Public Affairs 854
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University of Wisconsin-Madison

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Problem Set 2

Due in Lecture on Wednesday, February 24th. $\boxed{\text{"}Box-in\text{"}}$ your answers to the algebraic questions.

1. Expenditure switching versus expenditure reduction

Eq.No.	Equation	Description
(1)	$Y = AD$	Output equals aggregate demand – an equilibrium condition
(2)	$AD \equiv C + I + G + EX - IM$	Definition of aggregate demand
(3)	$C = \overline{CO} + c(Y - T)$	Consumption function, c is the marginal propensity to consume
(4)	$T = \overline{TA} + tY$	Tax function; $\overline{TA}$ is lump sum taxes, t is tax rate.
(5)	$I = \overline{IN}$	Investment function
(6)	$G = \overline{GO}$	Government spending on goods and services
(7)	$EX = \overline{EXP} + vq$	Export spending
(8)	$IM = \overline{IMP} + mY - nq$	Import spending

Equilibrium income, Y_0, is given by:

(9) $$Y_0 = \left(\frac{1}{1 - c(1-t) + m}\right)[\overline{A} + \overline{EXP} - \overline{IMP} + (n+v)q] \quad \text{let} \quad \overline{\alpha} \equiv \left(\frac{1}{1 - c(1-t) + m}\right)$$

1.1 Solve for the total differential (break the change in Y into its constituent parts).
1.2 Calculate the change in the trade balance given a $1 (billion) increase in government expenditures.
1.3 Calculate the change in the trade balance given a one unit change in the real exchange rate (a one unit depreciation of the real value of the dollar). Remember: GDP responds to a change in the real exchange rate, q.
1.4 If the marginal propensity to import rises, then what is true about the relative effectiveness of expenditure switching versus expenditure reducing as a means of reducing a trade deficit?

2. Fiscal policy in an IS-LM model

Suppose the real side of the economy is given by:

(1)	$Y = AD$	Output equals aggregate demand – an equilibrium condition
(2)	$AD \equiv C + I + G + EX - IM$	Definition of aggregate demand
(3)	$C = \overline{CO} + c(Y - T)$	Consumption function, c is the marginal propensity to consume
(4)	$T = \overline{TA} + tY$	Tax function; $\overline{TA}$ is lump sum taxes, t is tax rate.
(5')	$I = \overline{IN} - bi$	Investment function
(6)	$G = \overline{GO}$	Government spending on goods and services
(7)	$EX = \overline{EXP} + vq$	Export spending
(8)	$IM = \overline{IMP} + mY - nq$	Import spending

and the monetary sector is given by:

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

For now, we ignore the external balance condition.

2.1 Solve for the IS curve, with Y on the left hand side. Show your work.
2.2 Solve for the LM curve, with i on the left hand side. Show your work.
2.3 Graph the IS and LM curves on a single graph. Show the vertical intercepts, the slopes, and the intersection.
2.4 Solve for equilibrium income. Show your work.
2.5 Calculate the change in income resulting from a given change in government spending on goods and services, ΔGO.
2.6 Show graphically what happens when government spending is increased. Clearly indicate the distance of the curve shifts, and the amount of the income change.
2.7 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.
2.8 Answer 2.7 again, if the interest sensitivity of money demand were zero. Explain why this is true.
2.9 Answer 2.7 again, if the interest sensitivity of investment were zero. Explain why this is true.

3. Monetary policy in an IS-LM model

Using the model laid out in Question 2,

3.1 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).

3.2 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.

3.3 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.

3.4 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.

3.5 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?

4. Policy with the *TB*=0 curve

Recall the definition of the trade balance is:

(13) $TB \equiv EX - IM$

4.1 Using the export and import functions, solve for the **TB**=0 curve (Y on the left hand side).

4.2 Draw the IS-LM-TB=0 graph, assuming that the economy is in initial internal and external equilibrium.

4.3 Show graphically the initial effect of an increase of government spending by ΔGO. Clearly indicate the distance of the curve shifts and the amount of the income change.

4.4 Over time, the money base changes by an amount equal to the change in foreign exchange reserves,

(14) $\Delta MB = \Delta res = BP = -ORT$

where in this simple model without any private capital inflows, $BP=TB$. Show what happens to the curves over time.

4.5 Explain what has happened to the composition of output after adjustment is complete.

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