Ch 6: Determination of National Income

Unit 2- The Keynesian Theory of Determination of National Income

Introduction

- The Great Depression of the 1930s, a severe economic crisis, highlighted the lack of a developed theory to address persistent unemployment.
- Classical economists had no solutions, though some suggested government spending to reduce unemployment.
- The publication of John Maynard Keynes's General Theory of Employment, Interest, and Money in 1936 marked a turning point in modern macroeconomics.
- Keynes introduced key concepts, such as the relationship between consumption and income, the multiplier effect, liquidity preference, and the role of expectations in influencing demand and output.

The Keynesian theory of income determination is presented in three models:

- i. The two-sector model consisting of the household and the business sectors,
- ii. The three-sector model consisting of household, business and government sectors, and
- iii. The four-sector model consisting of household, business, government and foreign sectors

Before we attempt to explain the determination of income in each of the above models, it is pertinent that we understand the concept of circular flow in an economy which explains the functioning of an economy.

Circular Flow of Income

The circular flow model illustrates how money moves through an economy. It shows that money flows from producers to workers as wages and then returns to producers as payment for products. In essence, the economy operates as a continuous circular flow of money.

- The basic purpose of the circular flow model is to understand how money moves within an economy. It breaks the economy down into two primary players: households and corporations and identifies two types of markets:
- **1**. **Markets for Goods and Services:** Where households spend their income to purchase products.
- 2. Markets for Factors of Production: Where households provide resources like labor, capital, and land to firms in exchange for income.

Households in the Circular Flow:

• Households own all factors of production and earn income by selling these factors to business firms. This income is entirely spent on consuming goods and services produced by these firms.

Firms in a Circular Flow

- Firms hire the factors of production from households, produce goods and services, and sell them back to households.
- In the simplified model, all household income is spent, and firms do not save, so total income equals total expenditure.
- The total income produced, Y, accrues to the households and equals their disposable personal income Yd i.e., Y= Yd.

Circular Flow in a Two Sector Economy



Factor pavments = Household Income = Household Expenditure = Total Receipts of Firms= Value of Output

- Circular broken lines with arrows depict 'real flows,' which represent the movement of actual goods and services.
- Continuous lines with arrows illustrate 'money flows,' which correspond to payments for goods, services, or wages.
- The model assumes no injections or leakages, meaning all household income is spent on goods and services.
- Household expenditures equal the total receipts of firms, which in turn equal the value of output.

Equilibrium in a Circular Flow

- Equilibrium means a state where there is no change or a position of rest.
- Output is at equilibrium when the amount produced equals the amount demanded.
- An economy is in equilibrium when the plans of firms to produce match the expenditure plans of households.
- The two-sector model helps us understand the basics of Keynesian economics and income determination.
- Before we discuss the Keynesian theory of income determination, let us look at the basic concepts, definitions and functions used in his theory of income determination.

Basic Concepts And Functions

Aggregate Demand Function:

Aggregate demand (AD) is what economists call total planned expenditure.

In a simple two- sector economy, the ex ante aggregate demand (AD) for final goods or aggregate expenditure consists of only two components:

(i) Ex ante aggregate demand for consumer goods (C), and
(ii) Ex ante aggregate demand for investment goods (I)

AD = C + I

In a simple economy, the variable I is assumed to be determined exogenously and constant in the short run.

Therefore, the short-run aggregate demand function can be written as:

 $AD = C + \overline{I}$

Where I = constant investment.

From the equation, we can infer that, in the short run, AD depends largely on the aggregate consumption expenditure.

The Consumption Function

Consumption function expresses the functional relationship between aggregate consumption expenditure and aggregate disposable income, expressed as: C = f(Y)

Income < Consumption

When disposable income is low, households spend more than they earn. To cover this gap, they either borrow money or dip into their savings. This is called dissaving.

Income = Consumption

As income increases, consumption also rises. At a certain point, households spend exactly what they earn. Here, there's no need to borrow or save extra; their spending perfectly matches their income.

Income > Consumption

When income rises further, households increase their consumption, but not by the full amount of the income increase. They start to save more since they don't need to spend every extra dollar they earn.

The specific form of consumption–income relationship termed the consumption function, proposed by Keynes is as follows:

C = a + bY

where

- C = aggregate consumption expenditure;
- Y = total disposable income;
- a = autonomous consumption (constant term which denotes the (positive) value of consumption at zero level of disposable income;)
- b = is the marginal propensity to consume (MPC) i.e. the increase in consumption per unit increase in disposable income.

MPC = $\Delta C / \Delta Y$. It is also known as the slope of the consumption function.



The Keynesian assumption is that consumption increases with an increase in disposable income, but that the increase in consumption will be less than the increase in disposable income (b <1).

i.e. 0 < b < 1.

Average Propensity to Consume

Just as marginal propensity to consume, the average propensity to consume is a ratio of consumption defining income consumption relationship. The ratio of total consumption to total income is known as the average propensity to consume (APC).

APC = Total Consumption/ Total Income

Relationship Between Income and Consumption

Income (Y) (`Crores)	Consumption (C) (`Crores)	Saving (`Crores)	APC (C/Y)	ΜΡϹ (ΔϹ /ΔΥ)
0	50	-50	00	-
100	125	-25	125/100 = 1.25	75/100 = 0.75
200	200	0	200/200 = 1.00	75/100 = 0.75
300	275	25	275/300 = 0.92	75/100 = 0.75
400	350	50	350/400=0.88	75/100 = 0.75
500	425	75	425/500=0.85	75/100 = 0.75

Note: The conventional Keynesian MPC is assumed to have a constant value less than 1.00 and usually greater than 0.50.

Relationship Between Income, Consumption and Saving

- Saving is also a function of disposable income. The saving function shows the functional relationship between national income (= disposable income in two sector model) and saving.
- S = f(Y)

Disposable Income (Yd)	Consumption (C)	Saving (s)
0	20	-20
60	70	-10
120	120	0
180	170	10
240	220	20

The slope of the saving function is the marginal propensity to save. The marginal propensity to save is the increase in saving per unit increase in disposable income.

 $MPS = \Delta S / \Delta Y$

If a one-unit increase in disposable income leads to an increase of 'b' units in consumption, the remainder (1 - b) is the increase in saving.

Saving is an increasing function of the level of income because the marginal propensity to save (MPS) = 1- b is positive, i.e. saving increases as income increases. Average Propensity to Save (APS)

The ratio of total saving to total income is called average propensity to save (APS).

Alternatively, it is that part of total income which is saved.

APS = Total Saving/Total Income

Aggregate Supply

- Ex ante or planned aggregate supply is the total supply of goods and services which firms in a national economy plan on selling during a specific time period.
- It is equal to the national income of the economy, which is either consumed or saved.

AS = C + S



Equilibrium in a Two-Sector Model

The equilibrium level of income and output in the Keynesian framework is that level at which aggregate demand and aggregate supply (or output) are equal.

C + I = C + S

At equilibrium, Investment is equal to Savings.

I = S





The aggregate demand curve is linear and positively sloped indicating that as the level of national income rises, the aggregate demand (or aggregate spending) in the economy also rises.

The aggregate expenditure line is flatter than the 45degree line because, as income rises, consumption also increases, but by less than the increase in income.

The 45-Degree Line: This line represents all points where total planned expenditure (AD) equals total production (AS). If the economy is at a point on this line, it's in equilibrium.



For all points below the 45-degree line, planned aggregate expenditure is lesser than GDP.

For all points above the 45-degree line; planned aggregate expenditure is greater than GDP.

Only at point E and at the corresponding equilibrium levels of income and output Yo does aggregate demand exactly equals output.

At that level of output and income, planned spending precisely matches production.

We would like equilibrium to occur at potential GDP i.e. at the level of full employment.

- According to Keynes, aggregate demand will not always be equal to aggregate supply.
- Aggregate demand depends on the households' plan to consume and to save. Aggregate supply depends on the producers' plan to produce goods and services.
- In other words, aggregate supply represents aggregate value expected by business firms and aggregate demand represents their realised value.
- For the aggregate demand and the aggregate supply to be equal so that equilibrium is established, the households' plan must coincide with producers' plan.
- At equilibrium, expected value equals realised value.

However, Keynes held the view that that there is no reason to believe that:

- i. consumers' consumption plan always coincides with producers' production plan, and
- ii. that producers' plan to invest matches always with households' plan to save.

Putting it differently, there is no reason for C + I and C + S to always be equal.



Above the equilibrium of income, saving exceeds planned investment. This leads to reduced consumption, which can slow down the economy. Ultimately national income will fall, reducing savings and bringing the economy closer to equilibrium

Below equilibrium level of income, planned investment exceeds saving. This leads to increased consumption, which can stimulate the economy. Ultimately, national income will rise, increasing savings and pushing the economy toward equilibrium.

This is called the process of re-adjustment.

If the leakages (savings) are greater than the injections (investments), then national income will fall, while if injections (investments) are greater than leakages (savings), national income will rise.

The national income will be in equilibrium only when intended saving is equal to intended investment.

If there is any deviation from equilibrium, i.e. planned saving is not equal to planned investment, the process of readjustment will bring the economy back to equilibrium.

Equilibrium with Unemployment or Inflation

- An important point to remember is that Keynesian equilibrium with equality of planned aggregate expenditures and output need not take place at full employment.
- If the aggregate expenditure line intersects the 45-degree line at the level of potential GDP, then there is full employment equilibrium. There is no recession, and unemployment is at the natural rate.
- But there is no guarantee that the equilibrium will occur at the potential GDP level of output. The economy can settle at any equilibrium which might be higher or lower than the full employment equilibrium.

Deflationary Gap

- If the aggregate demand is for an amount of output less than the full employment level of output, then we say there is deficient demand.
- Deficient demand gives rise to a 'deflationary gap' or 'recessionary gap'. Recessionary gap also known as 'contractionary gap' arises in the Keynesian model of the macro economy when the equilibrium level of aggregate production achieved in the short-run falls short of what could be produced at full employment.
- Recessionary gap occurs when the economy is in a business-cycle contraction or recession.



Inflationary Gap

- If the aggregate demand is for an amount of output greater than the full employment level of output, then we say there is excess demand.
- Excess demand gives rise to 'inflationary gap' which is the amount by which actual aggregate demand exceeds the level of aggregate demand required to establish the full employment equilibrium.
- This is the sort of gap that tends to occur during a business-cycle expansion and sets in motion forces that will cause demand pull inflation.



- During inflationary gap, the real output will be constant, but the rise in the price level will cause an increase in the nominal output until the new equilibrium is reached at point E.
- At the new equilibrium, real output, real income and employment will be the same; nominal output and income has increased due to inflation.
- In the Keynesian model, neither wages nor interest rates will decline in the face of abnormally high unemployment and excess capacity.
- Therefore, output will remain at less than the full employment rate as long as there is insufficient spending in the economy. Keynes argued that this was precisely what was happening during the Great Depression.

The Investment Multiplier

- How much does a one-unit increase in autonomous spending raise the equilibrium level of income?
- It might seem that a one-unit increase in autonomous spending should raise equilibrium income by one unit since income equals aggregate demand in equilibrium.
- This is incorrect. The actual effect is larger than one unit. The increase in income occurs through multiple rounds of spending, not just a one-time increase.
- This process is known as the investment multiplier, which describes how initial increases in investment lead to a larger overall increase in national income.

- 1. Business Investment in Capital Goods
- 2. Hire Workers for Construction
- 3. Increase in Workers' Wages
- 4. Increase in Workers' Disposable Income
- 5. Increase in Demand for Goods and Services
- 6. Businesses Respond by Increasing Output
- 7. Hire More Workers and Buy More Materials
- 8. Further Increase in Wages
- 9. (Repeats until New Equilibrium is Reached)

Multiplier refers to the phenomenon whereby increase in investment expenditure will lead to a proportionately larger change (or multiple changes) in the equilibrium level of national income.

The investment multiplier explains how many times the equilibrium aggregate income increases as a result of an increase in autonomous investment.

When the level of investment increases by an amount, say ΔI , the equilibrium level of income will increase by some multiple amounts, ΔY . The ratio of ΔY to ΔI is called the investment multiplier, k.

$$\mathbf{k} = \Delta \mathbf{Y} / \Delta \mathbf{I}$$

For example, if a change in investment of 2000 million causes a change in national income of 6000 million, then the multiplier is 6000/2000 = 3.

From the above, we find that the marginal propensity to consume (MPC) is the determinant of the value of the multiplier and that there exists a direct relationship between MPC and the value of multiplier.

Higher the MPC more will be the value of the multiplier, and vice-versa. On the contrary, higher the MPS, lower will be the value of multiplier and vice-versa.

 $k = \Delta Y / \Delta I = 1 / 1$ -MPC

The maximum value of multiplier is infinity when the value of MPC is 1 i.e. the economy decides to consume the whole of its additional income.

We conclude that the value of the multiplier is the reciprocal of MPS (k = 1/MPS).

For example, if the value of MPC is 0.75, then the value of the multiplier is 1/0.25 = 4.

The multiplier concept is central to Keynes's theory because it explains how shifts in investment caused by changes in business expectations set off a process that causes not only investment but also consumption to vary. The multiplier shows how shocks to one sector are transmitted throughout the economy.

Increase in income due to increase in initial investment, does not go on endlessly. The process of income propagation slows down and ultimately comes to a halt. Causes responsible for the decline in income are called leakages.

Income that is not spent on currently produced consumption goods and services may be regarded as having leaked out of the income stream. If the increased income goes out of the cycle of consumption expenditure, there is a leakage from the income stream which reduces the effect of multiplier.

The more powerful these leakages are, the smaller the value of the multiplier.

Causes of Leakages

- Progressive rates of taxation which result in no appreciable increase in consumption despite increase in income
- High liquidity preference and idle saving or holding of cash balances and an equivalent fall in marginal propensity to consume
- Increased demand for consumer goods being met out of the existing stocks or through imports
- Additional income spent on purchasing existing wealth or purchase of government securities and shares from shareholders or bondholders
- Undistributed profits of corporations
- Part of increment in income used for payment of debts
- In case of full employment additional investment will only lead to inflation
- Scarcity of goods and services despite having high MPC

- The MPC, on which the multiplier effect of increase in income depends, is high in underdeveloped countries; but ironically the value of multiplier is low.
- Due to structural inadequacies, increase in consumption expenditure is not generally accompanied by increase in production.
- E.g. increased demand for industrial goods consequent on increased income does not lead to increase in their real output; rather prices tend to rise.

The Three-Sector Model of a Closed Economy

In a closed economy, we consider three main sectors: households, businesses (firms), and the government. Here's how each sector interacts and contributes to the overall economy:

Households provide factors of production to firms and the government in exchange for factor income. They use their income to consume goods and services and to pay taxes.

Firms use the income from selling goods and services to make factor payments and invest in production.

The Government collects taxes and uses that money to fund public services, make transfer payments, purchase goods and services from firms, and finance deficits through borrowing.

How the Government Interacts with Households and Firms

The three-sector, three-market circular flow model which accounts for government intervention highlights the role played by the government sector. The government sector adds the following key flows to the model:

- i) Taxes on households and business sector to fund government purchases
- ii) Transfer payments to household sector and subsidy payments to the business sector
- iii) Government purchases goods and services from business sector and factors of production from household sector, and
- iv) Government borrowing in financial markets to finance the deficits occurring when taxes fall short of government purchases

Leakages in a 3-Sector Model

1. Saving Flow:

- When households save part of their income instead of spending it on consumption, this money is diverted to financial markets in the form of savings accounts, bonds, stocks, etc.
- This money doesn't immediately return to the firms as consumption expenditure. Instead, it is held in financial institutions, which can reduce the immediate demand for goods and services.

2. Tax Payments :

- Taxes paid by households go to the government.
- Taxes represent a leakage because this money is not used for consumption or investment but is instead collected by the government. It reduces the amount of disposable income available for spending or saving.

Injections in a 3-Sector Model

1. Investment

- Investment refers to spending by firms on capital goods (e.g., machinery, buildings) and is financed through borrowing from financial markets.
- Investment is an injection because it adds to the demand for output. The money used for investment flows from the financial markets to the business sector, increasing overall economic activity and national income.
- This injection compensates for some of the leakages, such as saving and taxes, by creating new demand in the economy.

2. Government Spending:

 Government spending on goods and services injects money directly into the economy, increasing the demand for output. This helps to offset the reduction in demand caused by taxes and savings.

Equilibrium in a 3-Sector Model

In a three-sector model of a closed economy, equilibrium income is determined by balancing total demand and total supply.

Aggregate Demand (AD) consists of: Household consumption (C), Business investment (I), Government spending (G)

Aggregate Supply (AS) is the total output produced, and it equals the income (Y) distributed as: Consumption (C), Savings (S), Taxes (T)

Equilibrium Condition: The economy is in equilibrium when AD equals AS, meaning total demand equals total output (income). Mathematically:

C+I+G = Y = C+S+T



- The autonomous expenditure components namely, investment and government spending do not directly depend on income and are exogenous variables determined by factors outside the model.
- When aggregate demand (AD) is higher than national income (AS), there is excess demand, leading to unintended inventory shortages. This prompts businesses to increase output.
- Conversely, when aggregate demand (AD) is lower than national income (AS), there is excess inventory. Businesses will reduce production and employment, which decreases output back to equilibrium.
- An important thing to note is that the change in total spending, followed by changes in output and employment, is what will restore equilibrium in the Keynesian model, not changes in prices.

The Government Sector and Income Determination

- We have seen above that the government influences the level of income through taxes, transfer payments, government purchases and government borrowing.
- Now, we shall look into a few variables and their effect on income:
- (i) Income Determination with Lump Sum Tax
- (ii) Income Determination with Lump Sum Tax and Transfer payments
- (iii) Income Determination with tax as a function of Income
- (iv) Income Determination with Tax (as a Function of Income), Government Expenditure and Transfer Payments

(i) Income Determination with Lump Sum Tax

We assume that the government imposes a lump sum tax, i.e. taxes that do not depend on income, has a balanced budget (G=T) and also that there are no transfer payments. The consumption function is defined as –

C = a + b Yd Where Yd = Y –T (disposable income), T = lump sum tax

Now, we know, Y = C + I + GY = a + b (Y - T) + I + G

(ii) Income Determination with Lump Sum Tax and Transfer Payment

The consumption function is defined as: C = a + b Yd

Where Yd= Y- T+ TR where T is a lump sum tax TR is autonomous transfer payments

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So , C = a + b (Y - T + TR)
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Now, Y= C+ I+ G Y= a+ b (Y - T + TR) + I + G

(iii) Income Determination with Tax as a function of Income

In (i) and (ii) above, we have analysed the effect of balanced budget with an autonomous lump sum tax.

In reality, the tax system consists of both lump sum tax and proportional taxes. The tax function is defined as;

Tax function $T = \overline{T} + t Y$

Where,

T = autonomous constant tax

t = income tax rate

T = total tax

The consumption function is C = a + b YdWhere Yd = Y - Tor $Y - \overline{T} - t Y$

C=a+b(Y-T-tY)

Therefore, the equilibrium level of national income can be measured as-Y=C+I+Gor, Y=a+bYd+I+GOr, Y=a+b(Y-T-tY)+I+G

Tax multiplier = 1/1-b(1-t)

(iv) Income Determination with Tax (as a function of Income), Government Expenditure and Transfer Payment

Here consumption function is written as C= a + b(Y - T - tY + TR)

Now, Y= a + b(Y - T - tY + TR) + I + G

The Four-Sector Model

- The four sector model includes all four macroeconomic sectors, the household sector, the business sector, the government sector, and the foreign sector.
- The foreign sector includes households, businesses, and governments that reside in other countries.
- In the four sector model, there are three additional flows namely: exports, imports and net capital inflow which is the difference between capital outflow and capital inflow.
- The C+I+G+(X-M) line indicates the aggregate demand or the total planned expenditures of consumers, investors, governments and foreigners (net exports) at each income level.

The domestic economy trades goods with the foreign sector through exports and imports.

Exports are the injections in the national income, while imports act as leakages or outflows of national income.

Exports represent foreign demand for domestic output and therefore, are part of aggregate demand.

Since imports are not demands for domestic goods, we must subtract them from aggregate demand.

The demand for imports has an autonomous component and is assumed to depend on income. Imports depend upon marginal propensity to import which is the increase in import demand per unit increase in GDP.

The import function is expressed as M = M + mY. Marginal propensity to import $m = \Delta M / \Delta Y$ is assumed to be constant.

The demand for exports depends on foreign income and is therefore exogenously determined and autonomous.

Imports are subtracted from exports to derive net exports, which is the foreign sector's contribution to aggregate expenditures.

Equilibrium in a 4-Sector Model

As noted above, the equilibrium level of national income is determined at the level at which the aggregate demand is equal to aggregate supply. The equilibrium condition is expressed as follows-

$$Y = C + I + G + (X - M)$$

Where C = a + b(Y-T)M=M + mY

The equilibrium level of National Income can now be expressed by – Y = a+b(Y-T) + I + G + X - M – mY

If in the model proportional income tax and government transfer payments are incorporated, then C = a + b(Y - T - t Y + TR)

Then, Y = a + b(Y - T - tY + TR) + I + G + X - M - mY

Equilibrium in a 4-Sector Model



Effects of Leakages and Injections in a 4-Sector Model

- We have seen above that only net exports(X-M) are incorporated into the four sector model of income determination.
- We know that injections increase the level of income and leakages decrease it.
- Therefore, if net exports are positive (X > M), there is net injection and national income increases.
- Conversely, if X<M, there is net withdrawal and national income decreases.

Effects on Income When Imports > Exports



Four Sector Multiplier

You may recall that the multiplier in a closed economy is (1/1-b). The autonomous expenditure multiplier in a four sector model includes the effects of foreign transactions and is stated as (1/1-b+m), where 'm' is the propensity to import which is greater than zero.

The term (1/1-b+m) is known as the foreign trade multiplier whose value is determined by marginal propensity to consume (b) and marginal propensity to import (m).

The greater the value of 'm', the lower will be the autonomous expenditure multiplier.

The increase in imports per unit of income constitutes an additional leakage from the circular flow of (domestic) income at each round of the multiplier process and reduces the value of the autonomous expenditure multiplier.

The more open an economy is to foreign trade, the smaller will be the response of income to aggregate demand shocks, such as changes in government spending or autonomous changes in investment demand.

The higher the value of 'm', the larger the proportion of this induced effect on demand for foreign, not domestic, consumer goods.

An increase in demand for exports of a country is an increase in aggregate demand for domestically produced output and will increase equilibrium income just as an increase in government spending or an autonomous increase in investment.

In summary, an increase in the demand for a country's exports has an expansionary effect on equilibrium income, whereas an autonomous increase in imports has a contractionary effect on equilibrium income.

- However, this should not be interpreted to mean that exports are good and imports are harmful in their economic effects.
- Countries import goods that can be more efficiently produced abroad, and trade increases the overall efficiency of the worldwide allocation of resources.
- This forms the rationale for attempts to stimulate the domestic economy by promoting exports and restricting imports.

Conclusion

- National income depends on aggregate effective demand.
- If effective demand is below full employment output, it leads to unemployment and a gap between actual and potential output.
- If effective demand exceeds full employment output, it causes inflation with no real output gain.
- Equilibrium output may not match full employment output.
- High unemployment is a serious concern for society and the government.
- * Without government intervention, income instability arises from unstable investment.
- Government can stabilize the economy through fiscal policy, adjusting spending and taxes to counter investment shifts.

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