would the elasticity be constant over time? (**5 marks**)

Suppose now that the demand for money is sensitive to the nominal interest rate (i). In particular it now has the following form:

$M^d/P = 36 + 0.5Y - 100i$

d) You are given the following information: M = 120; P = 1.5; Y = 100; and the central bank is committed to, and is successfully maintaining, an inflation target of 2 per cent per year. What are the values of the <u>nominal</u> and <u>real</u> rates of interest that would be consistent with money market equilibrium? (**5 marks**)

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

The following equations describe a closed economy:

(1) $M^d/P = 12 + 0.7Y - 300(r + \pi^e)$ Demand for money (M^d)
(2) $C^d = 25 + 0.5(Y - T) - 100r$ Desired consumption (C^d)
(3) $I^d = 30 - 200r$ Desired investment (I^d)
(4) $G = T$ Government spending (G) = revenues (T)

The other variables are real output (Y), the real rate of interest (r) and expected inflation (π^e).

(a) Derive expressions for the IS and LM curves for this economy, each in terms of r as a function of Y as well as the variables that would shift these curves. Make sure to show and explain the steps that you need to take to get each relationship. What does each curve show in terms of r and Y? What variables would shift these curves and in which direction? (**8 Marks**)

(b) If the nominal money supply is 90, the price level is 1.5, G=T=10 and $\pi^e = 0$, what would be the levels of Y and r that would ensure goods and money market equilibrium? Show your results in a graph. (**8 Marks**)

(c) Derive an expression for the aggregate demand (AD) curve in terms of Y as a function of P and then use it to determine what would be the level of output if the price level were to fall from 1.5 to 1.0. Explain carefully, with the help of a graph, the mechanism that generates your results. (**9 Marks**)

Question 3: Some policy implications of the closed economy IS-LM-AD model (30 Marks)

Continue with the economy as described in equations (1) to (4).

(1) $M^d/P = 12 + 0.7Y - 300(r + \pi^e)$ Demand for money (M^d)
(2) $C^d = 25 + 0.5(Y - T) - 100r$ Desired consumption (C^d)
(3) $I^d = 30 - 200r$ Desired investment (I^d)
(4) $G = T$ Government spending (G) = revenues (T)

 As well, assume that the economy's long-run equilibrium values of r and Y are 5 per cent and 90, respectively.

Suppose that consumers, temporarily pessimistic about the future, decide to lower their consumption levels (*i.e.*, to save more). The new consumption function is:

(2') $C^d = \mathbf{20} + 0.5(Y - T) - 100r$,

where the change/shift is highlighted in bold.

(a) Calculate the initial, short-run equilibrium levels of Y and r. By what percentage has output changed compared with the initial equilibrium level that you found in part (b) of Question 2? Show your results in a graph. (**8 Marks**)

(b) Start from the short-run equilibrium that you found in part (a) of this question and employ fiscal policy to return the economy back to equilibrium. In particular, first rely solely on taxes (T) and then for comparison, use only government spending (G). Calculate by how much G and T would change respectively to get the economy back to equilibrium. What would be the effect on interest rates in each case? (**10 Marks**)

(c) If you were the Minister of Finance, concerned about the budget position, which instrument would you prefer and why? (**4 Marks**)

(d) In this part, <u>no calculations</u> are required. Use your knowledge of the IS-LM diagram to answer the following. Left to its own devices (that is, there is no policy actions), is there a mechanism by which this economy would return back to the equilibrium level of output? Would this new equilibrium differ from the long-run equilibrium and if so, how? Suppose instead that the central bank decided to use monetary policy to return the economy back to equilibrium. How would the results differ? Illustrate your answers with graphs. (**8 Marks**)

Question 4: Solving the open economy version of the IS-LM-AD model and its policy implications (25 Marks)

Now suppose that the economy that you have been studying is open to trade. The economy now has an additional equation for net exports (NX). Thus:

(1) $M^d/P = 12 + 0.7Y - 300(r + \pi^e)$ Demand for money (M^d)
(2) $C^d = 25 + 0.5(Y - T) - 100r$ Desired consumption (C^d)
(3) $I^d = 30 - 200r$ Desired investment (I^d)
(4) $G = T$ Government spending (G) = revenues (T)
(5) $NX = 46 - 0.3Y - 2e$,   Net exports (NX)
     where e is the <u>real</u> exchange rate

(a) Derive the LM and IS curves for this economy in terms of r as a function of Y as well as the fiscal and monetary variables. Derive as well the AD curve in terms of Y as a function of those same variables as well as the price levels. Which curves have been affected by the fact that the economy is now open to trade and how? (**5 Marks**)

(b) Suppose that the equilibrium level of output is 100. If the nominal money supply is 90, the price level is 1.5, G=T=10 and $\pi^e = 0$, what would be the level of r (which is now the world interest rate) and e. Once you have these values, verify that the components of GDP sum to 100. If the foreign price level were 0.9, what would be the level of the nominal exchange rate (e_{nom})? (**6 Marks**)

(c) Assume that the nominal exchange rate is flexible. Solve the model for the short-run effect on Y, NX, e and e_{nom} of a 1 per cent decrease in government spending, holding taxation constant at 10. Find as well the long-run equilibrium values of those same variables. Illustrate your results using a graph. What happens to I^d and NX? (**6 Marks**)

(d) Assume that the economy now has a fixed exchange rate and it is pegged at the level you found in part (b) of this question and that government spending is back to 10. However, there is a change in policy and the government sets the peg to 0.9. What would happen in the short run and in the long run to Y, NX, M, P and e? Illustrate your work graphically. (Hint: Note that, while e_{nom} is fixed, e, the real exchange rate, can change.) (**8 Marks**)