

PROBLEM SET 4 WITH ANSWERS

Q.1

- a) Explain what effect an increase in the marginal propensity to save will have on the slope of planned aggregate expenditures line and on the size of the multiplier.

An increase in the MPS also represents a reduction in the marginal propensity to consume. When the MPC falls, a given change in income now will have smaller effect on consumption. So, when output rises, there will be a smaller increase in planned aggregate expenditures. This indicates that the slope of the AE line will decrease. This increase in the MPS will also cause a reduction in the size of multiplier. When autonomous expenditures rise, firms will increase production and income will rise. Now, we will observe a smaller increase in expenditures as Y rises because of the larger MPS. This causes the final effect on output to be smaller, and therefore, causes the size of the multiplier to be smaller as well.

- b) Discuss some of the factors that would cause the actual multiplier to be different from $\frac{1}{1-MPC}$.

In simple models, we have not taken into account income taxes. As income tax rate will affect the size of the multiplier (makes it smaller). We have also not taken into account the effect of interest rates on the economy. Once interest rates are included, the size of the multiplier effect will be further reduced. And finally, we have assumed that the aggregate price level is fixed. Allowing for aggregate price level to change will further reduce the multiplier.

Q.2

Suppose that an economy is defined by the following equations:

$$C = 3500 + 0.8Y_d$$

$$I = 5000$$

$$T = 1000 + 0.25Y$$

$$G = 3500$$

i) Calculate the equilibrium level of Y.

$$Y = C + I + G$$

$$Y = 3500 + 0.8Y_d + 5000 + 3500$$

$$Y = 12000 + 0.8(Y - 1000 - 0.25Y)$$

$$Y = 11200 + 0.8Y - 0.2Y$$

$$0.4Y = 11200$$

$$Y^* = 28000$$

ii) Calculate the equilibrium level of national income (Y) using the injections = withdrawals (leakages) method.

$$\text{Leakages} = S + T + M$$

$$\text{Injections} = I + G + X$$

Because of that this economy is closed economy, we take the value of export and import as zero.

Write the consumption function as a general form;

$$C = C + cY_d \text{ Saving}$$

function becomes:

$$S = -C + (1 - c)Y_d$$

$$S = -3500 + 0.2(Y - 1000 - 0.25Y)$$

$$S = -3500 + 0.2Y - 200 - 0.05Y$$

$$S = -3700 + 0.15Y$$

Then, we can calculate the leakages and injections.

$$\text{Leakages} = -3700 + 0.15Y + 1000 + 0.25Y$$

$$\text{Leakages} = -2700 + 0.4Y$$

$$\text{Injections} = 5000 + 3500 = 8500$$

In equilibrium,

$$\text{Injections} = \text{Leakages}$$

$$-2700 + 0.4Y = 8500 \rightarrow 0.4Y = 11200$$

$$Y^* = 28000$$

iii) Calculate the equilibrium levels of C, S, the government budget balance and the trade balance.

$$C = 3500 + 0.8Y_d$$

$$C = 3500 + 0.8(Y - 1000 - 0.25Y)$$

$$C = 3500 + 0.6Y - 800$$

$$\begin{aligned}
C &= 2700 + 0.6(28000) \\
C^* &= 19500 \\
S &= Y_d - C \\
Y_d = Y - T &= 28000 - (1000 + 0.25(28000)) \\
Y_d &= 28000 - 8000 = 20000 \\
S &= 20000 - 19500 \\
S^* &= 500 \\
\text{Government Budget} &= T - G \\
T &= 1000 + 0.25(28000) = 8000 \\
\text{Government Budget} &= 8000 - 3500 = 4500
\end{aligned}$$

iv) Calculate the government expenditures multiplier.

$$\begin{aligned}
Y &= C_0 + cY_d + I_0 + G_0 \\
Y &= C_0 + c(Y - T_0 - tY) + I_0 + G_0 \\
Y &= C_0 + cY - cT_0 - ctY + I_0 + G_0 \\
C \\
Y_{eq} &= \frac{C_0 + I_0 + G_0}{1 - c + ct} - \frac{cT_0}{1 - c + ct} \\
\Delta Y_{eq} &= \frac{\Delta C_0 + \Delta I_0 + \Delta G_0}{1 - c + ct} - \frac{c\Delta T_0}{1 - c + ct}
\end{aligned}$$

In this set-up, simple multiplier is equal to $1/(1 - c - ct)$.

$$\Delta Y_{eq} = \frac{\Delta G_0}{1 - c + ct}$$

Let's assume government expenditure multiplier as k_g , then

$$\begin{aligned}
k_g &= \frac{1}{1 - c + ct} = \frac{1}{1 - 0.8 + (0.8)(0.25)} = 0.4 \\
k_g &= 2.5
\end{aligned}$$

v) Calculate the lump-sum tax multiplier.

Let's look at the solution of (iii), then we find the tax multiplier as:

$$\begin{aligned}
k_t &= -\frac{c}{1 - c + ct} \\
k_t &= \frac{0.8}{-0.8 + (0.8)(0.25)} = -\frac{0.8}{0.4} = -2
\end{aligned}$$

vi) If full employment national income is 30,000 TL, there is a(n) (recessionary / inflationary) gap of 2,000. The government should (decrease/ increase) its expenditures, when all other variables stay constant, by 800 to move the economy to full employment level.

Since $Y^* = 28000$ and it is less than full-employment income, there is a recessionary gap. The desired change in Y is 2000 (30000 - 28000). Since gov't expenditure multiplier is 2.5, the government should increase G by 800 (2000/2.5).

vii) If instead of changing its expenditures in (i) the government decides to move the economy to full employment by changing lump-sum taxes, how much should lump-sum taxes be changed?

Since the tax multiplier is -2. $\Delta T_0 = \Delta Y / k_t = 2000 / (-2)$ Government should decrease lump-sum taxes by 1000.

viii) If the government wishes to move the economy to full-employment without changing the government's budget balance how much should G and T be changed?

Let's look at the solution (iii) again,

$$\Delta Y_{eq} = \frac{\Delta C_0 + \Delta I_0 + \Delta G_0}{1 - c + ct} - \frac{c\Delta T_0}{1 - c + ct}$$

To keep budget balance constant, $\Delta G_0 = \Delta T_0$ should be hold. Let's say it is equal to **BB**.

$$\text{Balanced Budget Multiplier } (k_{BB}) = \frac{1 - c}{1 - c + ct}$$

$$\Delta G_0 = \Delta T_0 = \frac{\Delta Y}{k_{BB}}$$

$$\Delta G_0 = \Delta T_0 = \frac{2000}{0.5} = 4000$$

G and T should be increased by 4000.

Q.3.

Suppose that we have a hypothetical economy characterized by following equations:

$$C = c_0 + c_1 Y_d$$

$$Y_d = Y - T$$

$$T = \bar{T}$$

$$I = I_0 + bY$$

$$G = \bar{G}$$

$$X = \bar{X}$$

$$M = mY$$

- a. Show endogenous and exogenous variables.

Endogenous Variables: C, I, M

Exogenous Variables: T, G, X

The main difference between these two groups is that although endogenous variables are functions of income and that means their values are affected by income, the value of exogenous variables are determined autonomously.

- b. Write down the equilibrium condition in goods market and derive the aggregate expenditure function.

The equilibrium condition in goods market is $Z (AE) = Y$

$$Z = C + I + G$$

$$Z = c_0 + c_1(Y - T) + I_0 + bY + G + X - mY$$

$$Z = c_0 + c_1Y - c_1T + I_0 + bY + G + X - mY$$

$$Z = Y(c_1 + b - m) + c_0 - c_1T + I_0 + G + X$$

The part that depends on Y shows the slope of AE function.

- c. Derive the equilibrium income and multiplier.

The equilibrium condition is $Z=Y$, thus we can write Y instead of Z.

$$Y = Y(c_1 + b - m) + c_0 - c_1T + I_0 + G + X$$

Let's gather the variables that depend on y on the same side and put them in parenthesis. Then, we have,

$$Y(1 - c_1 - b + m) = c_0 - c_1T + I_0 + G + X$$

$$Y^{eq} = \frac{1}{(1 - c_1 - b + m)} [c_0 - c_1T + I_0 + G + X]$$

Value of multiplier is $\frac{1}{(1 - c_1 - b + m)}$

Q.4

Consider an economy is characterized as follows:

$$C = 10800 + 0.8Y_d$$

$$T = 1200 + 0.05Y$$

$$M = 500 + 0.16Y$$

$$I = 15000$$

$$G = 12500$$

$$X = 3000$$

$Tr = 200$ where Y is output, Y_d is disposable income, C is consumption, T is taxes, M is import, I is investment, G is government spending, X is export and Tr is government's transfer payments.

- a. Obtain and write down the Aggregate Expenditure function and calculate the equilibrium level of output.

$$AE = C + I + G + NX$$

$$AE = 10800 + 0.8(Y - 1200 - 0.05Y + 200) + 15000 + 12500 + 3000 - 500 - 0.16Y$$

$$AE = 10800 + 0.8Y - 800 - 0.04Y + 15000 + 12500 + 3000 - 500 - 0.16Y$$

$$AE = 40000 + 0.6Y$$

$$\text{For equilibrium: } AE = Y$$

$$Y = 40000 = 0.6Y$$

$$0.4Y = 40000,$$

$$Y = 100000$$

- b. Calculate net exports.

$$NX = X - M$$

$$NX = 3000 - 500 - 0.16(100000)$$

$$NX = -13500$$

- c. Obtain and write down the private saving function.

$$S = Y_d - C$$

$$S = Y_d - 10800 - 0.8Y_d$$

$$S = -10800 + 0.2Y_d$$

d. What is the MPS out of Y_d and what is the MPC out of Y_d in this economy?

$$C = 10800 + 0.8Y_d$$

$$S = -10800 + 0.2Y_d$$

$$MPS = 0.2$$

$$MPC = 0.8$$

e. What is the marginal propensity to consume out of national income (Y) and what is the marginal propensity to save out of national income (Y)?

$$C = 10800 + 0.8Y_d$$

$$C = 10800 + 0.8(Y - 1000 - 0.05Y)$$

$$C = 10800 + 0.8Y - 800 - 0.04Y = 10000 + 0.76Y$$

$$S = -10800 + 0.2Y_d$$

$$S = -10800 + 0.2(Y - 1000 - 0.05Y)$$

$$S = -10800 + 0.2Y - 200 - 0.01Y = -11000 + 0.19Y$$

$$\text{Marginal Propensity to Consume out of } Y = 0.76$$

$$\text{Marginal Propensity to Save out of } Y = 0.19$$

f. Obtain and write down the leakages function and injections function and find the equilibrium level of income using leakages and injections.

$$\text{Leakages} = S + NT + M$$

$$= -11000 + 0.19Y + 1000 + 0.05Y + 500 + 0.16Y$$

$$= -9500 + 0.4Y$$

$$\text{Injections} = I + G + X$$

$$= 15000 + 12500 + 3000 = 30500$$

$$30500 = -9500 + 0.4Y$$

$$Y = 100000$$

MULTIPLE CHOICE QUESTION

Q1) A tax _____ income.

- A) increase, increases national
- B) cut, decreases disposable
- C) cut, increases disposable
- D) increase, decreases planned

Q2) The multiplier is defined as

- A) The ratio of the change in the inventories to the change in interest rate
- B) The ratio of the change in the equilibrium level of output to the change in an autonomous variable
- C) The ratio of equilibrium level of output to an autonomous variable
- D) The ratio of the change in the equilibrium level of output to an autonomous variable

Q3) Inventories refer to

- A) goods which have been presold before they are produced.
- B) goods that have been produced but not yet sold.
- C) goods that have been planned but not yet produced.
- D) goods that have been produced and sold in the same year.

Q4) If inventories decline by more than analysts predict they will decline, this implies that

- A) actual investment spending was greater than planned investment spending.
- B) actual investment spending was less than planned investment spending.
- C) actual investment spending was equal to than planned investment spending.
- D) there is no relationship between actual investment spending and planned investment spending

Q5) If firms sell exactly what they expected to sell, all of the following will be true except

- A) aggregate expenditure will be greater than GDP.
- B) there is no unplanned change in inventories.
- C) inventories will not change, and GDP and employment will remain stable.
- D) aggregate expenditure will be equal to GDP.

Q6) _____ in taxes will decrease consumption spending, and _____ in transfer payments will increase consumption spending.

- A) An increase; an increase
- B) A decrease; an increase
- C) An increase; a decrease
- D) A decrease; a decrease

Q7) _____ describes the relationship between consumption spending and disposable income.

- A) Household wealth
- B) The liquidity trap
- C) The consumption function
- D) The paradox of thrift

Q8) If disposable income increases by \$100 million, and consumption increases by \$90 million, then the marginal propensity to consume is

- A) 0.9.
- B) 0.8.
- C) 0.75.
- D) 0.6.

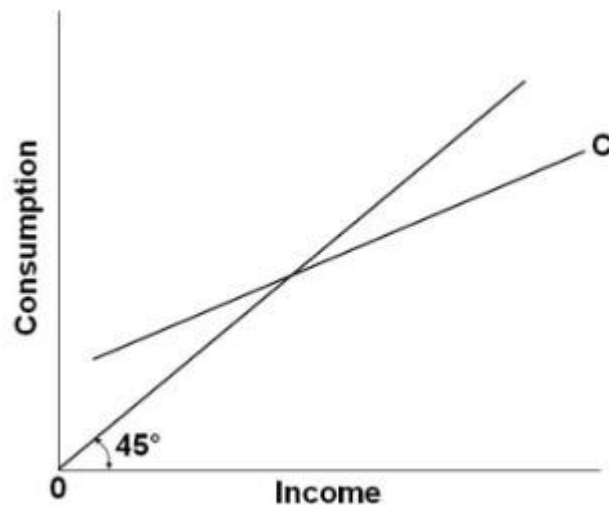
Q9) Investment spending will decrease when

- A) the interest rate falls.
- B) the corporate income tax decreases.
- C) **business cash flow decreases.**
- D) firms become more optimistic about earning future profits.

Q10) The most important determinant of consumer spending is:

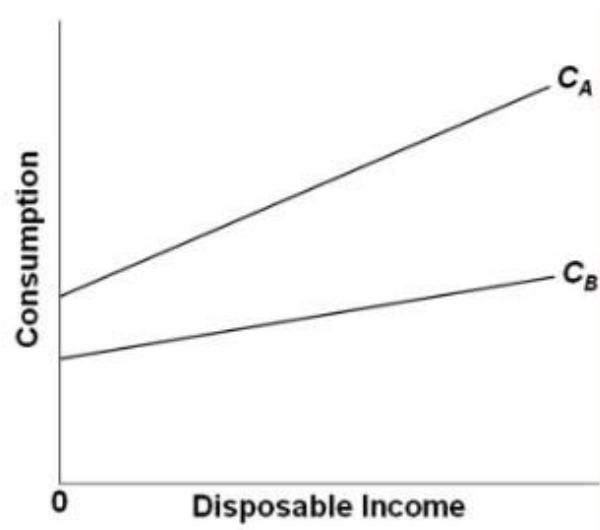
- A) the level of household borrowing.
- B) consumer expectations.
- C) the stock of wealth.
- D) **the level of income.**

Q11) Refer to the following figure. The consumption schedule indicates that:



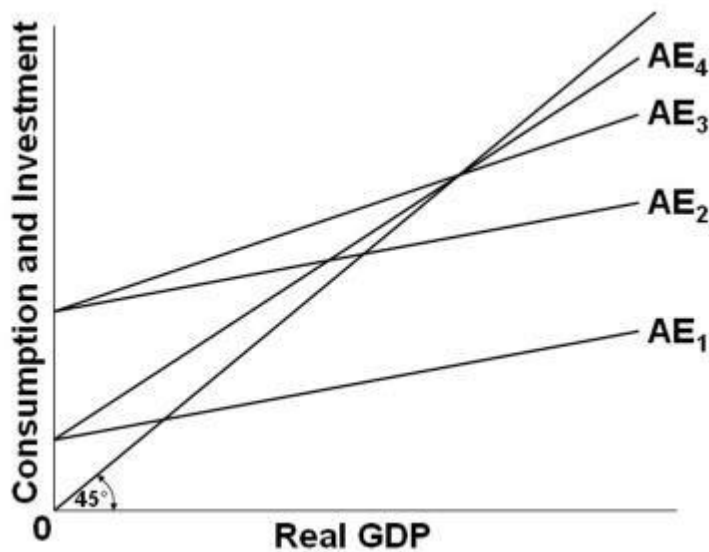
- A) consumers will maximize their satisfaction where the consumption schedule and 45° line intersect.
- B) **up to a point consumption exceeds income but then falls below income.**
- C) the MPC falls as income increases.
- D) households consume as much as they earn.

Q12) Refer to the following diagram, which shows consumption schedules for economies A and B. We can say that the:



- A) MPC is greater in B than in A.
- B) APC at any given income level is greater in B than in A.
- C) MPS is smaller in B than in A.
- D) **MPC is greater in A than in B.**

Please answer the next three questions referring to the figure below.



Q13) Which aggregate expenditure schedule AE in the diagram for a private closed economy implies the largest MPC, assuming investment is the same at each level of income?

- A) **AE_4 .**
- B) AE_3 .
- C) AE_2 .
- D) AE_1 .

Q14) Which two aggregate expenditure schedules AE in the diagram for a private closed economy have the same MPC, assuming investment is the same at each level of income?

- A) **AE_1 and AE_2 .**
- B) AE_2 and AE_3 .
- C) AE_1 and AE_4 .
- D) AE_3 and AE_4 .

Q15) Which aggregate expenditure schedule(s) AE in the diagram for a private closed economy represent(s) the highest level of investment, assuming investment is the same at each level of income and the level of consumption at zero income is the same for each schedule?

- A) **AE_4 only.**
- B) AE_2 and AE_3 .
- C) AE_1 and AE_4 .
- D) AE_3 and AE_4 .