

**Problem Set 2**

Due in Lecture on Wednesday, October 14th. "Box-in" your answers to the algebraic questions.

**1. Fiscal policy in an IS-LM model**

Suppose the real side of the economy is given by:

(11.1)  $Y = AD$

(11.2)  $AD = C + I + G + X - IM$

(11.3)  $C = \bar{C} + c(Y - T)$

$T = \bar{T}$

(12.1)  $I = \bar{I} - bi$

Investment depends on interest rate

(11.4')  $IM = \bar{IM} + mY - n\bar{q}$

Real exchange rate fixed

(11.11)  $X = \bar{X} + v\bar{q}$

$G = \bar{G}$

and the monetary sector is given by:

<u>Eq.No.</u>	<u>Equation</u>	<u>Description</u>
(10)	$\frac{M^d}{P} = \frac{M^s}{P}$	Equilibrium condition
(11)	$\frac{M^s}{P} = \frac{\bar{M}}{P}$	Money supply
(12)	$\frac{M^d}{P} = kY - hi$	Money demand

For now, we ignore the external balance condition.

- 1.1 Solve for the IS curve, with  $Y$  on the left hand side. Show your work.
- 1.2 Solve for the LM curve, with  $i$  on the left hand side. Show your work.
- 1.3 Graph the IS and LM curves on a single graph. Show the vertical intercepts, the slopes, and the intersection.
- 1.4 Solve for equilibrium income. Show your work.
- 1.5 Calculate the change in income resulting from a given change in government spending on goods and services,  $\Delta G$ .
- 1.6 Show graphically what happens when government spending is increased. Clearly indicate the distance of the curve shifts, and the amount of the income change.

1.7 Is the effect of government spending on income greater or less in this model, as compared to the simple Keynesian model? Explain why the difference occurs, in words.

1.8 Answer 1.7 again, if the interest sensitivity of money demand were zero. Explain why this is true.

1.9 Answer 1.7 again, if the interest sensitivity of investment were zero. Explain why this is true.

## 2. Monetary policy in an IS-LM model

Using the model laid out in Question 1,

2.1 Calculate the change in income for a given change in money supply,  $\Delta(M/P)$  (you can assume that the price level  $P$  is fixed at 1).

2.2 Show graphically what happens when the real money stock is increased. Clearly indicate the distance of the curve shifts and the amount of the income change.

2.3 Suppose instead that the interest sensitivity of investment were very low. Show graphically the effect upon output and interest rates that result from an increase of the real money stock. Clearly indicate the distance of the curve shifts and the amount of the income change.

2.4 Suppose the interest sensitivity of money demand was infinite. Show graphically the effect upon output and interest rates that result from an increase of the real money stock. Clearly indicate the distance of the curve shifts and the amount of the income change.

2.5 Assume non-zero values for the interest sensitivity of investment and money demand. Show graphically how the Fed could keep the interest rate constant as the government pursued an expansionary fiscal policy. Clearly indicate the distance of the curve shifts and the amount of the income change. What is the effect on output?

## 3. Policy under Fixed Exchange Rates in the IS-LM-BP=0 model

Suppose the economy is given by the following set of equations.

$$(12.2) \quad Y = \bar{\alpha}[\bar{A} + \bar{X} - \bar{IM}] + (n + v)\bar{q} - bi \quad \text{<IS curve>}$$

$$\text{where } \bar{\alpha} = \left( \frac{1}{1 - c + m} \right), \quad \bar{A} \equiv \bar{C} - c\bar{T} + \bar{I} + \bar{G}$$

$$(12.6) \quad i = -\left(\frac{1}{h}\right)\left(\frac{\bar{M}}{\bar{P}}\right) + \left(\frac{k}{h}\right)Y \quad \text{<LM curve>}$$

$$(12.12) \quad i = -\left(\frac{1}{\kappa}\right)[(\bar{X} - \bar{IM} + \bar{FA}) + (n + v)\bar{q} + \bar{i}^* + \left(\frac{m}{\kappa}\right)Y] \quad \text{<BP=0 curve>}$$

3.1 Draw a graph of initial equilibrium, where the goods and money markets are in equilibrium, as is the balance of payments. Assume that  $m/\kappa > k/h$ .

3.2 Show what happens if the government decreases government spending by  $\Delta G$ , both immediately, and over time in the absence of central bank sterilization. Note, the money base changes by an amount equal to the change in foreign exchange reserves,

(16)  $\Delta M = \Delta FXRes = BP = -ORT$

3.3 Answer 3.2, assuming the central bank sterilizes changes in official reserves. At the new equilibrium, what is true about (i) the level of output; (ii) the level of investment; (iii) the real exchange rate; and (iv) the trade balance?

3.4 Redraw 3.1, and show the impact of a monetary contraction, both immediately and over time. Assume over time, capital flows are sterilized.

3.5 Explain why the process you lay out in 3.4 occurs.

3.6 Answer 3.4 if capital flows are *not* sterilized.