

### Problem Set 2

Due *in lecture* on Monday, February 22nd. Be sure to put your name on your problem set. Put “boxes” around your answers to the algebraic questions.

1. Suppose the economy is described by the following equations (so we are looking at a closed economy):

• Real Sector

$Y = AD$	Equilibrium condition
$AD \equiv C + I + G$	Definition of aggregate demand
$C = a_0 + bY_d$	Consumption function
$Y_d \equiv Y - T + F$	Def'n of disposable income
$T = tY$	Tax function
$F = FT_0 - fY$	Government transfers spending
$I = e_0 - dR$	Investment function
$G = GO_0$	Government purchases spending

• Asset Sector

$(M^d/P) = (M^s/P)$	Equilibrium condition
$(M/P)^d = \mu_0 + kY - hR$	Real money demand
$(M/P)^s = (M_0/P_0)$	Real money supply (with price level fixed)

- 1.1 Solve for the IS curve ( $Y$  as a function of  $R$ ).
- 1.2 Solve for the LM curve ( $R$  as a function of  $Y$ ). What is the channel by which monetary influences affect the real goods sector in this model?
- 1.3 Solve for the equilibrium values of  $Y$ .
- 1.4 Graph the IS and LM curves on one diagram. Clearly indicate the intercepts and the slopes.
- 1.5 What are the exogenous and endogenous variables?
- 1.6 What is the government spending multiplier? What is the monetary policy multiplier?

2. Suppose the equations in the model above assume the following values:

$$a_0 = 1000; b = 0.8 \quad t = 0.20 \quad FT_0 = 800; f = .05; GO_0 = 600$$

$$e_0 = 2000; d = 10 \quad k = 1; h = 100; \mu_0 = 200 \quad M_0 = 10000; P_0 = 1$$

- 2.1 Calculate the equilibrium values of  $Y$ ,  $R$ , and  $I$  (call them  $Y_0$ ,  $R_0$ , and  $I_0$ , respectively).
- 2.2 Assume  $G$  increases to 1100, and is completely bond financed (no portfolio effects here). Calculate the new level of income,  $Y_1$ , and hence calculate the numerical value of the government spending multiplier,  $\Delta Y/\Delta G$  (OR calculate  $\Delta Y/\Delta G$  and then find  $Y_1$ ).
- 2.3 Calculate how much *investment* has been crowded out by the increase in  $G$ . Explain the crowding out *briefly* using words and a graph.
- 2.4 Suppose the  $G$  remains at 600, but  $M/P_0$  increases to 10500. Calculate the new equilibrium  $Y$  and  $R$  (call them  $Y_2$  and  $R_2$ ).
- 2.5 Calculate the monetary policy multiplier,  $\Delta Y/\Delta(M/P)$ .

3. Suppose that  $G$  is increased to 1100, and  $M/P_0$  is also increased to 10500 (so that the fiscal policy is money-financed).

3.1 What is the new equilibrium  $Y$  and  $R$  (call them  $Y_3$  and  $R_3$ )?

3.2 What is the new level of investment (call it  $I_3$ )? Relative to what happens in question 2.3, why has a different amount of investment been crowded out?

4. Using the algebraic model provided in question 1, draw the IS-LM diagrams for the following situations:

4.1 Money demand is very sensitive to income.

4.2 Money demand is very insensitive to the interest rate.

4.3 Investment is very sensitive to the interest rate.

4.4 The marginal tax rate is very high.