

Nanyang Technological University  
School of Social Sciences

HE2002 Macroeconomics II AY23-24 SEMESTER 2

Solution to Tutorial 1

1. Chapter 3, Q2

*A numerical example that requires the calculation of the equilibrium output.*

- (a) Recall the condition for the equilibrium output:

$$Y = c_0 + c_1(Y - T) + \bar{I} + G$$

Put in  $C = 480 + 0.5Y_D$  where  $Y_D = Y - T = Y - 70$ ,  $I = 110$ , and  $G = 250$  to get

$$Y = 480 + 0.5(Y - 70) + 110 + 250 \Rightarrow Y = 1610 \text{ billion.}$$

- (b) The disposable income  $Y_D = Y - T = 1610 - 70 = 1540$  billion.

- (c) The consumption spending  $C = 480 + (0.5)(1540) = 1250$  billion.

2. Chapter 3, Q3

*A numerical example that checks your understanding of investment and saving and investigates the equilibrium effects of an increase in government spending ( $G$ ).*

- (a) Private saving is equal to consumers' disposable income minus their consumption:

$$S = Y_D - C = Y - T - C = 1540 - 1250 = 290 \text{ billion}$$

Public saving is equal to taxes (net of transfers) minus government spending:

$$T - G = 70 - 250 = -180 \text{ billion (budget deficit).}$$

Investment spending is the sum of private saving and public saving:

$$I = S + (T - G) = 290 - 180 = 110 \text{ billion}$$

- (b) Equilibrium output is given by 1610 billion. Total demand is the sum of consumption, investment, and government spending:

$$C + I + G = 1250 + 110 + 250 = 1610 \text{ billion.}$$

As a result, production also increases to maintain equilibrium.

- (c) Replace  $G$  with 300 from the equations above, we can solve for the equilibrium output  $Y = 1710$  billion, consumption  $C = 1300$  billion, and disposable income  $Y_D = 1640$  billion.

Alternatively, we can use the multiplier  $1/(1 - 0.5) = 2$ . Given this multiplier effect, when the government spending increases by 50 billion, the equilibrium output will increase by 100 billion.

When output increases, disposable income increases, raising consumption. Therefore,  $Y_D$  will rise by 100 billion and  $C$  will rise by 50 billion.

The government will increase fiscal spending to increase equilibrium output and boost economic growth.

### 3. Chapter 3, Q4 The balanced budget multiplier

*An analytical question that investigates the equilibrium effects of changes in  $G$  and  $T$ , with additional discussion about the overall effect of balanced budget changes, which is captured by the balanced budget multiplier.*

- (a)  $Y$  increases by  $1/(1 - c_1)$
- (b)  $Y$  decreases by  $c_1/(1 - c_1)$
- (c) The answers differ because spending affects demand directly, but taxes affect demand indirectly through consumption, and the propensity to consume is less than one.
- (d) The change in  $Y$  equals  $1/(1 - c_1) - c_1/(1 - c_1) = 1$ . Balanced budget changes in  $G$  and  $T$  do change output.
- (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.

### 4. Chapter 3, Q5 Automatic stabilizers

*An analytical question that changes the assumption in the basic model by allowing  $T$  to depend on income endogenously, investigates the equilibrium effects, and shows how such a fiscal policy acts as an automatic stabilizer.*

- (a) Replace the function of  $T$  in the equilibrium condition to get

$$Y = c_0 + c_1(Y - (t_0 + t_1Y)) + I + G$$

$$\Rightarrow Y = \frac{1}{1 - c_1 + c_1t_1}(c_0 - c_1t_0 + I + G)$$

- (b) The multiplier is  $\frac{1}{1 - c_1 + c_1t_1}$ .

If  $t_1 = 0$ , it will be the case that  $T$  is independent of the income level.

If  $0 < t_1 < 1$ , this multiplier will be smaller than  $\frac{1}{1 - c_1}$ , so the economy responds less to changes in autonomous spending.

After a positive change in autonomous spending, the increase in total taxes (because of the increase in income) tends to lessen the increase in output. After a negative change in autonomous spending, the fall in total taxes tends to lessen the decrease in output.

- (c) Because of the automatic effect of taxes on the economy, the economy responds less to changes in autonomous spending than in the case where taxes are independent of income. Since output tends to vary less (to be more stable), fiscal policy is called an automatic stabilizer.