

## Macroeconomic Theory Solutions to Problem Set 1

Point values per problem in [ ]. Total possible: 124.

Ch. 3 #5 [8]

- a. Taking the derivative of  $Y$  with respect to  $G$  in equation 3.7 gives  $1/(1-c_1)$ .
- b. The derivative wrt  $T$  is  $-c_1/(1-c_1)$ .
- c. Spending effects demand directly, but taxes affect demand through consumption, and the propensity to consume is less than 1.
- d. The change in  $Y$  is  $1/(1-c_1) - c_1/(1-c_1) = 1$ . Balanced budget changes in  $G$  and  $T$  are not macroeconomically neutral.
- e. The propensity to consume has no effect because the balanced budget tax increase aborts the multiplier process.  $Y$  and  $T$  both increase by one unit, so disposable income, and hence consumption, do not change.

Ch. 3 #6 [8]

- a. Tax rate is less than one.
- b.  $Y = c_0 + c_1 Y_D + I + G$  implies  $Y = [1/(1-c_1+c_1t_1)] * [c_0 - c_1t_0 + I + G]$ .
- c. The multiplier is  $[1/(1-c_1+c_1t_1)]$ , which is less than  $1/(1-c_1)$ , so the economy responds less to changes in autonomous spending when  $t_1$  is positive.
- d. Because of the automatic effects of taxes on the economy, the economy responds less to changes in autonomous spending than in the case where taxes are independent of income. So output tends to vary less, and fiscal policy is called an automatic stabilizer.

Ch. 3 #7 [7]

- a.  $Y = [1/(1-c_1+c_1t_1)] * [c_0 - c_1t_0 + I + G]$ .
- b.  $T = t_0 + t_1 * [1/(1-c_1+c_1t_1)] * [c_0 - c_1t_0 + I + G]$ .
- c.  $Y$  and  $T$  decrease.
- d. If  $G$  is cut,  $Y$  decreases even more.

Ch. 4 #5 [9]

- a.  $B^D = 50,000 - 60,000 * (0.35 - i)$ . An increase in the interest rate of 10% increases bond demand \$6,000.
- b. An increase in wealth increases bond demand, but has no effect on money demand.
- c. An increase in income increases money demand, but decreases bond demand.
- d. When people earn more income, this does not change their wealth right away. Thus, they increase their demand for money and decrease their demand for bonds.

Ch. 4 #6 [10]

- Demand for high-powered money  $= 0.1 * \$Y * (0.8 - 4i)$ .
- $\$100b = 0.1 * \$5,000b * (0.8 - 4i)$ ,  $i = 15\%$ .
- $M = (1/0.1) * \$100b = \$1,000b$ ,  $M = M^d$  at the interest rate in b.
- The interest rate falls to 5%.
- $M = (1/0.1) * \$300b = \$3,000b$

Ch. 5 #3 [16]

- Plug the expression for C into  $Y = C + I + G$  and derive  $Y = (1/1 - c_1) * [c_0 - c_1 T + I + G]$ .
- Plug also the expression for I into the above equation and derive  $Y = (1/1 - c_1 - b_1) * [c_0 - c_1 T + b_0 - b_2 i + G]$ . Since the multiplier is larger than in part a, the effect is bigger.
- Substituting for the interest rate in the answer to part b,  $Y = (1/1 - c_1 - b_1 + b_2 d_1 / d_2) * [c_0 - c_1 T + b_0 + (b_2 M / P) / d_2 + G]$ . The multiplier is  $(1/1 - c_1 - b_1 + b_2 d_1 / d_2)$ .
- The multiplier is greater (less) than the multiplier in part a if  $(b_1 - b_2 d_1 / d_2)$  is greater (less) than zero. The multiplier is big if  $b_1$  is big,  $b_2$  is small,  $d_1$  is small, and/or  $d_2$  is big. That is, if I is very sensitive to Y, I is not very sensitive to i, money demand is not very sensitive to Y, money demand is very sensitive to i.

Ch. 5 #4 [17]

- The IS curve shifts left. Output and interest rate fall. The effect on I is ambiguous because Y and i effects work in opposite directions.
- $Y = (1/1 - c_1 - b_1) * [c_0 - c_1 T + b_0 - b_2 i + G]$ .
- From the LM relationship:  $i = Y * d_1 / d_2 - (M/P) / d_2$ . To obtain the equilibrium interest rate, substitute for Y from part b.
- $I = b_0 + b_1 Y - b_2 i = b_0 + b_1 Y * d_1 / d_2 + b_2 (M/P) / d_2$ . Again, substitute for Y.
- Holding M/P constant, I increases with equilibrium output when  $b_1$  is greater than  $b_2 d_1 / d_2$ . Since a decrease in G reduces output, the condition under which a decrease in G increases I is  $b_1$  is bigger than  $b_2 d_1 / d_2$ .
- The effect on I from Y has to be less than the effect from i after controlling for the endogenous response of i and Y, determined by the slope of the LM curve,  $d_1 / d_2$ .

Ch. 5 #5 [49]

- $Y = C + I + G = 200 + .25(Y - 200) + 150 + .25Y - 1000i + 250$ ,  $Y = 1100 - 2000i$ .
- $M/P = 1600 = 2Y - 8000i$ ,  $i = Y/4000 - 1/5$ .
- Substituting b into a gives  $Y = 1000$ .
- Substituting c into b  $i = 5\%$ .
- $C = 400$ ,  $I = 350$ ,  $G = 250$ ,  $C + I + G = 1000$ .

f.  $Y=1040$ ,  $i=3\%$ ,  $C=410$ ,  $I=380$ . A monetary expansion reduces the interest rate and increases output. The increase in output increases consumption. The increase in output and the fall in the interest rate increase investment.

g.  $Y=1200$ ,  $i=10\%$ ,  $C=450$ ,  $I=350$ . A fiscal expansion increases output and the interest rate. The increase in output increases consumption.

The condition from problem 3 is satisfied with equality ( $.25=1000*(2/8000)$ ), so contractionary fiscal policy will have no effect on investment. When  $G=100$ ,  $i=0\%$ ,  $Y=800$ ,  $I=350$ ,  $C=350$ .