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ECON 202 –Discussion Questions 2 (Chapter 3)
ANSWERS

PART A: LONG QUESTIONS

1. Consider the goods market in a closed economy which can be described by the following equations:

$$C = c_0 + c_1 Y_D$$

$$T = t_0 + t_1 Y$$

$$G = \bar{G}$$

$$I = \bar{I}$$

Here, C is private consumption, Y_d is disposable income, T is net taxes, Y is income, I is investment, G is government spending.

- Solve for the algebraic expression that represents the income level that brings the goods market to equilibrium.
- Let $c_0 = 100$, $c_1 = 2/5$, $t_0 = 50$, $t_1 = 1/6$, $\bar{I}=80$ and $\bar{G}=100$. What is the equilibrium value of income? What are the equilibrium values of private consumption, private saving and net taxes?
- Calculate the value of public saving. In the equilibrium, is the government running a budget deficit or a budget surplus?
- Suppose that the government wants to change its spending in order to achieve a balanced budget, i.e. $G=T$. Which level of G is needed to have a balanced budget in the goods market equilibrium?
- Suppose now that the government wants to achieve a balanced budget ($G=T$) through modifications of the tax rate t_1 rather than through a change in expenditures, G . Find the tax rate t_1 for which the government's budget is balanced in the goods market equilibrium. Does the tax rate increase or decrease from its initial level? What are the implications of this change for the equilibrium level of income?

Solution:

a) $Z = C + I + G$

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

$$Z = c_0 + c_1(Y - t_0 - t_1 Y) + \bar{I} + \bar{G}$$

$$Z = c_0 + (c_1 - c_1 t_1)Y - c_1 t_0 + \bar{I} + \bar{G}$$

In eqm: $Y = Z$

$$(1 - c_1 + c_1 t_1)Y = c_0 - c_1 t_0 + \bar{I} + \bar{G}$$

$$\Rightarrow Y^* = \frac{1}{1 - c_1 + c_1 t_1} [c_0 - c_1 t_0 + \bar{I} + \bar{G}]$$

b) $Y^* = \frac{1}{1 - \frac{2}{5} + \frac{2}{5} \cdot \frac{1}{6}} [100 - \frac{2}{5} 50 + 80 + 100]$

income: $Y^* = 390 //$

consumption: $C = c_0 + c_1(Y - t_0 - t_1 Y)$

$$C = 100 + \frac{2}{5} (390 - 50 - \frac{1}{6} 390) = 210 //$$

private savings: $S = Y_D - C = Y - t_0 - t_1 Y - C = 390 - 50 - \frac{1}{6} 390 - 210$

$$S = 65 //$$

net taxes: $T = t_0 + t_1 Y = 50 + \frac{1}{6} 390 = 115 //$

c) Public savings: $T - G = 115 - 100 = 15 \Rightarrow$ budget surplus

$$d) \quad T - G = 15$$

$$\text{Suppose } \Delta G \Rightarrow \Delta Y \Rightarrow \Delta T$$

$$\Delta G - \Delta T = 15 \quad \text{to have a balanced budget}$$

$$\begin{aligned} \Rightarrow T' - G' &= (T + \Delta T) - (G + \Delta G) \\ &= \underbrace{T - G}_{= 15} - \underbrace{(\Delta G - \Delta T)}_{= 15} = 0 \end{aligned}$$

$$\text{Then, } \Delta G - \Delta T = 15, \quad T = t_0 + t_1 Y$$

$$\Delta G - t_1 \Delta Y = 15, \quad Y = \frac{1}{1 - c_1 + c_1 t_1} [c_0 - c_1 t_0 + I + G]$$

$$\Delta G - t_1 \left(\frac{1}{1 - c_1 + c_1 t_1} \right) \Delta G = 15$$

$$\Delta G - \frac{1}{6} \left(\underbrace{\frac{1}{1 - \frac{2}{5} + \frac{2}{5} \cdot \frac{1}{6}}}_{\frac{3}{2}} \right) \Delta G = 15$$

$$\Delta G - \frac{\Delta G}{4} = 15 \Rightarrow \Delta G = 20 //$$

$$\Rightarrow \Delta Y = \frac{3}{2} 20 = 30$$

$$\Rightarrow \Delta T = \frac{1}{6} 30 = 5$$

$$e) \quad T - G = 15$$

$$T' - G = 0$$

$$G = 100 \Rightarrow T' = 100$$

$$T' = t_0 + t_1' Y$$

$$= 50 + t_1' Y = 100$$

$$\Rightarrow t_1' Y = 50$$

$$\Rightarrow t_1' \frac{1}{1 - c_1 + c_1 t_1'} [c_0 - c_1 t_0 + I + G] = 50$$

$$\Rightarrow t_1' \frac{1}{1 - \frac{2}{5} + \frac{2}{5} t_1'} \underbrace{\left[100 - \frac{2}{5} 50 + 80 + 100 \right]}_{= 260} = 50$$

$$\Rightarrow t_1' \frac{260}{\frac{3 + 2t_1'}{5}} = 50 \Rightarrow \frac{t_1'}{3 + 2t_1'} = \frac{1}{26} \Rightarrow 24t_1' = 3$$

$$\Rightarrow t_1' = \frac{3}{24} = \frac{1}{8} \quad \text{remember } t_1 = \frac{1}{6}$$

$\Rightarrow t_1$ should decrease.

2. Suppose an economy is described as follows:

$$C = c_0 + c_1 Y_D$$

$$T = t_0 + t_1 Y$$

G and I are both constant and assume that t_1 is between zero and one.

a. Solve for equilibrium output.

- b. Find an expression for the goods market multiplier. Does economy respond more to changes in autonomous spending when t_1 is equal zero or positive? Explain.
- c. Assume that economy begins trade.

$$M = mY$$

Assume that there is no export. Find an expression of goods market multiplier. Is it greater or less than the closed economy multiplier? Explain the difference.

Solution:

a.

$$Z = C + I + G \text{ and in equilibrium } Z = Y$$

$$Y = c_0 + c_1[Y - t_0 - t_1 Y] + I + G$$

$$Y = c_0 + c_1 Y - c_1 t_0 - c_1 t_1 Y + I + G$$

$$Y(1 - c_1 + c_1 t_1) = [c_0 - c_1 t_0 + I + G]$$

$$Y = [c_0 - c_1 t_0 + I + G] / (1 - c_1 + c_1 t_1) \text{ in equilibrium.}$$

- b. The multiplier = $1/(1 - c_1 + c_1 t_1)$ which is less than $1/(1 - c_1)$ where there is no tax. So, economy responds less to changes to autonomous spending when t_1 is positive. After a positive change in autonomous spending, the increase in total taxes tends to lessen the increase in output.

- c. New equilibrium condition of goods market: Y

$$= [c_0 - c_1 t_0 + I + G] / (1 - c_1 + c_1 t_1 + m)$$

The new multiplier = $1/(1 - c_1 + c_1 t_1 + m)$ is smaller than the previous one (in part b) because now there is an additional source of leakage, namely import.

3. Suppose a closed economy is described as follows:

- The consumption function is $C = c_0 + c_1 Y_D$
- The investment (I) and the government spending (G) are exogenously determined.
- The government is running a balanced budget.

a. Write down the equilibrium condition for the goods market. What is the algebraic expression of equilibrium output?

The equilibrium condition is $Y = c_0 + c_1(Y - G) + I + G$

Upon solving for Y, we get equilibrium output $Y = [c_0 + I + (1 - c_1)G] / (1 - c_1)$

b. Derive an expression for the goods market multiplier and autonomous spending.

The multiplier is $(1-c_1)^{-1}$, and the autonomous spending is $[c_0+I+(1-c_1)G]$

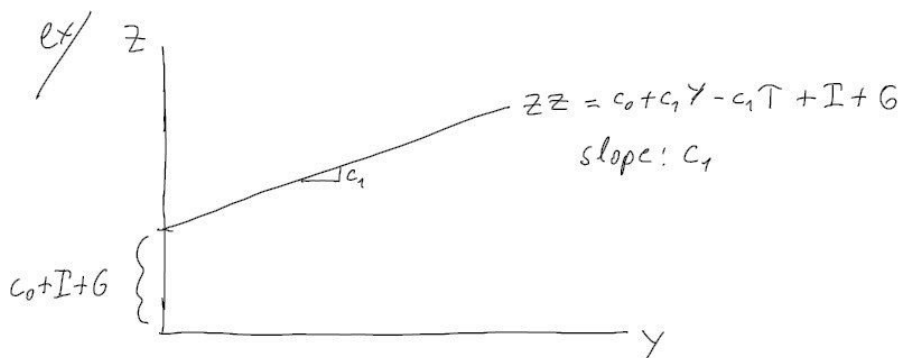
c. Compute the impact of increasing G on equilibrium output, i.e., derive an expression for $\Delta Y/\Delta G$ where Y is the equilibrium output. What is the multiplier? Explain the multiplier process in response to an increase in G in this economy.

$\Delta Y/\Delta G = 1$. So, under a balanced budget, equilibrium output rises by the same amount as government spending (instead of a multiple), and the multiplier is 1. The leakage exactly neutralizes the multiplicative potential of government spending due to the necessity to increase taxes to keep the budget balanced.

d. Suppose the latest consumer survey reports a decrease in the marginal propensity to save ($s_1 = 1-c_1$). Compute the impact of the decrease in the marginal propensity to save on equilibrium output, i.e., derive an expression for $\Delta Y/\Delta s_1$ where Y is the equilibrium output and s_1 is the propensity to save. (Note: $s_1+c_1=1$) What is the effect on saving in goods market equilibrium?

$\Delta Y/\Delta s_1 = -(1-c_1)^{-2}(c_0+I)$. The equilibrium saving will not change. Read the "Paradox of Saving" for a detailed discussion.

4. Explain what factors cause shifts and changes in the slope of the ZZ curve?



- The ZZ curve will shift when any autonomous component of demand changes. (c_0, I, G, T)
- The components of multiplier of goods market will determine the size of the slope. (c_1)

* These may change according to our behavioral equations.

PART B: MULTIPLE CHOICE

- 1) Which of the following events would cause an increase in the size of the multiplier?
 - A) A reduction in taxes
 - B) **A decrease in the marginal propensity to save**
 - C) A decrease in government expenditure
 - D) An increase in marginal propensity to save
 - E) None of the above

- 2) Suppose, as unrealistic as this might be, that disposable income is zero for a country. Given this information, we know that:
 - A) the marginal propensity to consume must be zero.
 - B) consumption must be zero.
 - C) saving must be positive.
 - D) **saving is negative.**
 - E) saving must be zero.

- 3) Suppose that the marginal propensity to save is 0.2 in an economy. If there are no other endogenous variables in the economy, the size of the multiplier is
 - A) 2.5
 - B) 1.67
 - C) 3.33
 - D) 4
 - E) **5**

- 4) The induced part of the consumption function represents
 - A) The level of consumption, even the disposable income is zero
 - B) Total consumption expenditure
 - C) **The change in consumption caused by a one-unit change in disposable income**
 - D) Total income minus taxes

- 5) Autonomous spending in a closed economy equals which of the following?
 - A) **$c_0 + I + G - c_1T$**
 - B) $C + I + G$
 - C) Z
 - D) $c_0 + I + G + c_1T$

- 6) Suppose the marginal propensity to consume equals .8 (i.e., $c_1 = .8$). Given this information, which of the following events will cause the largest reduction in output?
 - A) I decreases by 400
 - B) G decreases by 400
 - C) T increases by 400
 - D) **both A and B**

- 7) The autonomous part of the consumption function (C_0) represents
- A) **The level of consumption even the disposable income is zero**
 - B) Total consumption expenditure
 - C) The change in consumption caused by a one-unit change in disposable income
 - D) Total income minus taxes
- 8) In a dynamic model for the goods market, how would inventory investment change during period of recession?
- A) Decrease
 - B) **Increase**
 - C) Does not change
 - D) Ambiguous
 - E) None of the above
- 9) Which of the following events would cause a decrease in the size of the multiplier?
- A) A reduction in taxes
 - B) An increase in the marginal propensity to consume
 - C) A decrease in government expenditure
 - D) **An increase in marginal propensity to save**
 - E) None of the above
- 10) A decrease in the marginal propensity to save from .3 to .2 will cause:
- A) **An increase in the multiplier and a given change in autonomous consumption (c_0) to have a larger effect on output.**
 - B) A reduction in the multiplier and a given change in autonomous consumption (c_0) to have a larger effect on output.
 - C) A reduction in the multiplier and a given change in autonomous consumption (c_0) to have a smaller effect on output.
 - D) An increase in the multiplier and a given change in autonomous consumption (c_0) to have a smaller effect on output.

PART C: SHORT QUESTIONS

TRUE/FALSE/UNCERTAIN (Explain it.) (3 points each)

1. If a decrease in government spending by 600 leads to a reduction in income by 1200, then the size of the multiplier is 3.

FALSE. If a decrease in government spending by 400 leads to the decline in income by 1200, then the size of the multiplier is 2. $1200 = 3 * 400$

2. Fiscal policy is more effective when consumers' marginal propensity to consume is higher.

TRUE. The multiplier is proportional to the MPC, and the effectiveness of fiscal policy depends on the size of the multiplier. With a higher multiplier, any given change in G or T will have a larger effect on equilibrium income, Y .

3. Even a totally export-oriented country can only sell what it produces, so exports must always be less than or equal to GDP.

FALSE. Consider the national accounting identity: $Y = C + G + I + X - Q$. We note that if imports (Q) are large enough then we can have $X > Y$. Intuitively, a country can import goods and then resell them abroad, i.e. export them.