

**ECON 202**  
**INTERMEDIATE MACROECONOMICS**  
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**Exercise VII**  
**Multiplier Analysis**

1. A macroeconomy is described by the following relationships:

Consumption:  $C = \bar{C} + cYD$

Investment:  $\bar{I}$

Government expenditure:  $\bar{G}$

Income Tax Revenue:  $TA = \bar{t}Y$

where  $\bar{C}$ ,  $c$ ,  $\bar{I}$ ,  $\bar{G}$ , and  $\bar{t}$  are constant values,  $Y$  is total income and  $YD$  is disposable income.

a. Find the equilibrium output for this economy

b. Indicate the multiplier for this economy. Does charging a tax increase or decrease the multiplier?

c. Find the budget surplus ( $BS = TA - G$ ).

d. Suppose the parameters take on the following values:

$\bar{C} = 40$ ;  $c = 0.8$ ;  $\bar{I} = 35$ ;  $\bar{G} = 15$ ;  $\bar{t} = 0.2$

Use these formulae to find numerical values for equilibrium output, the multiplier, and the budget surplus.

2. Consider the following model of the economy:

$C = 50 + 0.6(Y - TA + TR)$ ;  $I = 100$ ;  $G = 100$ ;  $X = IM = 0$ ;

where  $C$  is consumption,  $Y$  is income,  $TA$  is taxes,  $TR$  is transfers,  $I$  is investment,  $G$  is government spending,  $X$  is exports and  $M$  is imports.

a. State the equilibrium condition for GDP (national income) and solve for equilibrium national income for  $TA = 100$  (lump-sum tax) and  $TR = 0$ .

b. The government decides to increase spending by 10. If it doesn't raise taxes, what will the new values of autonomous spending, the multiplier, and equilibrium income be? If the government raises taxes at the same time to maintain a balanced budget, what will the new values of autonomous spending, the multiplier, and equilibrium income be? Give a brief explanation of why income changed by as much or as little as it did.

c. Now, instead of assuming that the government collects a fixed amount of taxes, assume that it collects a fixed percentage of national income:  $T=tY$ . Assuming the tax rate,  $t$ , is 0.1667, solve for equilibrium income, autonomous spending, and the multiplier. Explain any differences with your answers to part b. Is the government budget balanced? What happens now if the government increases spending by 10? State and briefly explain the changes in equilibrium income and the government budget deficit.

3. Consider the following Goods Market model in a closed economy:

$$C = \bar{C} + cYD \quad (1)$$

$$I = \bar{I} - b \cdot r \quad (2)$$

$$G = \bar{G} \quad (3)$$

$$TA = tY \quad (4)$$

where  $Y$  is GDP,  $C$  is consumption,  $G$  is government spending,  $YD$  is disposal income,  $r$  is the interest rate,  $\bar{I}$  is autonomous investment,  $I$  is realized (actual) investment,  $t$  is the tax rate, and  $TA$  is tax revenue.

(i) Interpret the parameters in the equations above.

(ii) What are the *endogenous* and *exogenous* variables in the above model?

(iii) Solve for the equilibrium output in the goods market. Represent equilibrium in the AD-Y space.

(iv) Plot and show the slope of the IS curve in the  $r$ - $Y$  space.

(v) What is the effect on output and consumption of a fiscal expansion financed by a similar increase in tax revenues:  $\Delta G = \Delta TA$ . Does the budget deficit  $BD = G - TA$ , change in any particular way?

Now assume that the money demand and supply are the following (here  $P=1$ ):

$$L = kY - h \cdot r \quad (5)$$

$$M^S = M \quad (6)$$

- (vi) What is the equilibrium condition? Represent equilibrium in the  $r$ - $M$  space.
- (vii) Interpret the parameters in equation (5).
- (viii) Plot and show the slope of the LM curve in the  $i$ - $Y$  space.
- (ix) How does the slope depend on  $k$ ? On  $h$ ? Give an economic interpretation.
- (x) Solve for both the LM and IS equation and find the equilibrium output.

4. Answer the following questions based on the information below:

$$\begin{aligned}C &= 500 + .9(Y-TA) \\M_d &= 3000 + .1Y - 5000r \\M_s &= 4000 \\TA &= 500 + .1(Y) \\IM &= 100 + .2(Y) \\I &= 2500 - 1000r \\G &= 2000 \\X &= 1000\end{aligned}$$

- (i) Find the equation for the IS curve
- (ii) Find the equation for the LM curve
- (iii) Calculate the equilibrium levels of:  $Y$ ,  $r$ ,  $C$ ,  $I$ ,  $NX$ , and Government Budget

Using IS-LM identity, one should be able to find: