INTRODUCTION

o Macroeconomics is the study of the behavior of the economy as a whole.

o Here we are dealing with "aggregates" such as: aggregate consumption, aggregate investment, aggregate demand, aggregate supply, aggregate output, general price level.....

→ Macroeconomists try to understand the factors that either promote or retard economic growth in order to support economic policies that will support development, progress, and rising living standards.
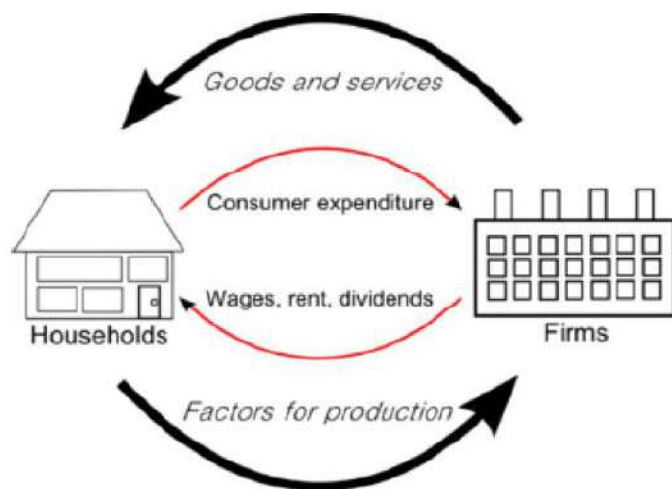
First: Closed Economy

→ A Closed Economy without Government

→ There are two sectors (the participants in the economy):

1-household sector,

2-business sector (Production sector),

* A Closed Economy without Government is one that does not interact with other economies in the world (no exports, no imports).

Goods and services

Consumer expenditure

Wages. rent. dividends

Households   Firms

Factors for production

GROSS DOMESTIC PRODUCT

Can be determined by when the sum of all expenditure (aggregate expenditure AE) equals the sum of all income Y

{ Y = AE = C + I }

➔ Why expenditure = income

- In every transaction, the buyer's expenditure becomes the seller's income.

Y = AE = C + I

where

Y = GDP = the value of total output

AE = C + I = aggregate expenditure in closed economy without government

➔ **Consumption**:

- the value of all goods and services bought by households.
- Includes:
- durable goods last a long time ex: cars, home appliances
- non-durable goods last a short time ex: food, clothing

- services work done for consumers ex: dry cleaning, air travel.
- Consumption is the biggest single component of aggregate demand

   # The Aggregate consumption function:

$$C = a + bY$$

a : autonomous consumption: a part of consumption that doesn't relate to the income level. It is the consumption that occur when income equal zero.

b: $= \Delta C / \Delta Y$: the slope of the function

b: $= \Delta C / \Delta Y$: is the marginal propensity to consume, (MPC), which measures the change in total consumption when national income change by one unit. The value of MPC ranges from 0 to 1.

➔ *Generally, people on lower incomes tend to have a <u>higher</u> propensity to spend.*

Investment expenditure includes:
- *business fixed investment*
  spending on equipments that firms will use to produce other goods & services

- *residential fixed investment*
  spending on housing units by consumers

- *inventory investment*
  the change in the value of all firms' inventories

   → Examples of Factors which affect the planned investment :
- **Technological change** – makes capital more productive raising the rate of return.
- **Expectations** – positive or negative views of the future influence planned investment

=> In a Closed Economy without Government, the Equilibrium occurs when:

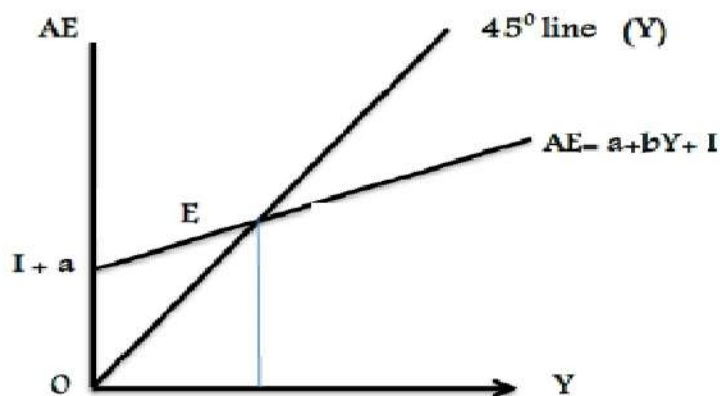*Real output (National Income) = Desired aggregate expenditures

<mark>Y = AE</mark>

* The 45^0 line: shows the equilibrium condition that desired AE be equal to actual Y

Y = AE = C + I
Where,
 C: Consumption function
I: autonomous investment (given)

The slope of *AE* function in a closed economy without government is the *marginal propensity to spend* (*z*), which was simply equal *MPC*.

> ➢ AE = C + I

> ➢ AE = a + b y + I

> ➢ AE = (a+I) + b Y

Slope of AE in closed economy without government = MPC

➔ It is the final change in equilibrium national income as a result of one unit change in any autonomous expenditure

$$K = \Delta Y / \Delta I = [1/(1-b)]$$

➔ If autonomous investment increases, AE curve would shift upward and equilibrium national income would increase

➔ **Derivation of Investment multiplier in closed economy without government:**

$C = a + bY$ Change in consumption: $\Delta C = b \, \Delta Y$

At equilibrium: Y = AE = C + I
Change in income: $\Delta Y = b \, \Delta Y + \Delta I$

$\Delta Y - b\Delta Y = \Delta I$

$\Delta Y (1 - b) = \Delta I$
Or
$\Delta Y = 1/1\text{-}b \; \Delta I$

$$k = \frac{1}{1-b} = \frac{1}{1-MPC} = \frac{1}{MPS}$$

Example (1):

Given the following

$C = 500 + 0.8 \, Y$

$I = 1,250$

➔ **Determine the AE function**

AE = 500 + 0.8 Y + 1250

AE = 1750 + 0.8 Y

Intercept of AE = 1750   Slope of AE = 0.8
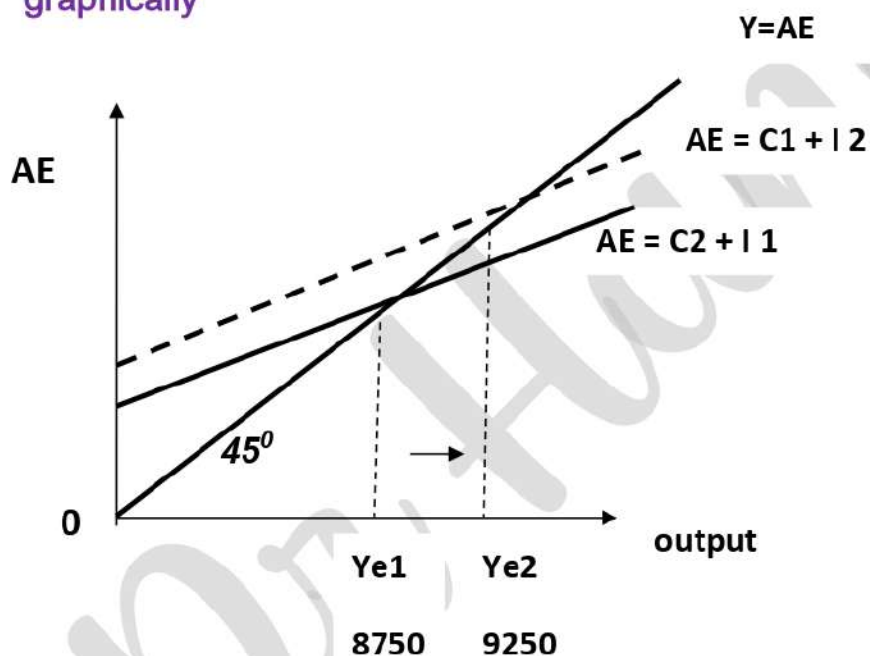
➔ Calculate the equilibrium level of Y:

Solution:

Y=AE

Y = 1750 + 0.8 Y

0.2 Y = 1750

Y = 8750

➔ If investment (I) increases by 100

Calculate the change in equilibrium income and show the results graphically

➔ IF MPC = 0.8 and investment increased by 100, calculate the change in Y
SOLUTION:

K = (1/(1-0.8)) = (1/0.2) = 5

ΔY = K * ΔI

ΔY = 5 * 100 = 500   **Therefore, the new Y = 9250**

NOTE:

As the value of MPC increase, the value of simple multiplier increases. (positive relation between simple multiplier and the marginal propensity to consume)

$$k = \frac{1}{1-b}$$

As the value of MPS increase, the value of simple multiplier decreases. (negative relation).

$$k = \frac{1}{MPS}$$

Second: CLOSED ECONOMY WITH GOVERNMENT

➔ **How government purchases and tax revenues are related to national income???**

1- Government spending

- **G includes all government spending on goods and services** (defense, education, health expenditure, infrastructure...).

- **G excludes transfer payments** (e.g. unemployment insurance payments), because they do not represent spending on goods and services.

2- Taxes

A- Lumpsum tax	B- Income tax
Fixed taxes that are not affected by income level	Tax revenues depend on the value of income

→Notes concerning consumption & savings in closed economy with government:

- <u>John Maynard Keynes</u> was one of the major figures who developed a theory of consumption that depended mainly on disposable income.

- The Consumption function Reflects the relationship between direct consumption (C) and disposable income (Yd)

- *Disposable income is income after subtracting taxes Yd= Y - T*

- Households increase their C as Yd rises.

- Savings = Disposable Income - Consumption

- Savings are essentially the portion of your income you don't consume.

- Dissavings = consuming more than the available income either by liquidating accumulated wealth or borrowing money.

- **Examples of Non-Income determinants of consumption and saving:**

 – <u>Wealth</u> = value of real assets (i.e. houses, land) and financial assets (i.e. cash, savings, stocks, bonds)
 – When wealth increases, households increase spending and reduce savings
 – Shifts Consumption schedule upward and savings schedule downwards....Opposite occurs when wealth decreases
 – <u>Expectations about future prices and income</u>
 – Expectations of rising prices in the future will cause an increase in consumption and decrease in saving in the present.
 – Shifts Consumption schedule upward and Saving schedule downward
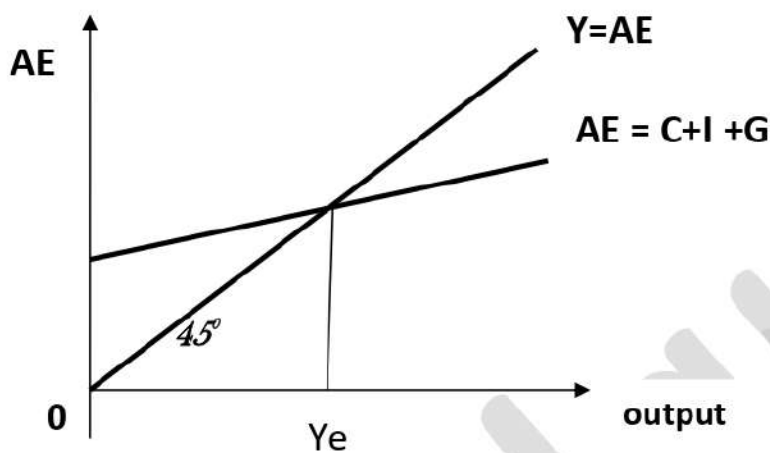 – Opposite occurs, when there are expectations of a recession and lower income in the future

Equilibrium also can be determined when:

Way1:

Ye → intersection of the 45⁰ line & the AE   AE = C + I + G

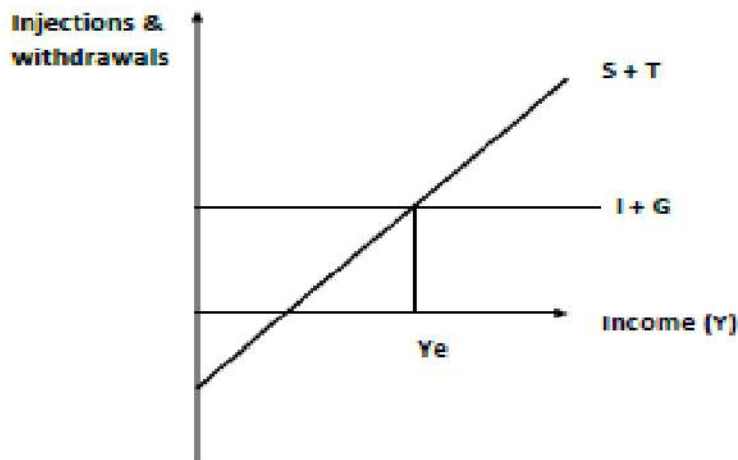**WAY 2:**

INJECTION = LEAKAGEs

➤ <u>Injections</u> are additional spending from: **I & G**

➤ <u>Leakages</u> are withdrawals from: **S & T**

So, at equilibrium,   **I+G = S+T**

SAVINGS is the sum of public savings & private savings

- **Private savings equals disposable income minus consumption**

  S = Yd – C

  S= Y – T – C

- **Public savings equals taxes minus government spending (T-G)**
  If T>G   → budget surplus
  If T<G   → budget deficit

- **At equilibrium: Production = Demand**
  Y = AE = C + I + G
  Subtract taxes from both sides:
  Y – T = C + I + G – T
  Y – T – C = I + G – T
  S = I + G – T
  I = S + (T – G)

At equilibrium in goods market→

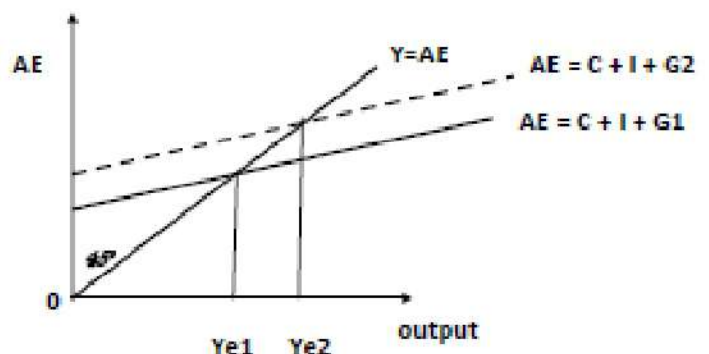**Investment = Private savings + Public savings**

Paradox of Thrift

- Keynes said that a free market economy can suffer from recession if for some reason incomes of households fall.

- This will happen if leakages become larger than injections. This could be for a number of reasons.

- Keynes focused on the example of an increase in savings by households. He pointed out that although saving is usually seen as a sensible action to ensure households have money for any unexpected spending needs in the future, it can have bad macroeconomic consequences.

- With more saving there is less demand and consumption (spending on goods and services) which would lead to a continuous fall in National Income and rising unemployment.

- Keynes called this effect the "Paradox of thrift" (paradox means "an opinion that expresses the opposite of what most people believe to be true" and thrift means "saving".

- Keynes said that in order for the economy to experience economic growth, injections should be greater than leakages.

- This could happen by increasing any of the injections or reducing any of the leakages, though he suggested the easiest and most direct way was for governments to increase government spending (G). This needed to be extra spending in the economy, not just a redirection of tax revenues. Therefore, governments had to borrow money, known as "deficit spending".

- How much should they spend? This depends on the size of what Keynes called the "Multiplier".

- THE EFFECT OF AN INCREASE IN G

➔ Effect of increasing G on Equilibrium national income in case of lumpsum tax

$$\uparrow G \implies \uparrow AE \implies \uparrow Ye$$

Increase in government expenditures leads to <u>upward shift in AE</u>

Therefore, increasing the equilibrium level of income

Government Expenditure multiplier (K_g)

$\Delta Y = k_g * \Delta G$

<u>k_g:</u> is the ratio of change in equilibrium national income to the change in government spending

Government expenditure Multiplier (k)
$= \dfrac{\Delta Y}{\Delta G} = \dfrac{1}{1-b}$

<u>Note:</u>

Government expenditure Multiplier in case of closed economy with government & lumpsum tax is equal to the simple multiplier.

How to derive AE function in case of existence of income tax??

➜ **Tax function:** **T = tY.**

- Tax revenue: T
- Marginal tax rate: t

➜ **The consumption function becomes**

C = a + b (Y − tY)

$$C = a + b (1 − t) Y$$

Aggregate Expenditure

Use the consumption function and the import function to replace C and M in the *AE* equation:

➜ *AE = a + b (1 - t)Y + I + G*

➜ *AE = (a + I + G) + [b (1 - t)]Y.*

$$AE = A + \boxed{[b (1 - t)]} \; Y.$$

Slope of AE = [b (1 - t)]

Equilibrium Expenditure

Equilibrium expenditure occurs when aggregate planned expenditure (*AE*) equals real GDP (*Y*).

$$Y = AE$$
$$Y = AE = A + [b (1 - t)] \; Y.$$

1. The government expenditure multiplier

➜ equals the change in equilibrium expenditure and real GDP (*Y*) that results from a change in government expenditure (*G*) divided by the change in government expenditure.

➜ The magnitude of the multiplier depends on the slope of the AE curve. When the AE curve is steeper (higher slope) the multiplier is larger

$$\text{G Multiplier} = \frac{\Delta Y}{\Delta G} = \frac{1}{1 - [SLOPE\ OF\ AE]}$$

$$\Delta Y = \frac{1}{1 - [b(1-t)]}\ \Delta G$$

$$\text{Multiplier} = \frac{\Delta Y}{\Delta G} = \frac{1}{1 - [b(1-t)]}$$

So the multiplier is larger,
- The greater the marginal propensity to consume (b)
- The smaller the marginal tax rate (t)

Example 2:

    C = 500 + 0.8 Yd   G=600   T=100   I =1000
    a- Determine the aggregate expenditure function.
   a- Calculate the equilibrium level of income.
   b- Calculate Public savings at equilibrium level of income.
   c- Calculate the increase in equilibrium income if **G** increases by 200.

    Solution:
   a-   AE = 500 + 0.8 (Y-100) + 1000 + 600
       AE= 2100+ 0.8Y - 80
      AE = 2020+ 0.8 Y
   b- At equilibrium: Y = AE
               Y = 2020+ 0.8 Y
               0.2 Y = 2020
               Y = 10,100

    c- Public savings = T – G = 100 – 600 = -500 → Budget Deficit

d-   K = (1/(1-0.8))=5
               $\Delta Y = 200 * 5 = 1000$

C = 500 + 0.8 Yd   G=600   T=0.2Y   I =1000
a. Determine the aggregate expenditure function
b. Calculate the equilibrium level of income
c. Calculate Public savings at equilibrium level of income.
d. Calculate the increase in equilibrium income if G increases by 200

Solution

a. AE = 500 + 0.8 (1-t) Y + 1000 + 600
    AE= 2100 + 0.8 (1- 0.2) Y

AE = 2100 + 0.64 Y   → slope of AE (b(1-t)) decreases because of income tax

b. At equilibrium: Y = AE
                         Y = 2100 + 0.64 Y
                         0.36 Y = 2100
                         Y = 5833.33

c. Public savings = T – G = 0.2(5833.33) - 600= 566.66 → Budget Surplus

d.   K= (1/(1-b(1-t))

   K= 1/(1-0.8(1-0.2)) = 1/(1- 0.64) =2.778

$$\Delta Y = 200 * 2.778 = 555.6$$

A- Lumpsum tax:

Effect of increasing T on Equilibrium national income Y

Increase in lumpsum taxes leads to downward shift in AE (same slope & different intercept) & decrease in equilibrium level of income

B- Income tax:

Assume that tax revenues depend on the value of income:

$$T = t\,Y$$

T: tax revenue

t: tax rate

Y: income

Example: if t = 0.3 and Y = 600 then T = 0.3(600) = 180
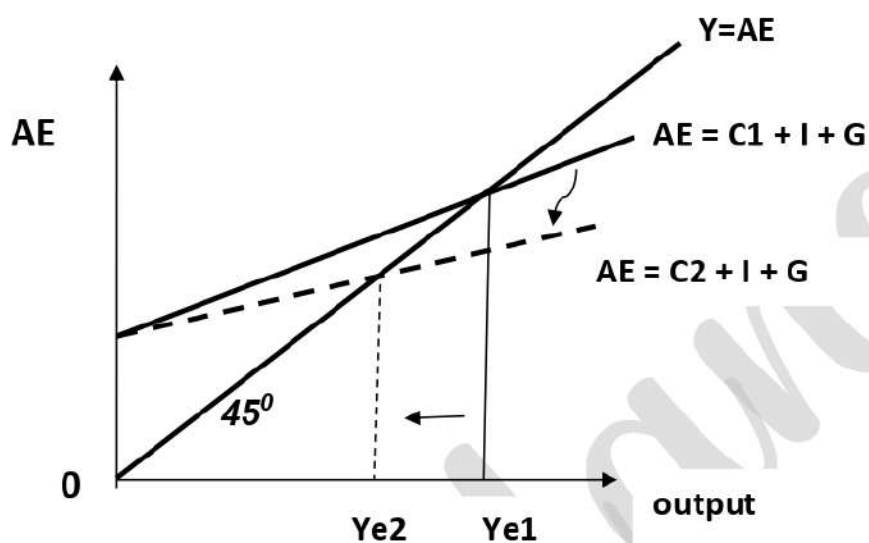
⇨ THE EFFECT OF AN INCREASE IN INCOME TAX RATE

What is the effect of increasing the tax rate (t) on the AE and Y???

➔ An increase in tax rate (t) causes a downward rotation in AE
➔ Therefore, the equilibrium level of national income will decrease

e. national income:

NOTE: An increase in tax rate causes a decrease in the slope of AE with the same intercept.

NOTE: A decrease in the tax rate causes an upward rotation and an increase in the slope of AE with the same intercept.