UNIT-1: NATIONAL INCOME ACCOUNTING

CHAPTER OVERVIEW

Determination of National Income

National Income Accounting

- Different concepts of National Income
- Measurement of National Income in India
- Limitations and Challenges of National Income Computation

1.1 | NATIONAL INCOME ACCOUNTING - INTRODUCTION

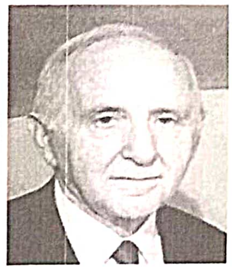
➢ National Income Accounting, pioneered by Nobel prize-winning economists **Simon Kuznets** and **Richard Stone**, is the **system of macro-economic accounts** from-
- ❑ the stage of **production** of goods and services, to
- ❑ the stage of their **final disposal**.

➢ Like any other accounting system , the national income accounts **first define concepts** and then **construct measures** corresponding to these concepts .

➢ National Accounts help us to understand how the various **transactions** from the stage of **production** of goods and services to the stage of their **final disposal** are **interrelated** and give us an idea of the **working** of an economy.

➢ It helps to meet the **needs of Government**, **private analysts**, **policy makers** and decision takers.

Richard Stone



Simon Kuznets

➢ The **Central Statistical Organization (CSO)** in the Ministry of Statistics and Programmed Implementation (MoSP&I) is **responsible** for the **compilation of National accounts statistics**.

➢ At the **State level**, **State Directorates of Economics and Statistics (DESs)** have the responsibility of compiling their State Domestic Product and other aggregates.

1.2 | USEFULNESS AND SIGNIFICANCE OF NATIONAL INCOME ESTIMATES

National income accounts are fundamental aggregate statistics in macroeconomic analysis and are extremely useful, especially for the emerging and transition economies.

1) It helps businesses to **forecast the future demand** for their products.
2) Estimates of national income show **composition & structure** of national income in terms of **different sectors** of the economy, the **periodical variations** in them and the **broad sectoral shifts** in an economy over time.
3) Sectoral contribution to National Income information is used by the government to decide various **sector-specific development policies** to increase growth rates.

4) National income statistics also provide a **quantitative basis** for **macroeconomic modelling** and analysis, for **assessing and choosing economic policies** and for objective statements as well as **evaluation** of governments' economic policies.
5) National income estimates throw light on **income distribution** and the possible **inequality in the distribution** among different income categories. It facilitates the process of **comparisons of structural statistics**, such as ratios of investment to growth, taxes proceeds and fiscal deficit , or government expenditures to GDP.
6) **International comparisons** in respect of **incomes** and **living standards** assist in determining **eligibility for loans**, and/or other funds or conditions under which such loans, and/ or funds are made available.
7) Combined with financial and monetary data, national income data provides a **guide to make policies** for **growth** and **inflation**.

1.3 | DIFFERENT CONCEPTS OF NATIONAL INCOME

✓ The **production** side of the economy **transforms inputs**, such as labor and capital, into **output**, GDP.
✓ **Inputs** such as labor and capital are called **factors of production**, and
✓ The **payments made to factors**, such as wages and interest payments, are called **factor payments**.

1.3.1 | GROSS DOMESTIC PRODUCT

Gross domestic product (GDP) is a measure of-
1) **monetary value** of
2) all **final**
3) **economic** goods and services,
4) **gross of depreciation**,
5) **produced**
6) **within domestic territory** of a country
7) **during a given time period**.

Monetary Value → Price x Number of Units of ALL Goods & Services Produced




Car	Shirt	House	Airplane Journeys	Total
100 Cars	500 Shirts	50 Houses	1000 Tickets	1650 ?????
Rs 5,00,000	Rs 1,500	Rs 60,00,000	Rs 4000	????
Rs 5,00,00,000	**Rs 7,50,000**	**Rs 30,00,00,000**	**Rs 40,00,000**	**Rs 35,47,50,000**

Analysis of Definition of GDP (For Knowledge Purpose)

1) Monetary Value

➢ **Money** enables us to **measure** and **find aggregate of different types of products expressed in different units** of measurement by **converting them in terms of Rupees**, say **tonnes of wheat** may, thus, be added with **millions of apples** and with **value of services such as airplane journeys**.

2) Final Goods

- Final goods are **used either-**
  - ✓ for **consumption** [Household sector]; **or**
  - ✓ for **investment**. [Business Sector]
- They are **neither resold nor undergo further transformation** in process of production.

Intermediate Goods

- Intermediate goods refer to those goods which are **used either for**
  - ✓ **resale** or
  - ✓ for **further production in the same year**.
- They **do not end up in final consumption**, and are **not capital goods** either.
- They have **derived demand**. Intermediate goods are **used up in the same year**; if **they remain for more than one year**, then they are **treated as final goods**.

3) Economic Activities

- GDP includes those goods & services, which are **produced through economic activity** → **exchanged in market & valued at market price**

4) Depreciation

- The **monetary value of an asset decreases** over time due to **use, wear and tear or obsolescence**. This decrease is measured as depreciation or **consumption of fixed capital** (CFC). [**Capital consumption-** Use of asset during production process]
- Gross value **includes** depreciation.

5) Produced

- GDP is a **measure of production activity**. It covers all **production activities recognized by UN System of National Accounts (SNA),** developed **by United Nations,** called the '**production boundary**'.

6) Domestic Territory

- Domestic refers to '**the geographic confines**' of a country. For example,
  - if a **Chinese citizen works temporarily in India**, his production will be **included** in GDP of India.
  - MV Foods Ltd, an Indian company produces 50,000 bottles of soft drink in USA → will **not be included** in GDP of India

7) Flow Measure

GDP is a **'flow' measure of output per time period** and **includes only those G/S produced in current period**

Exclusions from GDP

1) Transfer Payments/Income - **Transfer income** refers to any **income** which a person **receives without providing any goods** or services in return to the payer. Government **making a payment, without goods** or services being **received in return**. Eg- social security benefits, unemployment compensation etc.
2) Financial transactions - **Stocks & bonds** which are **exchanged during the period** are **not included** - do not directly involve current production. However, **value of services that accompany sale and purchase** (e.g. fees paid to real estate agents and lawyers) **is included**.
3) **Sale of 2nd Hand goods**
4) Non-reported output - **illegal transactions.** Eg - narcotics and gambling

NOMINAL GDP VS REAL GDP

➢ **Gross Domestic Product**

1. Nominal GDP or GDPMP → (GDP at Current Prices)

Gross domestic product (GDP) is the value of all-

- ✓ final goods and services
- ✓ produced in the country
- ✓ within a given period.

It includes the value of goods produced, such as houses and mobiles, and the value of services, such as telecom, health, insurance. The output of each of these is **valued at its market price**, and the values are added together to get GDPmp

1. Real GDP → (GDP at Base Prices or GDP at Constant Prices)

Nominal GDP increases over time for two reasons:

a) The production of most of goods increases over time

b) The prices of most goods also increase over time.

If our goal is to **measure production** and its **change over time**, we need to **eliminate the effect of increasing prices** on our measure of GDP. That's why **Real GDP** is constructed as the sum of the quantities of final goods times constant prices (rather than current prices)

	2012-13	2022-23
Number of Cars Produced in a year	100 units	120 units
Price per car	Rs 5,00,000	Rs 9,00,000
Total Value	**5,00,00,000**	**10,80,00,000**

Total Value of Cars has increased by 116% → **But, whether ACTUAL production has also increased by 116% ?**

No, production of cars has only increased by 20%.

➢ Changes in GDP due to <u>changes in prices</u> **fail to correctly explain the performance** of the economy in producing goods and services. Thus concept of **Real GDP** is important.

➢ For making **comparisons of GDP at different points of time**, we need to compute <u>**Real GDP**</u>.

➢ <u>**Real GDP**</u> is calculated in such a way that the goods and services produced in a particular year are **evaluated at some constant set of prices** or constant prices. In other words, it is calculated **using the prices of a selected 'base year'**.

CA Mohnish Vora (MVSIR)

	2012-13 (Base Year)
BY Production	100 units
BY Price	Rs 5,00,000
BY GDP	**5,00,00,000**

	2022-23 (Current Year)
CY Production	120 units
BY Price	Rs 5,00,000
Real GDP of 2012-13	**6,00,00,000**

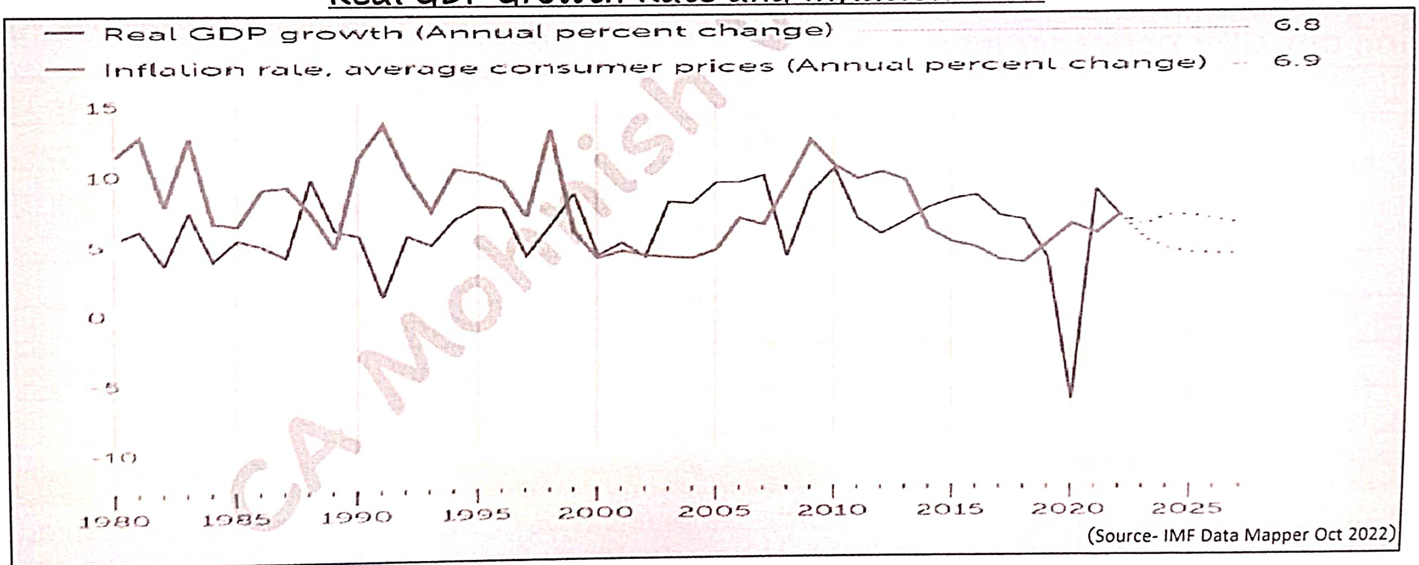
- **Nominal GDP changes** from year to year for **two reasons.**
  1) The **quantity** of goods and services **produced changes**, and
  2) When **market prices change**.

- **Real GDP** is the value of GDP **estimated using base year prices**.
  - ✓ It is an **inflation adjusted** measure → **not affected by change in price**
  - ✓ It **changes only when** there is actual **change in the quantity of output produced**.

- Hence, Real GDP is a **better measure** of **economic well being** than Nominal GDP, as it shows the **true picture** of change in production of an economy.

Real GDP at (2011-12) Prices in Q1 2022-23 is estimated to attain a level of ₹ 36.85 lakh crore, as against ₹ 32.46 lakh crore in Q1 2021-22, showing a **growth of 13.5 percent** as compared to 20.1 percent in Q1 2021-22

Real GDP Growth Rate and Inflation Rate



(Source- IMF Data Mapper Oct 2022)

GDP Deflator

Calculation of real GDP gives a useful measure of inflation → **GDP deflator**. It is the ratio of nominal GDP in a given year to real GDP of that year

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

GDP deflator, can be used to '**deflate**' or **take inflation out of GDP**. In other words, the GDP deflator is a **price index used to convert nominal GDP to real GDP**

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}} \times 100$$

- The deflator measures the **change in prices** that has occurred **between** the **base year** and the **current year**.
- It measures the current level of prices relative to the level of prices in the base year.
- Since nominal GDP & real GDP must be the same in base year, **deflator for the base year** is **always 100**.

Inflation is a closely monitored aspect of macroeconomic performance and a significant variable guiding macroeconomic policy. **Using the GDP deflator**, the **inflation rate between two consecutive years** can be **computed** using the following procedure-

$$\text{Inflation rate in year 2} = \frac{\text{GDP deflator in year 2} - \text{GDP deflator in year 1}}{\text{GDP Deflator in year 1}} \times 100$$

GDP Deflator in India is expected to reach **154.87 points** by the end of 2022, according to analysts' expectations.

In the long-term, the India GDP Deflator is projected to trend around **167.94** points in **2023** and **175.67** points in **2024**.

Inflation Rate in 2023 = (167.94 - 154.87) / 154.87 * 100

Inflation Rate in 2023 as compared to 2022 will be **8.439 %**.

Illustration - 1

Find out GDP Deflator? Interpret It

(In Billion Rs.)

Years	Nominal GDP	Real GDP	GDP Deflator
2014	500	500	100
2015	800	650	123.08
2016	1150	800	143.75
2017	1300	950	136.84
2018	1550	1190	130.25
2019	1700	1240	137.10

Solution - 1

A deflator above 100 is an indication of price levels being higher as compared to the base year. From years 2015 through 2019, we find that price levels are higher than that of the base year, the highest being in the year 2016.If the GDP deflator is greater than 100, then nominal GDP is greater than real GDP. If the GDP deflator next year is less than the GDP deflator this year, then the price level has fallen; if it is greater, price levels have increased.

Illustration - 2

The nominal and real GDP respectively of a country in a particular year are Rs. 3000 Crores and Rs. 4700 Crores respectively. Calculate GDP deflator and comment on the level of prices of the year in comparison with the base year.

Solution - 2

Nominal GDP = Rs. 3000 crores
Real GDP = Rs. 4700 crores

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

The price level has fallen since GDP deflator is less than 100 at 63.83.

Illustration - 3

Find nominal GDP if real GDP = 450 and price index = 120

Solution - 3

$$\text{Nominal GDP} = \text{Real GDP} \times \frac{\text{Price index}}{100}$$

$$\text{Nominal GDP} = 450 \times \frac{120}{100} = 540$$

Illustration - 4

Suppose nominal GNP of a country in 2010 is given at Rs. 600 Crores and price index is given as base year 2010 is 100. Now let the nominal GDP increases to Rs. 1200 Crores in 2018 and the price index rises to 110, find out real GDP?

Solution - 4

$$\text{Real GDP} = \text{Nominal GDP} \times \frac{100}{\text{Price index}}$$

$$\text{Nominal GDP} = 1200 \times \frac{100}{110} = 1090.9 \text{ crores}$$

Net Domestic Product (NDP)

As you know capital wears out, or depreciates, while it is being used to produce output,

Net Domestic Product (NDP) = GDP (-) Depreciation.

NDP thus comes closer to measuring the net amount of goods and services produced in the country in a given period of time.
It is the total value of production minus the value of capital used up in producing that output.

Other considerations such as asset obsolescence and complete destruction are also taken into account by the NDP.

NDP MP = GDP MP – Depreciation

As you are aware, the basis of distinction between 'gross' and 'net' is depreciation or consumption of fixed capital.

Gross = Net + Depreciation or **Net = Gross – Depreciation**

CA Mohnish Vora (MVSIR)

Domestic Vs National

- The term 'national' refers to normal residents of a country who may be within or outside the domestic territory of a country and is a broader concept compared to the term 'domestic'.
- The term 'domestic' refers to production done by people WITHIN the domestic territory

Net Factor Income from Abroad (NFIA)

NFIA is the difference between the aggregate amount that a country's citizens and companies earn abroad, and the aggregate amount that foreign citizens and overseas companies earn in that country.

NFIA = Net compensation of employees
+ Net income from property and entrepreneurship
+ Net retained earnings

National = Domestic + Net Factor Income from Abroad

Gross National Product (GNP)

- Gross National Product (GNP) is a measure of the market value of all final economic goods and services, gross of depreciation, produced within the domestic territory of a country by normal residents during an accounting year including net factor incomes from abroad.
- It is the total income earned by a nation's permanent residents (called nationals). It differs from GDP by including income that our citizens earn abroad and excluding income that foreigners earn here.

GNP MP

=

GDP MP

+

Factor income earned by the domestic factors of production employed in the rest of the world

-

Factor income earned by the factors of production of the rest of the world employed in the domestic territory

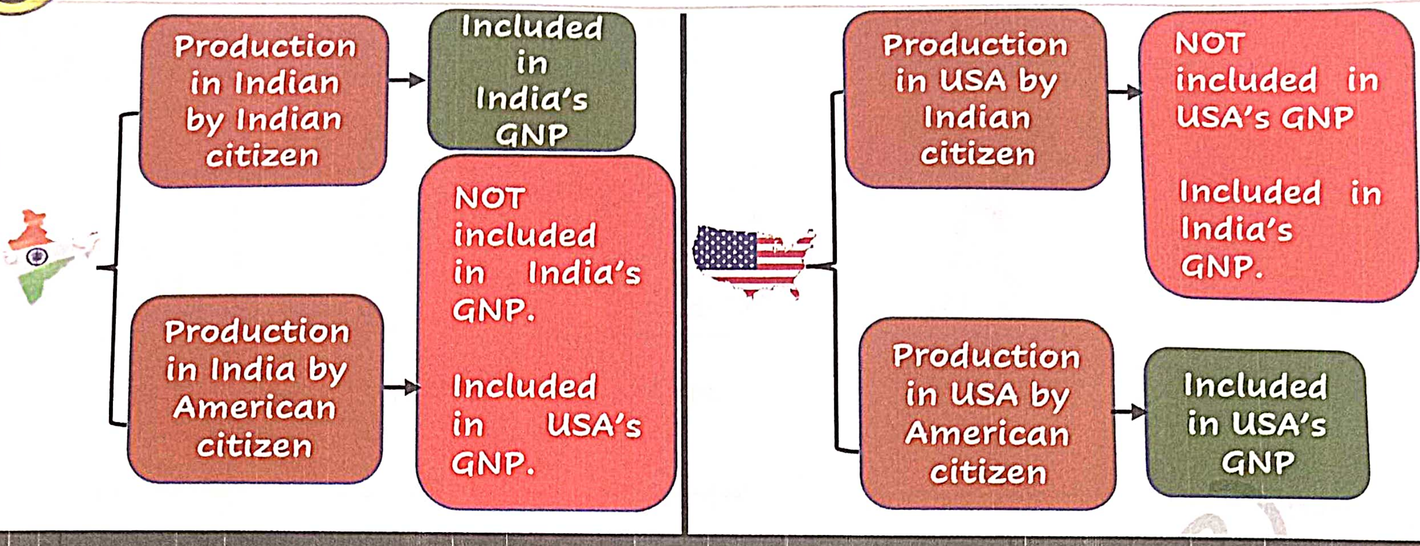
} Net Factor income from abroad (NFIA)

GNP MP = GDP MP + Net Factor Income from Abroad

OR

GDP MP = GNP MP - Net Factor Income from Abroad

If Net Factor Income from Abroad is positive, then GNP MP would be greater than GDP MP.



		GDP	GNP
1.	Earnings from production in India that accrue to foreign residents or foreign-owned firms	Included	Excluded
2.	Profits earned in India by X Company, foreign-owned firm	Included	Excluded
3.	Earnings of Indian corporations overseas	Excluded	Included
4.	Earnings of Indian residents working overseas	Excluded	Included
5.	Profits earned by Company Y, an Indian company in UK	Excluded	Included

➢ **Net National Product at Market Prices (NNPMP)**

Net National Product at Market Prices (NNPMP) is a measure of the market value of all final economic goods and services, produced by normal residents within the domestic territory of a country including Net Factor Income from Abroad during an accounting year excluding depreciation.

NNP MP = GNP MP – Depreciation

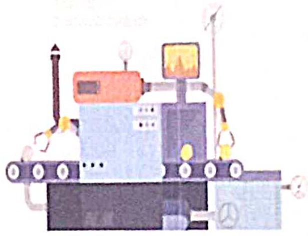
NNP MP = NDP MP + Net Factor Income from Abroad

NNP MP = GDP MP + Net Factor Income from Abroad Depreciation

Note:

Market Price Vs Factor Cost






Land	Labour	Capital	Entrepreneur	Factors of Production (Inputs)
↓	↓	↓	↓	
Rent	Wages	Interest	Profit	Factor Cost

Cloth + Thread + Buttons + Labour

Rs 900 + Rs 50 + Rs 50 + Rs 200

Total = Rs 1200

Cost= Rs 1200 + Profit= Rs 400
Factor Cost= Rs 1600
+ GST (IDT) = Rs 200 - Subsidy= Rs 300
Market Price = Rs 1500

Shirt

Market Price= Rs 1500

Factor Cost + Indirect Taxes − Subsidy = Market Price

Net Indirect Taxes = Indirect Taxes - Subsidy

Indirect Taxes and Subsidies

Independent of the volume of actual production

Production Taxes & Production Subsidies

- Examples of **production taxes** are land revenues, stamps and registration fees and tax on profession, factory license fee, taxes to be paid to the local authorities, pollution tax etc
- Examples of **production subsidies** are subsidies to railways, subsidies to village and small industries.

Paid or received on per unit of product

Product Taxes & Product Subsidies

- Examples of **product taxes** are excise duties, sales tax, service tax and import export duties.
- Examples of **product subsidies** are food, petroleum and fertilizer subsidies.

Industry	(Rs. in crore) Gross Domestic Product		Percentage change over previous year
	Previous Year	Present Year	
	Q2	Q2	Q2
1. agriculture, forestry and fishing	131,550	135,789	3.2
2. mining and quarrying	25,509	24,774	-2.9
3. manufacturing	187,763	192,849	2.7
4. electricity, gas and water supply	22,894	25,137	9.8
5. construction	91,556	95,489	4.3
6. trade, hotels, transport and communication	311,166	342,080	9.9
7. financing, ins., real est. and business services	208,644	230,627	10.5
8. community, social and personal services	169,390	180,511	6.6
GDP at factor cost	**1,148,472**	**1,227,254**	**6.9**

Factor Cost vs Basic Price vs Market Price

At this stage, we need to clearly understand the difference between the concepts: 'market price' and 'factor cost and Basic Price

GDP at Basic Price excludes any taxes on products the producer receives from the purchaser and passes on to the government **(Eg: GST or Sales Tax or Services Tax)** but includes any subsidies the producer receives from the government and uses to lower the prices charged to purchasers. In simple terms, the basic price is the subsidized price without tax.

Basic price = factor cost + Production taxes – Production subsidy

Relationship between Factor Cost and Basic Price:

Factor cost + production tax – production subsidies = Basic prices.

Relationship between Basic Price and Market Price:

Basic Price + Product tax – Product Subsidy = Market Price.

Note: Thus, market price includes both product tax as well as production tax while excluding both product and production subsidies.

Factor Cost + **Production Taxes** – **Production Subsidy** = **Basic Price**

Basic Price + **Product Taxes** – **Product Subsidy** = **Market Price**

Operating Surplus

Operating Surplus = Income from Property + Income from Entrepreneurship
OR
Operating Surplus = Rent + Interest + Profit

Mixed Income of Self- employed

- Mixed income is the income of self-employed persons like doctors lawyers barbers shopkeepers farmers etc. These persons work both as producers and as suppliers of factor services to themselves independently. Some part of their income relates to wage income and the rest part to property income.

- The **remuneration of the self-employed** is treated as mixed income. It is defined as the income that is received, over a given reference period, by individuals, **for themselves or in respect of their family members**, as a result of their current or former involvement in self-employment jobs

- It earned from the production process by the enterprises which are **not incorporated**. They **use their own land, labour, capital & entrepreneurship**. Thus the **factor incomes** (rent, wages, interest, profit) **cannot be seperately estimated** as mostly they do not make their books of accounts.

Gross Domestic Product at Factor Cost (GDPFc)

Gross domestic product (GDP) at factor cost is GDP at market prices minus net indirect taxes. The **money value of output** produced **within a country's domestic limits** in a year, as received by the factors of production, is measured by GDP at factor cost.
Thus, we find that the basis of distinction between market price and factor cost is **net indirect taxes** [i.e., **Indirect taxes (-) Subsidies**]

	Gross Domestic Product at Factor Cost (GDP FC)
=	GDP MP – Indirect Taxes + Subsidies
	OR
	Compensation of employees
+	Operating Surplus (rent + interest+ profit)
+	Mixed Income of Self- employed
+	Depreciation
=	**Gross Domestic Product at Factor Cost (GDP FC)**

Net Domestic Product at Factor Cost (NDPFC) or Domestic Income

Net Domestic Product at Factor Cost (NDPFC)is defined as the **total factor incomes earned by the factors** of production. In other words, it is sum of domestic factor incomes or GDPfc net of depreciation.
As mentioned above, market price includes indirect taxes imposed by government. We must deduct indirect taxes and add the subsidies in order to calculate that part of domestic product which actually accrues to the factors of production. The measure that we obtain so is called Net Domestic Product at factor cost.

	Net Domestic Product at Factor Cost (NDP FC)
=	NDP MP – Indirect Taxes + Subsidies
	OR
=	NDP MP – Net Indirect Taxes

	Net Domestic Product at Factor Cost (NDP FC)
=	Compensation of employees
+	Operating Surplus (rent + interest+ profit)
+	Mixed Income of Self- employed

Factor Income earned in domestic territory (FID)

Net National Product at Factor Cost (NNPFC) or National Income

National Income is defined as the **factor income** accruing to the **normal residents** of the country during a year. It is the **sum** of **domestic factor income** and **net factor income from abroad**. In other words, national income is the value of factor income generated within the country plus factor income from abroad in an accounting year.

If NFIA is **positive**, then **national income** will be **greater** than **domestic factor incomes**.

Factor Income earned in Domestic Territory (NDPfc) + **Net Factor Income from Abroad (NFIA)** = **National Income (NNP FC)**

Per Capita Income

The GDP per capita is a measure of a country's **economic output per person**. It is obtained by dividing the country's gross domestic product, adjusted by inflation, by the total population.
It serves as an **indicator** of the **standard of living of a country**.

$$\text{GDP Per Capita} = \frac{\text{Real GDP}}{\text{Total Population}}$$

3 Golden Rules of NI
1) Gross – Depreciation = Net
2) MP = FC + IDT – Subsidy or MP = FC + NIT
3) Domestic + NFIA = National

Personal Income

- While national income is income earned by factors of production, Personal Income is the **income received** by the **household** sector including **Non-Profit Institutions Serving Households**.
- Thus, national income is a measure of income earned and personal income is a **measure of actual current income** receipts of persons from **all sources** which **may or may not be earned from productive activities** during a given period of time. Eg- transfer payments such as social security benefits, unemployment compensation, welfare payments etc.
- Individuals also contribute income which they do not actually receive; **eg, undistributed corporate profits** & **contribution of employers to social security**.
- Personal income **excludes** retained earnings, indirect business taxes, corporate income taxes and contributions towards social security.
- Households **receive interest payments** from the firms and governments; they also **make interest payments** to firms and governments.
- As such, the **net interest paid** by households to firms and government is also deducted from national income.
- Personal income forms the **basis for consumption expenditures** and is derived from national income as follows-

Note: **Social Security benefits** are **payments** made to qualified retirees and disabled people, and to their spouses, children, and survivors.

We can use multiple formulas to calculate Personal Income. Use formulas as per data given in question.

1st Formula (Basic Concept)

	Personal Income
=	National Income
+	Income received but not earned
-	Income earned but not received

2nd Formula

	Personal Income
=	National Income
-	Undistributed profits
-	Net interest payments made by households
-	Corporate Tax
+	Transfer Payments to the households from firms and government

3rd Formula

	Personal Income
=	National Income
-	Income from prop & ent. accruing to govt admin dep.
-	Saving of non-dept ent.
-	Saving of private corporates
-	Corporate profit tax
+	National debt interest
+	Current transfers from govt. & ROW

4th Formula

	Personal Income
=	Private Income
-	Undistributed Profits
-	Corporate Tax

- An important point to remember is that **national income** is **not** the **sum of personal incomes** because **personal income includes transfer payments** (eg. pension) which are **excluded from national income**.

- Further, **not all national income accrues** to individuals as their personal income.

For Knowledge Purpose

- **Non-profit institutions serving households**, abbreviated as **NPISH**, consist of non-profit institutions which are not mainly financed and controlled by government, and which provide goods or services to households for free or at prices that are not economically significant. Examples include **churches and religious societies, sports and other clubs, trade unions and political parties**.

- NPISH are private, non-market producers which are separate legal entities. Their main resources, apart from those derived from occasional sales, are derived from **voluntary contributions in cash or in kind** from households in their capacity as consumers, from payments made by general governments, and **from property income**.

Disposable Personal Income (DI)

Disposable personal income is a measure of the amount of the **money in the hands of the individuals** that is **available for their consumption or savings**. Disposable personal income is **derived from personal income** by subtracting the direct taxes paid by individuals and other compulsory payments made to the government.

DI = PI - Personal Income Taxes – Non tax payments

Net National Disposable Income (NNDI)

a) Net National Disposable Income (NNDI)

The amount of good/services, domestic economy has at its disposal.

- **NNDI** = NNPFC + Net IDT + Net Current Transfers from rest of world (Receipts less payments)

OR

- NNDI = NNI + net taxes on income and wealth receivable from abroad + net social contributions and benefits receivable from abroad.

b) Gross National Disposable Income (GNDI) =

- **GNDI** = NNDI + Depreciation

❑ Ignore "Govt's transfer payment" in above calculation

Note:

Example

Calculate **Gross National Disposable income** from the following data

Particulars	(in Rs. Crores)
NDP at factor cost	6000
Net factor income to abroad	-300
Consumption of fixed capital	400
Current transfers from government	200
Net current transfers from rest of the world	500
Indirect taxes	700
Subsidies	600

Solution - 2

	Particulars	Amount
	NDP at factor cost	6,000
+	Consumption of fixed capital	400
	GDP at factor cost	**6,400**
+	Net factor income to abroad	-300
	GNP at factor cost	6,100
+	indirect taxes	700
-	Subsidies	(600)
	GNP at market prices	6,200
+	Net current transfers from rest of the world	500
	Gross National Disposable income	**6,700**

Domestic Income may be categorized into

Income from domestic product accruing to the public sector which includes

- income from property and entrepreneurship accruing to government administrative departments and
- savings of non-departmental enterprises.

	Income from domestic product accruing to private sector
=	NDP FC
-	Income from property and entrepreneurship accruing to government administrative departments
-	Savings of non-departmental enterprises

For Knowledge Purpose

The **public sector** is classified into **two groups**-Government Sector and Non-Departmental Enterprises.

1) The **Government Sector** is comprised of
   - **Producers of government services**, viz., administrative departments of government and
   - **Departmental enterprises** like Railways, Communication and other departmental enterprises.

2) **Non departmental enterprises** consist of **Financial** enterprises and **Non-financial** enterprises. These enterprises have **separate boards of directors** and present profit and loss accounts and balance sheets.
   - **Financial** Enterprises- **RBI**, Financial corporations **LIC**, **GIC**
   - **Non-Financial Enterprises-** other undertakings/ enterprises of central, state, union territory governments and local authorities under the industry groups of agriculture, forestry and logging, fishing. Eg **IOCL** etc

PRIVATE INCOME

Private income is a measure of the income (**both factor income and transfer income**) which **accrues to private sector** from **all sources within and outside** the country.

	Private Income
=	Factor income from net domestic product accruing to the private sector
+	Net factor income from abroad
+	National debt interest
+	Current transfers from government
+	Other net transfers from the rest of the world

Particulars	Includes	Remarks
National Income	Earned Income recd. or not recd.	All sectors
Personal Income	Earned Income recd. & Transfer Income recd.	Household sector including NPISH
Private Income	Earned Income recd. or not recd. & Transfer Income recd. or not recd.	Private Sector
Income from Domestic Product accruing to Private Sector	NDP fc - Public Sector Income	Private Sector

Illustration - 5

From the following data, calculate NNP_{FC}, NNP_{MP}, GNP_{MP} and GDP_{MP}.

Item	Rs. In crores
Operating surplus	2000
Mixed income of self-employed	1100
Rent	550
Profit	800
Net indirect tax	450
Consumption of fixed capital	400
Net factor income from abroad	-50
Compensation of employees	1000

Solution - 5

GDP_{MP} = Compensation of employees + mixed income of self-employed + operating surplus + depreciation + net indirect taxes

(Note: operating surplus = rent+ profit + interest)

=1000 + 1100 + 2000 + 400 + 450 =4950

GNP_{MP} = GDP_{MP} + NFIA = 4950 + (-50) = 4900

NNP_{MP} = GNP_{MP} P consumption of fixed capital = 4900 – 400 = 4500 NNP_{FC} or

NI = NNP_{MP} – NIT =4500 – 450 = = 4050 Crores

Illustration - 6

From the following data, estimate National Income and Personal Income.

Item	Rs. In crores
Net national product at market price	1,891
Income from property and entrepreneurship accruing to government administrative departments	45
Indirect taxes	175
subsidies	30
Saving of non-departmental enterprises	10
Interest on National debt	15
Current transfers from government	35
Current transfers from rest of the world	20
Saving of private corporate sector	25
Corporate profit tax	25

Solution - 6

National Income = Net national product at market price – Indirect taxes + Subsidies
= 1,891 – 175 + 30 = 1746crores

Personal Income = National income – Income from property and entrepreneurship accruing to government administrative departments – Saving of non-departmental enterprises + National debt interest + Current transfers from government + Current transfers from rest of the world – Saving of private corporate sector – Corporate profit tax
= 1746 – 45 –10+ 15 + 35 + 20 – 25 – 25
= 1711 Crores

Illustration - 7

Calculate the aggregate value of depreciation when the GDP at market price of a country in a particular year was Rs. 1,100 Crores. Net Factor Income from Abroad was Rs. 100 Crores. The value of Indirect taxes – Subsidies was Rs. 150 Crores and National Income was Rs. 850 Crores.

Solution - 7

Given
GDPMP = 1100 Crores, NFIA = 100 Crores, NIT =150 Crores, NNPFC = 850 Crores
∴ GDPFC = GDPMP- NIT = 1100 – 150 = 950
GNPFC = GDPFC+ NFIA = 950 + 100 = 1050
NNPFC = GNPFC- Depreciation
850 = 1050- Depreciation
Depreciation = 1050 – 850 = 200 Crores.

Illustration - 8

On basis of following information, calculate NNP at market price and Disposable personal income

Item	Rs. In crores
NDP	14900
Income from domestic product accruing to government	150
Interest on National debt	170
Transfer payment by government	60
Net private donation from abroad	30
Net factor income from abroad	80
Indirect taxes	335
Direct taxes	100
Taxes on corporate profits	222
Undistributed profits of corporations	105

Solution - 8

NNP at market price = NNP at factor cost + indirect tax – subsidies
Where NNP at factor cost = NDPPC + NFIA
= 14900 + 80 = 14980
Therefore, NNPMP = Therefore, NNP MP = 14980 + 335 – 262 = 15053

Disposable personal income (DI) = PI- Personal income tax
PI = NI + income received but not earned – income earned but not received
= 14980+ 170+60 +30 -150 -222- 105 = 14763
Therefore, DI= 14763- 100 = 14663 Crores

4. MEASUREMENT OF NATIONAL INCOME IN INDIA

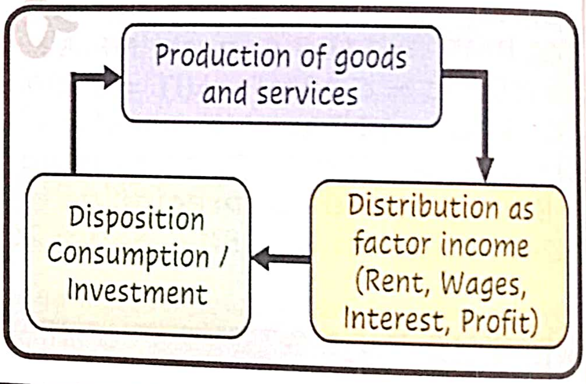
CIRCULAR FLOW OF INCOME

➢ Circular flow of income refers to the **continuous circulation** of
- ✓ **production**,
- ✓ **income generation** &
- ✓ **expenditure**

involving different sectors of the economy.

➢ There are **three different interlinked phases** in a circular flow of income-

Production phase	Firms **produce** goods and services with the help of factor services.
Income or Distribution phase	The **flow of factor incomes** in the form of **rent, wages, interest and profits** from firms **to** the **households** occurs
Expenditure or Disposition phase	The **income received** by different factors of production is **spent** on **consumption** and **investment** goods. This **expenditure leads to further production** of goods and services and **sustains the circular flow.**



Data requirements & Outcomes of Different Methods of National Income Calculation

Method	Data required	What is measured
Value Added Method or Product Method or Industrial Origin or Net Output Method	The sum of net values added by all the producing enterprises of the country	Contribution of production units
Factor Income Method or Factor Payment or Distributed Share	Total factor incomes generated in the production of goods and services	Relative contributio n of factor owners
Expenditure method or Income Disposal	Sum of expenditures of three spending units in economy, → govt., consumer households and producing enterprises	Flow of consumption and investment expenditures

VALUE ADDED METHOD OR PRODUCT METHOD

National income by value added method is the **sum total of net value added** at factor cost **across all producing units** of the economy. The value added method measures the **contribution of each producing enterprise** in the domestic territory of the country in an accounting year and entails consolidation of production of each industry less intermediate purchases from all other industries. This method of measurement **shows the unduplicated contribution by each industry** to the total output. This method involves the following steps:

Step1. Identifying the producing enterprises and classifying them into different sectors according to the nature of their activities

All the producing enterprises are broadly classified into three main sectors namely:

(i) Primary sector,

(ii) Secondary sector, and

(iii) Tertiary sector or service sector

These sectors are further divided into sub-sectors and each sub-sector is further divided into commodity group or service-group.

Step 2. Estimating the gross value added (GVAMP) by each producing enterprise (This is the same as GDPMP)

Gross value added (GVA MP) = Value of output – Intermediate consumption
= (Sales + change in stock) – Intermediate consumption

Step 3. Estimation of National income

For each individual unit, Net value added is found out.

$\sum$ (GVA MP) – Depreciation = Net value added (NVA MP)

By adding net value-added or net products of all the sub-sectors of a sector, we get the value- added or net product of that sector. For the economy as a whole, we add the net products contributed by each sector to get Net Domestic Product. We subtract net indirect taxes and add net factor income from abroad to get national income.

Net value added (NVA MP) – Net Indirect taxes = Net Domestic Product (NVA FC)

Net Domestic Product (NVA FC) + (NFIA) = National Income (NNP FC)

Important Points of Value Added Method

	Value of Output in PS
-	Intermediate Cons. in PS
=	**GVA by PS**

+

	Value of Output in SS
-	Intermediate Cons. in SS
=	**GVA by SS**

+

	Value of Output in TS
-	Intermediate Cons. in TS
=	**GVA by TS**

Gross Value Added at Market Price (GVA mp) or GDP mp

- Depreciation + NFIA - Net IDT

National Income (NNPFc)

If Value of Output is not given separately

Value of Output - Intermediate Consumption Gross Value Added	→	Sales + Change in Stock - Intermediate Consumption Gross Value Added

Where,
Change in Stock
= Cl. Stock – Op. Stock

The values of the following items are **also included** as per Product Method

a) own account production of fixed assets
b) Imputed value of production of goods for self consumption (eg- agriculture)
c) imputed rent of owner occupied houses
d) Change in Stock

INCOME METHOD

Production is carried out by the **combined effort of all factors of production**. The factors are paid **factor incomes** for the services rendered. In other words, whatever is produced by a producing unit is distributed among the factors of production for their services.
Under Factor Income Method, also called **Factor Payment Method** or **Distributed Share Method**, national income is calculated by **summation of factor incomes paid** out by all production units within the domestic territory of a country as wages and salaries, rent, interest, and profit. By definition, it includes factor payments to both residents and non- residents.
Thus, **NDPFC = Sum of factor incomes paid out by all production units within the domestic territory of a country**

	Compensation of Employees
+	Operating Surplus (R, I, P)
+	Mixed Income of Self-Emp
=	**NDP fc**
+	NFIA
=	**NNP fc (National Income)**

- Income earned by **owners of primary factors** of prod. are **included**. Thus, while wages of labourers will be included,
- **Pensions** of retired workers will be **excluded**.
- **Compensation of Employees includes** - wages and salary, bonus, D.A., commission, **employers' contri.** to PF and imputed value of pay in kind.
- **Non-labour income** - rent (actual & imputed), royalty, interest on loans for productive services
- **Profit** = Corp. taxes + Div + R.E.
- **Int. paid by govt.** on public debt, int. on consumption loans and interest paid by one firm to another are **excluded.**
- **Capital gains**, windfall profits, transfer incomes, **income from sale of 2nd hand goods** & financial assets & payments out of past savings are **not included**.
- However, **commissions**, **brokerages** and imputed value of services provided by owners of production units will be **included**.

EXPENDITURE METHOD

In the expenditure approach, also called Income Disposal Approach, national income is the aggregate final expenditure in an economy during an accounting year.

$$GDP_{MP} = \sum \text{Final Expenditure}$$

In this approach to measuring GDP which considers the **demand side** of the products, we add up the value of the goods and services purchased by each type of final user mentioned below.

1. **Final Consumption Expenditure**

a) Private Final Consumption Expenditure (PFCE):

- To measure this, the volume of final sales of goods and services to **consumer households** and **non-profit institutions serving households acquired** for **consumption** (not for use in production) are multiplied by market prices and then summation is done.
- It also includes the **value of primary products** which are **produced for own consumption** by the households, payments for domestic services which one household renders to another, the net expenditure on foreign financial assets or net foreign investment.
- Land and residential buildings purchased or constructed by households are not part of PFCE. They are included in gross capital formation.
- Thus, only expenditure on final goods and services produced in the period for which national income is to be measured and net foreign investment are included in the expenditure method of calculating national income.

a) Government Final Consumption Expenditure

- Since the collective services provided by the governments such as defense, education, healthcare etc. are **not sold in the market**, the only way they can be valued in money terms is by **adding up the money spent** by the government in the production of these services. This total expenditure is treated as consumption expenditure of the government.
- Government expenditure on **pensions**, **scholarships**, **unemployment** allowance etc. should be **excluded** because these are **transfer payments**.

2. **Gross Domestic Capital formation**

- Gross domestic fixed capital formation (Gross Investment) is that part of country's total expenditure which is **not consumed** but **added to** the nation's **fixed tangible assets and stocks.**
- It consists of the **acquisition of fixed assets** and the **accumulation of stocks**. The stock accumulation is in the form of **changes in stock.**
- Thus, gross investment includes final expenditure on machinery and equipment and own account production of machinery/equipment, exp. on construction, exp. on changes in inventories, and exp. on the **acquisition of valuables** such as, jewelry and works of art.

3. **Net Exports (X-M)**

- Net exports are the **difference** between **exports** and **imports** of a country during the accounting year. It can be positive or negative.

GDP mp = ∑ Final Expenditure = C + I + G + (X−M)

Private Final Consumption Expenditure (PFCE)	+ Government / Public Final Consumption Exp. (GFCE)	+ Gross Domestic Capital Formation (GDCF)	+ Net Exports
Exp. on Final Goods by Households & NPISH + Value of primary products which produced for own cons., + Payments for domestic services which one household renders to another, + Net exp. on foreign financial assets or net foreign invt.	The money spent by government in production of services such as defence, education, healthcare etc. Government expenditure on pensions, scholarships, unemployment allowance etc. should be excluded because these are transfer payments.	❑ It includes- ➢ Gross Domestic Fixed Capital Formation, i.e Invt in Fixed Assets by household, Pvt Business, Govt ➢ Changes in Inventory OR Inventory Investment ➢ Net Acquisition of Valuables ❑ GDCF − Dep = NDCF	Exports − Imports **Exports** depict the expenditure made by foreigners on goods produced in Domestic country

GDP_{MP} − Depreciation + NFIA − Net IDT = NNP_{FC}

Detailed Analysis of Income Method

	Compensation of Employees
+	Operating Surplus (R, I, P)
+	Mixed Income of Self-Emp
=	**NDP fc**
+	NFIA
=	**NNP fc (National Income)**

Income earned by owners of primary factors of prod. are included. Thus, while wages of labourers will be included, Pensions of retired workers will be excluded.

C.O.E. **includes** - wages and salary, bonus, Dearness allowance, commission, **employers' contribution** to PF and imputed value of pay in kind.

Non-labour income = rent (actual & imputed), royalty, interest on loans for productive services

Profit = Corp. taxes + Div + R.E.

Int. paid by govt. on public debt, int. on consumption loans and interest paid by one firm to another are **excluded.**

Capital gains, windfall profits, transfer incomes, income from sale of 2nd hand goods & financial assets & payments out of past savings are **not included.**

However, commissions, brokerages and imputed value of services provided by owners of production units will be **included.**

Method considered suitable for measurement of National Income in India & developed economies

- Ideally, all the three methods of national income computation should arrive at the same figure.
- When the national income of a country is measured separately using these methods, we get a three-dimensional view of the economy.
- Each method of measuring GDP is subject to **measurement errors** and each method provides a check on the **accuracy** of the other methods. By calculating total output in several **different ways** and then trying to **resolve the differences**, we will be able to **arrive at a more accurate** measure than would be possible with one method alone.
- Moreover, different ways of measuring total output give us different insights into the structure of our economy.
- Reliable statistical data is not available, thus it is **not possible to estimate India's NI wholly by one method.** Therefore, a **combination of output method and income method is used**.
  - ✓ **Value-added method** is used in - **commodity producing sectors like agriculture** and manufacturing.
  - ✓ In **small scale sector** net value added is estimated by the **income method** and
  - ✓ In **construction sector** net value added is estimated by the **expenditure method** also.
- **Method considered suitable for measurement of National Income of developed economies:**
  - ✓ **Income method** may be **most suitable for developed economies** where **data in respect of factor income is readily available.**
  - ✓ With the growing facility in the use of the commodity flow method of estimating expenditures, an increasing proportion of the national income is being estimated by **expenditure method**

CA Mohnish Vora (MVSIR)

Illustration - 9

Calculate National Income by Value Added Method with the help of following data-

Particulars	Rs. In crores
Sales	700
Opening stock	500
Intermediate consumption	350
Closing stock	400
Net factor income from abroad	30
Depreciation	150
Excise Tax	110
Subsidies	50

Solution - 9

NVA(FC) = GDP (MP) –Depreciation +NFIA- Net Indirect Tax
Where GVA(MP) = Value of output- intermediate consumption
Value of output = Sales+ change in stock
= 700+ (400-500)=600

GVA(MP) = 600 – 350= 250
Therefore NI = 250-150 +30-(110-50)
= 70 Crores

Illustration - 10

Calculate the Operating Surplus with the help of following data-

Particulars	Rs. In crores
Sales	4000
Compensation of employees	800
Intermediate consumption	600
Rent	400
Interest	300
Net indirect tax	500
Consumption of Fixed capital	200
Mixed income	400

Solution - 10

GVA_{MP} = Gross Value Output MP – Intermediate consumption
= (Sales + change in stock) – Intermediate consumption
= 4000-600 = 3400
GDP_{MP} = GVAMP = 3400 Crores
NDP_{MP} = GDPMP – consumption of fixed capital
= 3400 – 200
= 3200 Crores
NDP_{FC} = NDPMP – NIT
= 3200 – 500 = 2700 Crores
NDP_{FC} = Compensation of employees + Operating surplus + Mixed income
2700= 800 + Operating Surplus + 400

2701Operating surplus = 1500 Crores

Illustration - 11

Calculate national income by value added method.

Particulars	(Rs. **in crores)**
Value of output in primary sector	2000
Intermediate consumption of primary sector	200
Value of output of secondary sector	2800
Intermediate consumption of secondary sector	800
Value of output of tertiary sector	1600
Intermediate consumption of tertiary sector	600
Net factor income from abroad	-30
Net indirect taxes	300
Depreciation	470

Solution - 11

GDP_{MP} = (Value of output in primary sector - intermediate consumption of primary sector) + (value of output in secondary sector - intermediate consumption of secondary sector) + (value of output in tertiary sector - intermediate consumption of tertiary sector)

Value of output in primary sector	=	2000
- Intermediate consumption of primary sector	=	200
+ Value of output in secondary sector	=	2800
- Intermediate consumption in secondary sector	=	800
+ Value of output in tertiary sector	=	1600
- Intermediate consumption of tertiary sector	=	600

GDP_{MP} = **Rs.4800**
NNP_{FC} = GDP_{MP} + NFIA -NIT-Depreciation
NNP_{FC} =National income= 4800+(-30)-300-470 = **Rs. 4000 Crores**

Illustration - 12

Calculate Net Value Added by Factor Cost from the following data

Particulars	(Rs. in crores)
Purchase of materials	85
Sales	450
Depreciation	30
Opening stock	40
Closing stock	30
Excise tax	45
Intermediate consumption	200
Subsidies	15

Solution - 12

GVAMP = Sales+ change in stock - Intermediate consumption
= 450+ (30-40) -200
= 240Crores

NVAMP = GVAMP – Depreciation
NVAMP = 240-30 = 210 Crores
NVAFC = NVAMP – (indirect tax - subsidies)
= 210 – (45 -15) = 180Crores

Illustration - 13

Calculate NI with the help of Expenditure method and income method with the help of following data:

Items	(Rs. in crores)
Compensation of employees	1,200
Net factor income from abroad	20
Net indirect taxes	120
Profit	800
Private final consumption expenditure	2,000
Net domestic capital formation	770
Consumption of fixed capital	130
Rent	400
Interest	620
Mixed income of self-employed	700
30	30
Govt. final consumption expenditure	1100
Operating surplus	1820
Employer's contribution to social security scheme	300

Solution - 13

By Expenditure method

GDPMP = Private final consumption expenditure + Government final consumption expenditure + Gross domestic capital formation (Net domestic capital formation+ depreciation) + Net export

= 2000 + 1100 + (770+ 130) + 30= 4030Crores

NNPFC or NI = GDPMP- depreciation + NFIA – NIT

= 4030 – 130 + 20 – 120= 3800 Crores

By Income method

NNPFC or NI = compensation of employees+ operating surplus+ Mixed income of self- employed + NFIA

= 1200+ 1820+ 700+ 20= 3740Crores

Illustration - 14

From the following data calculate (a) Gross Domestic Product at Factor Cost, and (b) Gross Domestic Product at Market price

Items	(Rs. **in crores)**
Gross national product at factor cost	61,500
Net exports	(-) 50
Compensation of employees	3000
Rent	800
Interest	900
Profit	1,300
Net indirect taxes	300
Net domestic capital formation	800
Gross domestic capital formation	900
Factor income to abroad	80

Solution - 14

(a) GDP at factor cost = NDP at factor cost + Depreciation

= Compensation of employees+ Rent+ Interest + Profit + Mixed income+ (Gross domestic capital formation - Net domestic capital formation)

= Rs. 3,000 + Rs. 800 + Rs. 900 + Rs. 1,300 + (Rs. 900 - Rs. 800)

= Rs. 6100 Crores

(b) Gross Domestic Product at Market Price

= GDP at factor cost + Net Indirect taxes =Rs. 6100 + Rs. 300

= 6400 Crores

Note:

Illustration - 15

Calculate NNPFC. By expenditure method with help of following information-

Items	(Rs. in crores)
Private final consumption expenditure	10
Net import	20
Public final consumption expenditure	05
Gross domestic fixed capital formation	350
Depreciation	30
Subsidy	100
Income paid to abroad	20
Change in stock	30
Net acquisition of valuables	10

Solution - 15

Calculation of national income by expenditure method:

GDPMP = Government final consumption expenditure (Public final consumption expenditure) + Private final consumption expenditure + Gross domestic capital formation (Gross domestic fixed capital formation + change stock + Net acquisition of valuables) + Net export (Note: As net import is20, hence, net export is -20)

= 5 +10 + [350 + 30 +10]+(- 20) = 5+10+390-20 = 385 Crores

NNPFC = GDPMP – Depreciation + Net factor income from abroad (Income from abroad – Income paid to abroad) – Net Indirect tax (Indirect tax – subsidies)

= 385 – 30 + [0 – 20] – [0-100] = 385 – 30 – 20 + 100 = 435 Crores.

5. THE SYSTEM OF REGIONAL ACCOUNTS IN INDIA

- Regional accounts provide an integrated database on the innumerable **transactions taking place in the regional economy** and help **decision making at the regional level**. At present, practically all the states and union territories of India compute state income estimates and district level estimates.
- **State Income** or **Net State Domestic Product (NSDP)** is a measure in **monetary terms** of volume of **all goods & services produced** in **state** within a given **period of time** (generally a year) accounted **without duplication**.
- **Per Capita State Income** is obtained by **dividing the NSDP (State Income)** by the **midyear projected population** of the state.
- The state level estimates are **prepared by State Income Units** of respective State Directorates of Economics & Statistics (DESs). The **Central Statistical Organisation assists** the States in the **preparation** of these estimates by rendering **advice** on conceptual & methodological problems.
- In the preparation of state income estimates, certain activities such as **railways, communications, banking and insurance and central government administration**, that **cut across state boundaries**, and thus their **economic contribution cannot be assigned to any one state** directly are known as the '**Supra-regional sectors**' of the economy.
- The estimates for these supra regional activities are **compiled for the economy as a whole** and **allocated to the states** on the basis of **relevant indicators**.

Indicators to allocate income of Supra-Regional Sectors (For Knowledge Purpose)

Railways

The factor income namely, compensation of **employees**, **interest** and **profit** (including depreciation) at the national level are distributed among the zonal railways, in proportion to:

- **Total cost of staff** excluding the cost of staff engaged in railway workshops (manufacturing) and artisans (construction),
- **Capital** at charge, and
- **Net earnings**, respectively.

Banking & Insurance

The State-wise allocation of operating surplus of these activities is done on the basis of data obtained from concerned agencies on relevant indicators, viz. **Loans and advances** (Commercial Banks and Industrial Finance Corporation of India), **net premium income and sum assured** (LIC), **deposits** (Banking Department of RBI), **financial disbursements** (UTI), **investments and profits** (Cooperative Credit Societies).

6. GDP AND WELFARE

Can the **GDP** of a country be taken as an **index of welfare of people** in that country?

- There are many reasons to dispute the validity of GDP as a perfect measure of wellbeing. In fact, GDP **measures our ability to obtain many requirements to make our life better**; **yet leave out many important aspects** which ensure good quality of life for all.

GDP measures **exclude** the following which are **critical for the overall wellbeing** of citizens.

a) Income distributions and, therefore, GDP per capita is a completely inadequate measure of welfare. Countries may have **significantly different income distributions** and, consequently, **different levels of overall well-being** for the **same level of per capita income**.

b) Quality improvements in systems and processes due to **technological** as well as **managerial innovations** which reflect true growth in output from year to year.

c) **Productions hidden from government** authorities, either because those engaged in it are **evading taxes** or because it is **illegal** (**drugs, gambling etc.**).

d) **Nonmarket production** (with a few exceptions) and **Non-economic contributors** to well-being for example: **health of a country's citizens**, **education levels**, **political participation**, or other social and political factors that may significantly affect well-being levels.

e) The **disutility of loss of leisure time**. We know that, other things remaining the same, a country's GDP rises if the total hours of work increase.

f) **Economic 'bads'** for example: **crime**, **pollution**, **traffic congestion** etc which make us worse off.

g) The **volunteer work and services** rendered **without remuneration** undertaken in the economy, even though such work can contribute to social well-being as much as paid work.

h) Many things that contribute to our economic welfare such as, **leisure time**, **fairness**, **gender equality**, **security of community feeling** etc.,

i) Both **positive and negative externalities** which are external effects that **do not form part** of **market transactions**

j) The distinction between production that makes us better off and **production** that only **prevents us from becoming worse off**, for e.g. **defence expenditures** such as on **police protection**. **Increased expenditure on police** due to **increase in crimes** may increase GDP but these **expenses** only **prevent us from becoming worse off**. However, **no reflection** is made in national income of the **negative impacts of higher crime rates**. As another example, **automobile accidents** result in **production of repairs**, output of medical services, insurance, and legal services all of which are production included in GDP just as any other production.

7. LIMITATIONS AND CHALLENGES OF NATIONAL INCOME COMPUTATION

There are innumerable limitations and challenges in the computation of national income. The task is more complex in underdeveloped and developing countries.

There are many **conceptual difficulties** related to measurement which are difficult to resolve, such as:
(a) **lack** of an **agreed definition** of national income,
(b) **accurate distinction** between **final** goods and **intermediate** goods,
(c) issue of **transfer payments**,
(d) services of **durable goods**,
(e) **difficulty** of **incorporating distribution of income**,
(f) **valuation of a new good** at **constant prices**, and
(g) **valuation** of **government services**

Other **challenges** related to measurement of National Income are-
(a) **Inadequacy of data** and **lack of reliability** of available data,
(b) presence of **non-monetised sector**,
(c) production for **self-consumption**,
(d) **absence** of **recording of incomes** due to **illiteracy and ignorance**,
(e) **lack** of **proper occupational classification**, and
(f) accurate **estimation** of **consumption of fixed capital**

Note:

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Macro Economics

<u>Chapter 6</u>
Determination of National Income

<u>Unit 2</u>
The Keynesian Theory of Determination of National Income

Macro Economics Shastra
by MVSIR

UNIT-2: THE KEYNESIAN THEORY OF DETERMINATION OF NATIONAL INCOME

CHAPTER OVERVIEW

Determination of National Income

The Keynesian Theory of Determination of National Income

- The Two-Sector Model for National Income Determination
- The Investment Multiplier
- Determination of Equilibrium Income: Three Sector Model
- Determination of Equilibrium Income: Four Sector Model

1. INTRODUCTION

➢ In **previous unit, 'ex post' (realized)** values were used
Eg- **aggregate consumption (C)** denotes what **people have actually consumed**

➢ In this unit variables are defined in '**ex-ante**' (**anticipated**) terms or in terms of **what is intended or planned**. In theoretical model of economy which (discussed in this unit), **'ex ante' values** of these variables are our primary concern.
Eg- here '**consumption**' - what **people in an economy plan to consume**

➢ Ex-ante values are used, if we want to **predict** what **equilibrium value of output or GDP** is.

➢ The **Great Depression of the 1930's**, was the greatest economic crisis the western world had experienced.

➢ Before Keynes, classical economists said that **economy is self-regulating** and is always **capable of automatically achieving equilibrium** at '**natural level**' of **real GDP**

➢ However, Keynes in his "**General Theory of Employment Interest and Money (1936)**" argued that **markets** would **not automatically** lead to **full-employment equilibrium.**

➢ Keynesians believe that **prices and wages are not so flexible**; they are **sticky (rigid)**, especially **downward**. This **prevents economy** from **returning to natural level** of real GDP.

➢ So, **output will remain at less than full employment level** unless there is **insufficient spending**.

Keynes also introduced many of the building blocks of modern macroeconomics:

1. The **relation of consumption to income**, and the **multiplier**,
2. **Liquidity Preference** (the term Keynes gave to the demand for money), The importance of **expectations** in affecting consumption and investment.

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.

2. CIRCULAR FLOW IN A SIMPLE TWO-SECTOR MODEL

In an economy, money flows from producers to workers as wages and flows back to producers as payment for products. In short, an economy is an endless circular flow of money.

- The basic purpose of the circular flow model is to understand how money moves within an economy. The <u>circular flow of income</u> is a process where the **national income** and **expenditure** of an economy **flow in a circular manner continuously** through time.

- Two sector economy model assumes **only two sectors** in economy viz., **households** and **firms**, with only **consumption** and **investment** outlays.

- **Households** are assumed to-
  - **own all factors of production** and
  - they sell their factor services to earn factor **incomes**
  - Income is **entirely spent to consume** all final G/S produced by business firms.

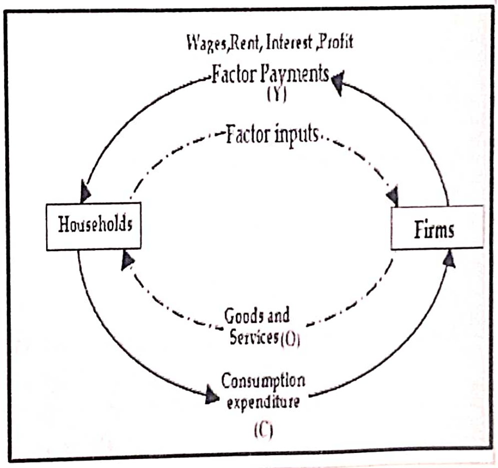
- **Business firms** are assumed to-
  - **hire factors** of production **from the households**;
  - they **produce and sell** goods and services to the households and
  - **They do not save**. There are **no corporations, corporate savings or retained earnings**.

- Since there is no govt, **Y = Yd**.

- Circular **broken lines** - factor and product flows- '**real flows**'
- **Continuous line** with arrows show **money flows**

These flows are in **opposite directions** and the value of real flows equal the money flows because the factor payments are equal to household incomes.

- No injections into or leakages from system. Since whole of household income is spent on G/S produced by firms.



Factor Payments = Household Income = Household Expenditure
= Total Receipts of Firms = Value of Output.

- Before we go into the discussion on the **equilibrium aggregate income** and changes in it, we shall first try to understand the meaning of the term '**equilibrium**' (defined as a **state** in which there is **no tendency to change**; or a **position of rest**). **Output** is at equilibrium level when the **quantity of output** produced is **equal** to the **quantity demanded**.
- Logically, an economy can be said to be in equilibrium when the **production plans of the firms** and the **expenditure plans** of the households **match**.
- Having understood the working of the two-sector model and the meaning of equilibrium output, we shall now have the formal presentation of the **theory of income determination in a two-sector model** which is the simplest representation of the key principles of Keynesian economics
- 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.

3. BASIC CONCEPTS AND FUNCTIONS

3.1 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)

$$AD = C + I$$

Of the two components, consumption expenditure accounts for the highest proportion of the GDP. 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:

$$AD = C + \bar{I}$$

Where $\bar{I}$ = constant investment.

From the equation (2.2), we can infer that, in the short run, AD depends largely on the aggregate consumption expenditure. We shall now go over to the discussion on consumption function.

3.2 The Consumption Function

Consumption function expresses the functional relationship between aggregate **consumption expenditure** and aggregate **disposable income**, expressed as:

$$C = f(Y)$$

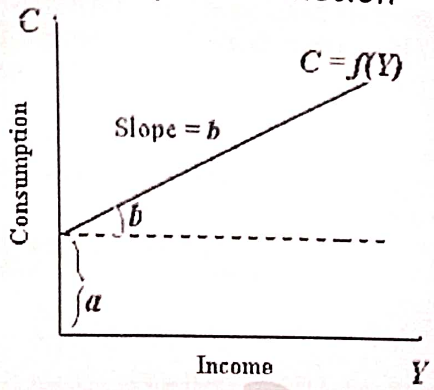
When **income is low**, **consumption** expenditures of households will **exceed** their disposable **income** and households **dissave** i.e. they either **borrow money** or **draw from their past savings** to purchase consumption goods. **(a)**
If the disposable **income increases**, consumers will **increase their planned expenditures** and current consumption expenditures rise, but **only by less than the increase in income**. **(b)**
The specific form of consumption–income relationship termed the consumption function, proposed by Keynes is as follows:

$$C = a + bY \quad , \quad MPC = \Delta C / \Delta Y = b$$

The consumption function shows the **level of consumption** (C) corresponding to **each level of disposable income** (Y) and is expressed through a linear consumption function, as shown by the line marked C = f(Y) in figure 1.2.2.

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**. This fundamental relationship between income and consumption plays a crucial role in the Keynesian theory of income determination.

The Keynesian Consumption Function



3.3 Relationship Between Income and Consumption

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).

$$APC = \frac{\text{Total consumption}}{\text{Total Income}} = \frac{C}{Y}$$

The table below shows the relationship between income and consumption

Relationship between Income and Consumption

Income (Y) (Rs. Crores)	Consumption (C) (Rs. Crores)	Saving (Rs. Crores)	APC (C/Y)	MPC (ΔC /ΔY)
0	50	-50	∞	-
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:

APC is calculated at various income levels. It is obvious that the proportion of income spent on consumption decreases as income increases. What happens to the rest of the income that is not spent on consumption? If it is not spent, it must be saved because income is either spent or saved; there are no other uses to which it can be put. Thus, just as consumption, saving is a function of disposable income: S=f(Y).

3.5 The 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**.

$$S = f(Y)$$

This can be illustrated with the following table and diagram.

Relationship between Income, Consumption and Saving

Disposable Income (Yd) (Rs. Crores)	Consumption (C) (Rs. Crores)	Saving (S) (Rs. Crores)
0	20	-20
60	70	-10
120	120	0
180	170	10
240	220	20

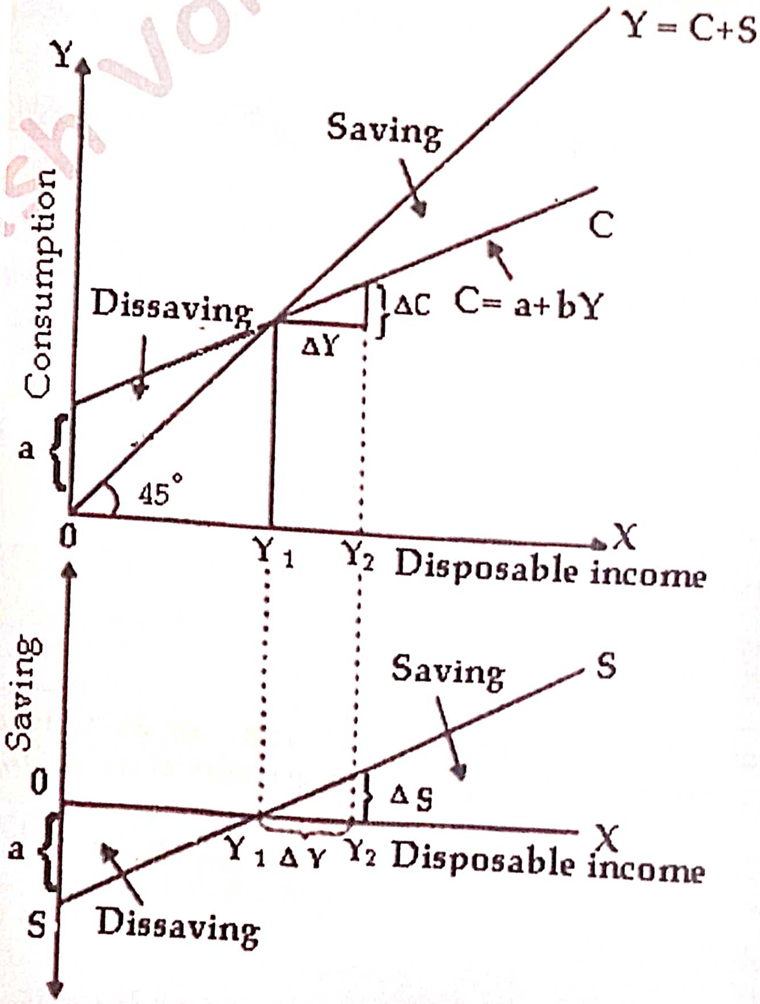
The Consumption and Saving Function

In figure 1.2.3, the consumption and saving functions are graphed. The saving function shows the level of saving (S) at each level of disposable income (Y). We know that consumption at zero level of income is positive (equal to a), and as such there should be dissaving also of the same magnitude. By definition, national income **Y = C + S**, Therefore, S = Y – C.

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

(MPS) , s = 1-c

Saving is an **increasing function of the level of income**. In other words, saving increases as income rises.



$$MPS = \frac{\Delta S}{\Delta Y} = 1 - b \quad (2.7)$$

Marginal Propensity to Consume (MPC) is **always less than unity**, but greater than zero, i.e., 0
< b < 1 Also, MPC + MPS = 1; we have **MPS= 0 < b < 1**. Thus, 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.

$$APS = \frac{\text{Total Saving}}{\text{Total Income}} = \frac{S}{Y} \quad (2.8)$$

3.8 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.

$$AS = Y = C + S$$

Illustration - 1

What will be the value of average propensity to save when -

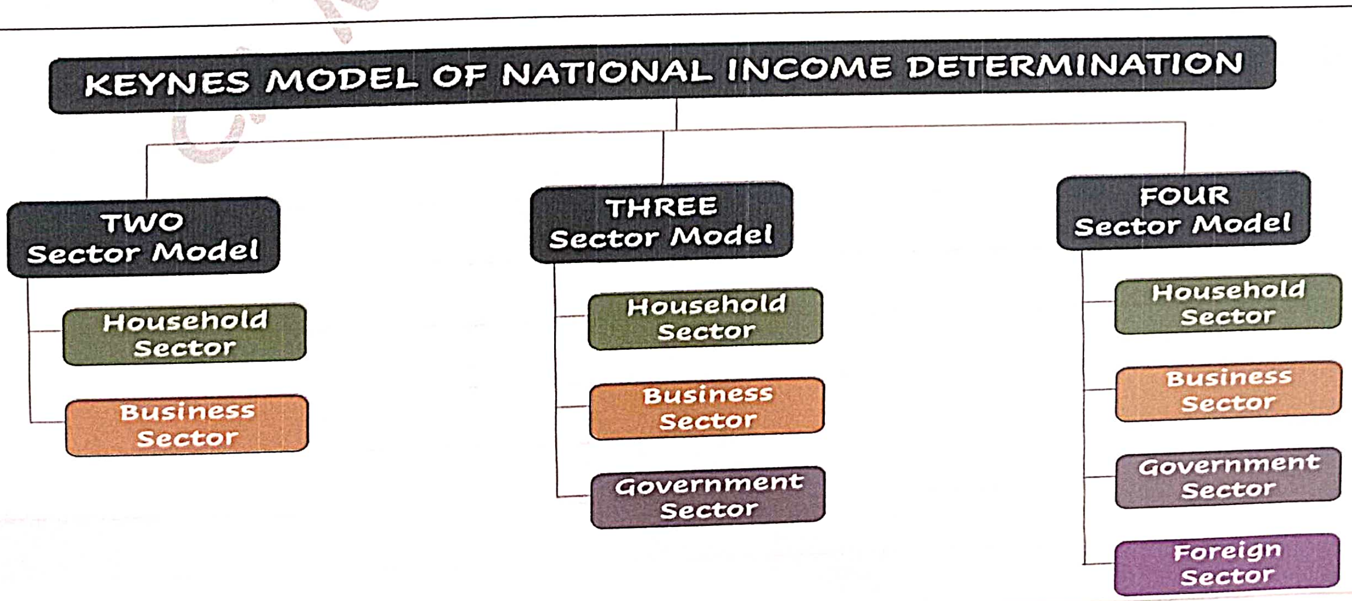
i. C = 200 at Y = 1,000

ii. S = 450 at Y = 1,200

Solution - 1

(i) APS = $\frac{S}{Y}$; S = Y − C = 1,000 − 200 = 800. Therefore, APS = $\frac{S}{Y} = \frac{800}{1000} = 0.8$

(ii) When S = 450 and Y = 1,200; APS= $\frac{S}{Y}$ = 450/1200= = 0.375



CA Mohnish Vora (MVSIR)

4. THE TWO-SECTOR MODEL OF NATIONAL INCOME DETERMINATION

TWO-SECTOR MODEL

Aggregate Demand

Total spending in the economy

C + I

Aggregate Supply

Total supply of goods and services which firms plan on selling during a specific time period

C + S

Equilibrium is achieved when,

$$AD = AS$$

or

$$C + I = C + S$$

or

$$I = S$$

In this section, we shall describe the two-sector model of determination of equilibrium levels of output and income in its formal form using the aggregate demand function and the aggregate supply function. The equilibrium level of income and output in the Keynesian framework is that level at which aggregate demand (C+ I) and aggregate supply (C + S) or output are equal. In other words, Investment is equal to Savings.

$$C + I = C + S$$

or

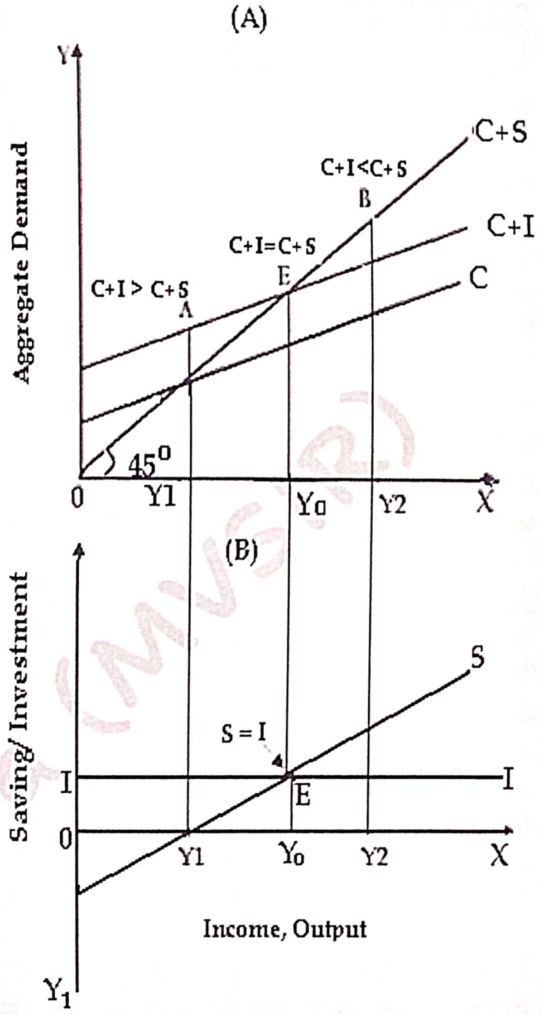
$$I = S$$

Notes

Determination of Equilibrium Income: Two Sector Model

- **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 **consumption line** is flatter than the 45-degree line because, as income rises, consumption also increases, but by less than the increase in income.
- **Autonomous expenditure component (I)** does not depend directly on income, the (C+I) schedule lies above the consumption function by a constant amount.
- The **45-degree line** illustrates every single point at which planned aggregate expenditure, measured on Y-axis, is equal to planned aggregate production, which is measured on X axis.
- In other words, all points
  - **on** the **45°** line indicate **AD = AS**.

Thus, it shows possible equilibrium income levels.
  - **below 45° line**, **AD < AS** → [Point B]
  - **above 45°** line, **AD > AS** → [Point A]



- If an economy is **operating on 45-degree line**, then market is in equilibrium. Ideally, we would like equilibrium to occur at potential GDP i.e., at the level of full employment. Only at **point E** and at the corresponding equilibrium levels of income and output YO does **aggregate demand exactly equals output**. At that level, planned spending precisely matches production.
- As per Keynes, **aggregate dem** will **not always be equal** to **aggregate supply**.
  - Agg. **demand** depends on the **households' plan to consume** and to **save**
  - Agg. **supply** depends on the **producers' plan** to **produce** G/S.
  - **To achieve equilibrium**, the **households' plan must coincide with producers' plan**. At equilibrium, expected value equals realized value.
- However, as per Keynes there is **no reason to believe that**:
  - consumers' **consumption plan** always **coincides** with **producers' production** plan, and
  - 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 be always equal

The investment function (I) is shown in panel B of the figure, equilibrium, planned investment equals savings Above the equilibrium of income Y0, saving (the distance between the 45 degree line and the consumption schedule) exceeds planned investment, while below equilibrium level of income Y0 , planned investment exceeds saving.

The equality between saving and investment can be seen directly from national income accounting . Since income is either spent or saved, Y = C+S. Without government and foreign trade, aggregate demand equals consumption plus investment, Y=C+I. Putting the two together, we have C+S = C+I, or S=I.

If the **leakages are greater than the injections**, then **national income will fall**, while if **injections are greater than leakages**, **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**.

4.1 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**.

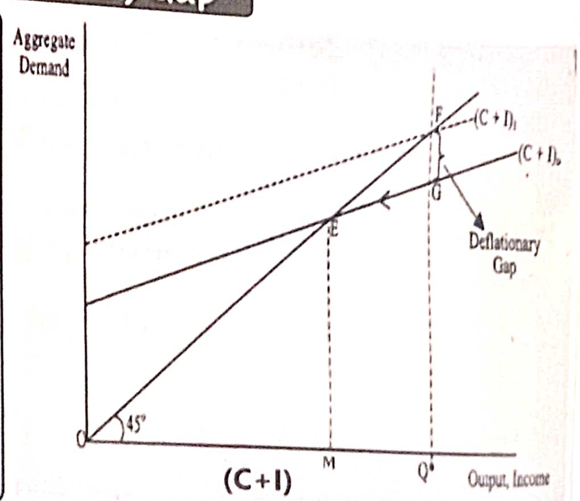
(i) Deflationary Gap

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**' or '**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**.

Deficient Demand - Deflationary Gap

In above figure, OQ* is the full employment level of output. For the economy to be at full employment equilibrium, aggregate demand should be Q*F. If the aggregate demand is Q*G, it represents a situation of deficient demand. The resulting **deflationary gap** is **FG**. Firms will **experience unplanned build-up of inventories of unsold goods** and they will **respond by cutting production** and **employment** leading to **decrease in output and income** until the **under-employment equilibrium is reached at E**.

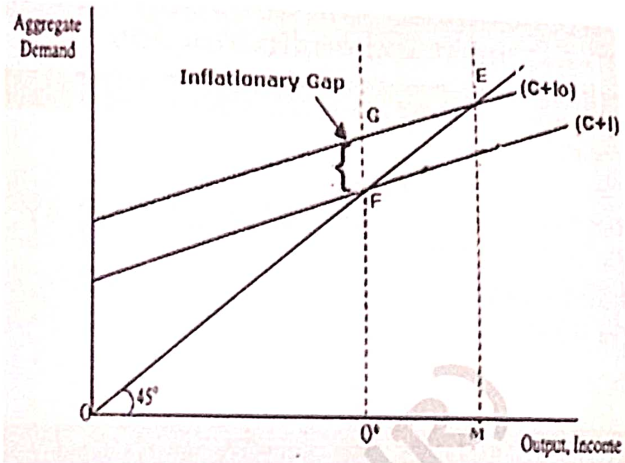


(ii) Inflationary Gap

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. It **occurs during expansion** and sets in motion forces that will **cause demand pull inflation**.

Excess Demand - Inflationary Gap



In figure 1.2.6, the economy will be at full employment equilibrium at F with OQ* full employment level of output and income. Suppose the aggregate demand is for Q*G, there is excess demand and the resulting inflationary gap FG. 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. Point E is an equilibrium point because the aggregate demand ME is equal to output OM. 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**.

Illustration - 2

Calculate marginal propensity to consume and marginal propensity to save from the following data about an economy which is in equilibrium:
National income = 2500, Autonomous consumption expenditure = 300, Investment expenditure = 100

Solution - 2

Y = C + I
By putting the value we get, 2500 = C + 100
C = 2500 -100 = 2400
C = $\bar{C}$ + bY
2400 = 300 + 2500 b
2400-300= 2500b
b = 0.84; MPS= 1- MPC = 1- 0.84 = 0.16

Notes

Illustration - 3

An economy is in equilibrium. Calculate national income from the following- Autonomous consumption = 100; Marginal propensity to save= 0.2; Investment expenditure= 200

Solution - 3

Y= C + I
Y= $\bar{C}$ + MPC (Y) + I
where MPC = 1-MPS Y = 100 + 0.8Y + 200= 300 + 0.8Y
Y- 0.8Y = 300
0.2Y=300,
Y= 1500

Illustration - 4

Suppose the consumption of an economy is given by C = 20+ 0.6 Y and investment I= 10+ 0.2
Y. What will be the equilibrium level of National Income?

Solution - 4

Y= C + I= 20+ 0.6 Y + 10+ 0.2 Y
Y = 30+ 0.8 Y
Y- 0.8 Y = 30
Y= 150

Illustration - 5

Suppose the consumption function C= 7+ 0.5Y, Investment is Rs. 100, Find out equilibrium level of Income, consumption and saving?

Solution - 5

Equilibrium Condición–
Y= C +I, Given C= 7+0.5Y and I= 100
Therefore Y= 7+0.5Y+ 100
Y- 0.5Y= 107

$$Y = \frac{107}{0.5} = 214$$

Y= C+I
214= C+100
C=114
S= Y- C =100

Illustration - 6

If the consumption function is C= 250 + 0.80 Y and I = 300. Find out equilibrium level of Y, C and S?

Solution - 6

$Y = \frac{1}{1-b}$ (a+ I) or Y = C+ I

$Y = \frac{1}{1-80}$ (250+300) = 2750

$C = a + \frac{b}{1-b}$ (a+ I) or C= 250 + 0.80 Y

C = 250+0.8(2750) C = 2450

S = Y-C where C = a+ bY S = Y- (a + bY)
S = -a + (1- b) Y
= - 250 + (1 – 0.80)2750= 300
Or directly,
S=Y- C
S=2750 – 2450= 300.

Illustration - 7

If saving function S = -10 + 0.2Y and autonomous investment I = 50 Crores. Find out the equilibrium level of income, consumption and if investment increases permanently by Rs. 5 Crores, what will be the new level of income and consumption?

Solution - 7

S= I
-10 + 0.2Y = 50
0.2Y = 50+ 10
Y = 300 Crores C= Y- S

Where S= -10 + 0.2 (300) = 50
C= 300-50 = 250 Crores
With the increase in investment by Rs. 5 Crores, the new investment will become equal to Rs. 55 Crores.
S = I
-10 + 0.2Y = 55
Y= 325 Crores
C= 270 Crores

Illustration - 8

Given the empirical consumption function C= 100+0.75Y and I = 1000, calculate equilibrium level of national income. What would be the consumption expenditure at equilibrium level national income?

Solution - 8

C= 100+0.75Y and I = 1000,

Y=C+I in equilibrium

$Y = 100 + 0.75Y + 1000 \Rightarrow Y = \dfrac{1}{1-0.75}(100+1000)$

$Y = \dfrac{1}{1-0.75}(1100) = 1/0.25\,(1100) = 4400$

$Y = C + I;\ C = 4400 - 1000 = 3400$

5. THE INVESTMENT MULTIPLIER

In this section we develop an answer to the following question: **By how much does a one unit increase in autonomous spending raise the equilibrium level of income?** There appears to be a simple answer. Since, in equilibrium, income equals aggregate demand, it would seem that a unit increase in autonomous demand or spending should raise equilibrium income by one unit. That is **not correct**. In Fact the effect of an **increase in investment** (upward shift in the investment schedule) causes an **upward shift in the aggregate demand** function. It is due to a **process of multiple increases** in equilibrium income due to increase in investment and how much increase occurs depends upon the marginal propensity to consume. The process of increase in national income due to increase in investment depicts the **investment multiplier** impact illustrated below.

Effect of Changes in Autonomous Investment

In the figure, an **increase in autonomous investment by ΔI shifts** the aggregate demand schedule from C+I **to C+I+ΔI**.

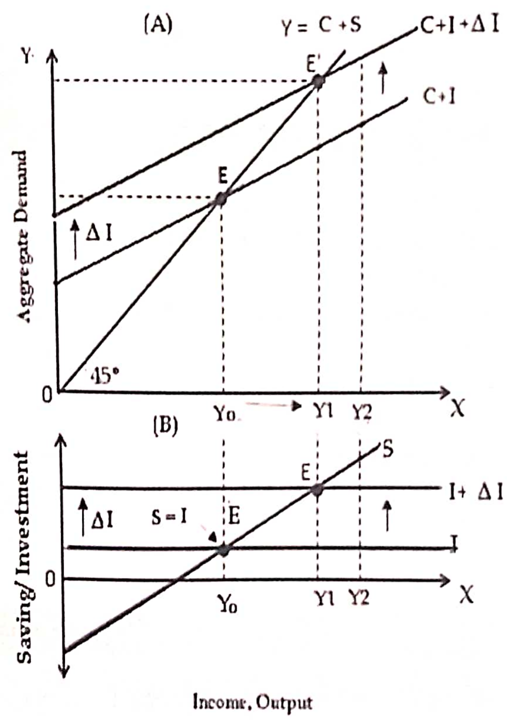
Correspondingly, the **equilibrium shifts from E to E1** and the **equilibrium income increases more than proportionately** from **Yo to Y1**.

Why and how does this happen? Due to the operation of the investment multiplier.

Multiplier refers to the phenomenon whereby a **change in an injection of 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, Δ Y. The ratio of ΔY to ΔI is called the **investment multiplier → k**.



$$K = \frac{\Delta Y}{\Delta I} \text{ or } \frac{1}{1 - MPC} \text{ or } \frac{1}{MPS}$$

The size of the multiplier effect is given by $\Delta Y = k\,\Delta I$.
For example, if a change in investment of Rs. 2000 million causes a change in national income of Rs. 6000 million, then the multiplier is 6000/2000 =3. Thus multiplier indicates the change in equilibrium national income for each rupee change in the desired autonomous investment. Since the increase in national income (ΔY) is the result of increase in investment (ΔI), the multiplier is called 'investment multiplier.'
The process behind the multiplier can be compared to the 'ripple effect' of water. Let us assume that the initial disturbance comes from a change in autonomous investment (ΔI) of 500 units. The economy being in equilibrium, an upward shift in aggregate demand leads to an increase in national income which in a two sector economy will be, by definition, distributed as factor incomes. There will be an equal increase in disposable income. Firms experience increased demand and as a response, their output increases. The process further continues as an autonomous rise in investment leads to induced increases in consumer demand as income increases.

We find at the end that the increase in equilibrium income per rupee increase in investment is:

$$\frac{\Delta y}{\Delta I} = \frac{1}{1-MPC} = \frac{1}{MPS} \quad (2.12)$$

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. 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.
For example, if the value of MPC is 0.75, then the value of the multiplier as per (2.11) is:

$$\frac{1}{1-MPC} = \frac{1}{0.25} = 4$$

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 slows down & ultimately comes to a halt. Causes responsible for the decline in income are called **leakages**.
Income that is not spent on currently produced goods/services are regarded as having leaked out of income stream. **The more powerful these leakages are, the smaller will be the value of multiplier.**
The leakages are caused due to:
1) **progressive rates of taxation** which result in no appreciable increase in consumption despite increase in income
2) **high liquidity preference** and idle saving or holding of cash balances and an equivalent fall in marginal propensity to consume

3) **increased demand** for consumer goods being **met out of existing stocks** or through **imports**
4) **additional income spent on purchasing existing wealth** or purchase of government securities and shares from shareholders or bond holders
5) **undistributed profits** of corporations
6) part of increment in income used for **payment of debts**
7) case of **full employment, additional investment** will only lead to **inflation**,
8) **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. An important element of Keynesian models is that they **relate to short-period equilibrium** and contain no dynamic elements. There is nothing like Keynesian macro-economic dynamics. When a shock occurs, for example when there is a change in autonomous investment due to change in some variable, one equilibrium position can be compared with another as a matter of comparative statics. There is no link between one period and the next and no provision is made for an analysis of processes through time.

Illustration - 9

In an economy investment expenditure is increased by Rs. 400 Crores and marginal propensity to consume is 0.8. Calculate the total increase in income and saving.

Solution - 9

MPC = 0.8; ΔI = 400 Crores
Multiplier (K)= 1 /1- MPC = 1 /1- 0.8 =1/ 0.2= 5
MPS= 1 - MPC = 1 – 0.8 = 0.2
Increase in income (ΔY) = K ×ΔI = 5 × 400=2,000 Crores
Increase in saving= ΔY × MPS = 2,000 × 0.2 = 400 Crores

Illustration - 10

An increase in investment by 400 Crores leads to increase in national income by 1,600 Crores. Calculate marginal propensity to consume.

Solution - 10

Increase in investment (ΔI) = 400 Crores
Increase in national income (Δ Y) = 1,600 Crores
Multiplier (K) =ΔY/ΔI = K= 1,600/ 400 = 4
We know, K= 1 /1 –MPC
4= 1 /1 –MPC
MPC= 0.75

Illustration - 11

In an economy, investment is increased by Rs 600 Crores. If the marginal propensity to consume is 0.6, calculate the total increase in income and consumption expenditure.

Solution - 11

MPC = 0.6; ΔI = Rs. 600 Crores
Multiplier (K) = 1/ 1- MPC = 1/ 1 – 0.6 = 1/ 0.4 =25.
Increase in income (ΔY) = K × ΔI = 2.5 × Rs 600 Crores= Rs. 1,500 Crores
Increase in consumption (ΔC) =ΔY × MPC = Rs1, 500Crores × 0.6 = Rs. 900 Crores.

Illustration - 12

Suppose in a country investment increases by Rs. 100 Crores and consumption is given by C = 10 + 0.6Y
(where C = consumption and Y = income). How much increases will there take place in income?

Solution - 12

Multiplier = $k = \dfrac{1}{1\text{-MPC}}$ $\quad k = \dfrac{1}{1-0.6} = 2.5$

Substituting the value of k and ΔI value in $\Delta Y = k\Delta I$
ΔY= 2.5 - 100= Rs. 250Crores
Thus, increase in investment by Rs 100 Crores will cause equilibrium income to rise by Rs. 250 Crores.

Notes

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THREE-SECTOR MODEL

1) Household Sector
2) Business Sector
3) Government Sector

Aggregate Demand

$$AD = C + I + G$$

Aggregate Supply

$$AS = C + S + T$$

Equilibrium is achieved when,

$$AD = AS$$

or

$$C + I + G = C + S + T$$

or

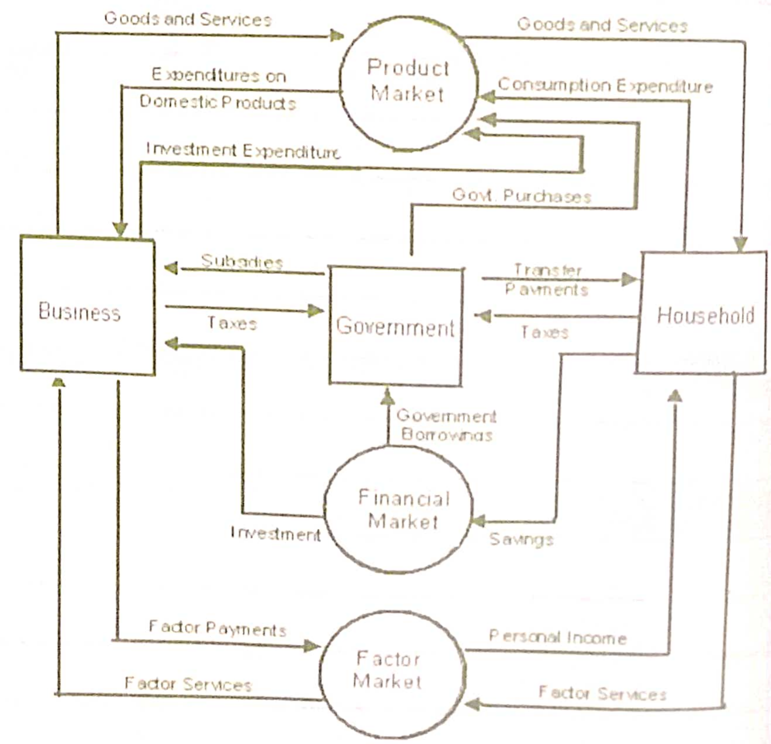
$$I + G = S + T$$

6. DETERMINATION OF EQUILIBRIUM INCOME: THREE SECTOR MODEL

Aggregate demand in the three sector model of closed economy (neglecting foreign trade) consists of three components namely, household consumption(C), desired business investment demand(I) and the government sector's demand for goods and services(G). Thus in equilibrium, we have

$$Y = C + I + G$$

Since there is no foreign sector, GDP and national income are equal. As prices are assumed to be fixed, all variables are real variables and all changes are in real terms. To help interpret these conditions, we turn to the flowchart below. Each of the variables in the model is a flow variable.



Circular Flow in a Three Sector Economy

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The three-sector, three-market circular flow model which accounts for government intervention highlights the role played by the government sector. From the above flow chart, we can find that The government sector adds the following key flows to the model:

1) **Taxes** on households and business sector to **fund government purchases**
2) **Transfer payments** to household sector and **subsidy payments** to the business sector
3) **Government purchases** goods and services from business sector and **factors of production from household** sector, and
4) **Government borrowing in financial markets** to **finance the deficits** occurring when taxes fall short of government purchases

However, unlike in the two sector model, the whole of national income does not return directly to the firms as demand for output.
There are two flows out of the household sector in addition to consumption expenditure namely,
- **saving** flow and
- flow of **tax** payments to the government. These are actually leakages.

The saving leakage **flows into financial markets**, which means that the part that is saved is held in the form of some financial asset (currency, bank deposits, bonds, equities, etc.). The tax flow goes to the government sector.

The **leakages** which occur in the household sector do not necessarily mean that the total demand must fall short of output. There are additional demands for output on the part of the business sector itself for investment and from the government sector. In terms of the circular flow, these are injections.

The **investment** injection is shown as a flow from financial markets to the business sector. The purchasers of the investment goods, financed by borrowing, are actually firms in the business sector themselves. Thus, investment represents an equivalent flow of funds lent to business sector.

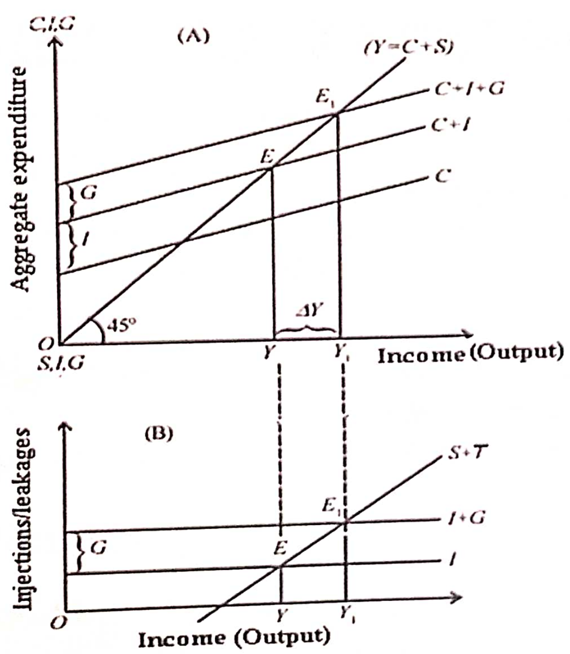
Determination of Equilibrium Income: Three Sector Model

The three-sector Keynesian model is commonly constructed assuming that government purchases are autonomous. This is not a realistic assumption, but it will simplify our analysis. Determination of income can also be explained with the help of aggregate demand and aggregate supply

$$AD = C + I + G$$
$$AS = C + S + T$$

The equilibrium national income is determined at a point where both aggregate demand and aggregate supply are equal, that is,

$$AD = Y = AS$$
$$C + I + G = Y = C + S + T$$



- The variables measured on the vertical axis are C, I & G.
- 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. These lines of autonomous expenditure are horizontal as their level does not depend on Y. Therefore, C + I + G schedule lies above the consumption function by a constant amount.
- The line S + T in the graph plots the value of savings plus taxes. This schedule slopes upwards because saving varies positively with income. Just as government spending, level of tax receipts (T) is decided by policy makers.
- The equilibrium level of income is shown at the point E1 where the (C + I + G) schedule crosses the 45° line, and aggregate demand is therefore equal to income (Y). In equilibrium, it is also true that the (S + T) schedule intersects the (I + G) horizontal schedule.

We shall now see why other points on the graph are not points of equilibrium

I) Consider a level of income below Y

- Aggregate demand exceeds income; i.e, the (C + I + G) schedule is above the 45° line. Equivalently at this point I + G is greater than S + T.
- With demand outstripping production, desired investments will exceed actual investment and there will be an unintended inventory shortfall and therefore a tendency for output to rise.

II) At levels of income above Y1

- Output will exceed demand; people are not willing to buy all that is produced.
- Excess inventories will accumulate, leading businesses to reduce their future production. Employment will subsequently decline and output will fall back to the equilibrium level.
- It is only at Y that output is equal to aggregate demand; there is no unintended inventory shortfall or accumulation and, consequently, no tendency for output to change.

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.

6.1 The Government Sector and Income Determination

Case 1 : Income Determination with Lump Sum Tax

Assumptions

1) Govt. imposes lump sum tax, i.e. taxes that do not depend on income,
2) Govt. has a balanced budget (G=T) and
3) There are no transfer payments.

Here,
$C = a + b\,Yd$
Where $Yd = Y - T$ (disposable income), T = lump sum tax

$$Y = [\,1/(1-b)\,] \times [\,a - bT + I + G\,]$$

$$\text{Multiplier} = 1/(1-b)$$

Illustration - 13

Suppose we have the following data about a simple economy:
$C = 10 + 0.75Yd$, $I = 50$, $G = T = 20$
where C is consumption, I is investment, Yd is disposable income, G is government expenditure and T is tax.

a) Find out the equilibrium level of national income.
b) What is the size of the multiplier?

Solution - 13

(a) Since G = T, budget of the government is balanced
Substituting the values of C, I and G in Y
we have, $Y=C+I+G$
$Y = a + bYd + I + G$
$Y= 10 + 0.75 (Y - 20) + 50 + 20$
$Y= 10 + 0.75 Y- 15 + 50 + 20$ or, $Y - 0.75 Y = 65$
or, $Y (1 - 0.75) = 65$
or, $0.25 Y = 65$
or, $Y = 65 /.25 = 260$
The equilibrium value of Y = 260
(b) The value of the multiplier is $= 1/ (1 - MPC) = 1/ (1 - b) = 1/ (1 - 0.75) = 1/0.25 = 4$

Case 2 : Income Determination with Lump Sum Tax & Transfer payments

Assumptions

1) Govt. imposes lump sum tax, i.e. taxes that do not depend on income,
2) Govt. has a balanced budget (G=T) and
3) There are transfer payments.

Here,
$C = a + b\ Yd$
Where $Yd= Y- T+ TR$
where T is a lump sum tax and TR is autonomous transfer payments

$$Y = [\ 1 / (1-b)\ ] \times [\ a - bT + bTR + I + G\ ]$$

$$\text{Multiplier} = 1 / (1-b)$$

Illustration - 14

Suppose the structural model of an economy is given –
$C = 100+ 0.75\ Yd$; $I = 200$, $G = T = 100$; $TR= 50$,
find the equilibrium level of income?

Solution - 14

$Y= C+ I+ G$
$Y = 100+ 0.75\ Yd + 200 + 100$
$Y= 100 + 0.75(Y- 100 + 50) + 200 + 100$
$Y = 100 + 0.75Y -75 + 37.5 +200 +100$
$Y = 1450$

Or use $Y = \frac{1}{1-b}(a - bT + bTR + I + G)$ to calculate income.

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Case 3 : Income Determination with tax as a function of Income

Assumptions

1) Govt. imposes tax, which consists of both lump sum tax and proportional taxes. The tax function is defined as;

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

2) There are no transfer payments.

Here,

C = a + b Yd

Where $Yd = Y - \overline{T} - t\,Y$

where T is a lump sum tax and TR is autonomous transfer payments

$$Y = \{ 1 / 1 - [b\,(1-t)] \} \times [\, a - b\overline{T} + I + G \,]$$

$$\text{Tax Multiplier} = 1 / 1 - b(1-t)$$

Illustration – 15

For a closed economy, the following data is given –
Consumption C = 75 + 0.5 (Y–T); Investment I = 80; Total tax T = 25 + 0.1Y;
Government expenditure G = 100.

a) Find out equilibrium income?
b) What is the value of multiplier?

Solution – 15

$Y = C + I + G$

$Y = 75 + 0.5(Y - 25 - 0.1Y) + 80 + 100$

$Y(1-0.5+0.05) = 75-12.5+80+100$

$$Y = \frac{1}{1-0.5+0.05}\,(242.5)$$

$$\text{Multiplier} = \frac{1}{1-b(1-t)} = 1/[1-0.5(1-0.1)] = 1.82$$

Case 4 : Income Determination with Tax (as a Function of Income), Government Expenditure and Transfer Payments

Assumptions

1) Govt. imposes tax, which consists of both lump sum tax and proportional taxes. The tax function is defined as;

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

2) There are transfer payments.

Here,

$Yd = Y - \overline{T} - tY + TR$

$$Y = \{ 1 / 1 - [b(1-t)] \} \times [\, a - b\overline{T} + bTR + I + G \,]$$

$$\text{Multiplier} = 1 / 1 - b(1-t)$$

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Illustration - 16

Suppose C= 100 + 0.80 (Y- T + TR); I = 200; T= 25+0.1Y; TR= 50; G = 100
Find out equilibrium level of Income?

Solution - 13

$Y = C + I + G$
$Y = 100 + 0.80 (Y - T + TR) + I + G$
$Y = 100 + 0.80(Y - 25 - 0.1Y + 50) + 200 + 100$
$Y - 0.80 Y + 0.08 Y = 420$
$Y(1 - 0.8 + 0.08) = 420$
$Y = 1500$

Notes

FOUR-SECTOR MODEL

1) Household Sector
2) Business Sector
3) Government Sector
4) Foreign Sector

Aggregate Demand

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

Aggregate Supply

$AS = C + S + T$

Equilibrium is achieved when,

$$AD = AS$$

or

$$C + I + G + (X - M) = C + S + T$$

or

$$I + G + X = S + T + M$$

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7. DETERMINATION OF EQUILIBRIUM INCOME: FOUR SECTOR MODEL

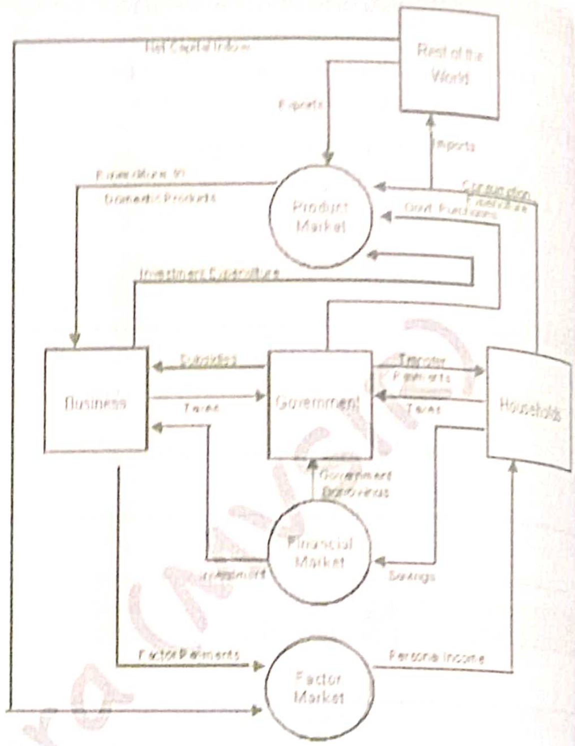
The four sector model includes all four macroeconomic sectors, the household sector, the business sector, the government sector, and the foreign sector. The foreign sector includes households, businesses, and governments that reside in other countries. The following flowchart shows the circular flow in a four sector economy.

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.

In equilibrium, we have

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

Fig: Circular Flow in a Four Sector Economy



- 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 demand for exports depends on foreign income and is therefore exogenously determined and are autonomous. Imports are subtracted from exports to derive net exports, which is the foreign sector's contribution to aggregate expenditures.

- Since import has an autonomous component (M) and is assumed to depend on income(Y) and marginal propensity to import (m), the import function is expressed as

$$M = M + mY$$

- Marginal propensity to import

$$m = \Delta M / \Delta Y$$ ..... is assumed to be constant.

Notes

As noted above, the equilibrium level of national income is determined at the level at which the aggregate demand is equal to aggregate supply. As the aggregate demand in the four sector model is given in equation 2.14, the equilibrium condition is expressed as follows-

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

Where $C = a + b(Y-T)$ $M = \bar{M} + mY$

The equilibrium level of National Income can now be expressed by –

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

$Y = a + b(Y - T) + I + G + X - \bar{M} - mY$

$Y - bY + mY = a - bT + I + G + X - M$

$$Y = \frac{1}{1-b+m}(a - bT + I + G + X - \bar{M})$$

The economy being in equilibrium, suppose export of country increases by Δ X autonomously, all other factors remaining constant. By incorporating the increase in exports by Δ X, the equilibrium equation of the country can be expressed as

$$Y + \Delta Y = \frac{1}{1-b+m}(a - bT + I + G + X - \bar{M} + \Delta X) \text{ or}$$

$$Y + \Delta Y = \frac{1}{1-b+m}(a - bT + I + G + X - \bar{M}) + \Delta X$$

$$Y = \frac{1}{1-b+m}(a - bT + I + G + X - \bar{M})$$

We get, $Y + \Delta Y = Y + \frac{1}{1-b+m}\Delta X$

Subtracting Y from both sides, we get $\Delta Y = \frac{1}{1-b+m}\Delta X$

By rearranging $\Delta Y = \frac{1}{1-b+m}\Delta X$, we get

Or alternatively written as

$$\frac{\Delta Y}{\Delta} = \frac{1}{1-b+m}$$

The term $\frac{1}{1-b+m}$ is known as foreign trade multiplier whose value is determined by marginal propensity to consume (b) and marginal propensity to import (m).

If in the model proportional income tax and government transfer payments are incorporated, then only the denominator of multiplier will change.

If income tax is of form $T = \bar{T} + tY$ where $\bar{T}$ is constant lump-sum, t is the proportion of income tax and TR > 0 and autonomous, then the four sector model can be expressed as: –

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

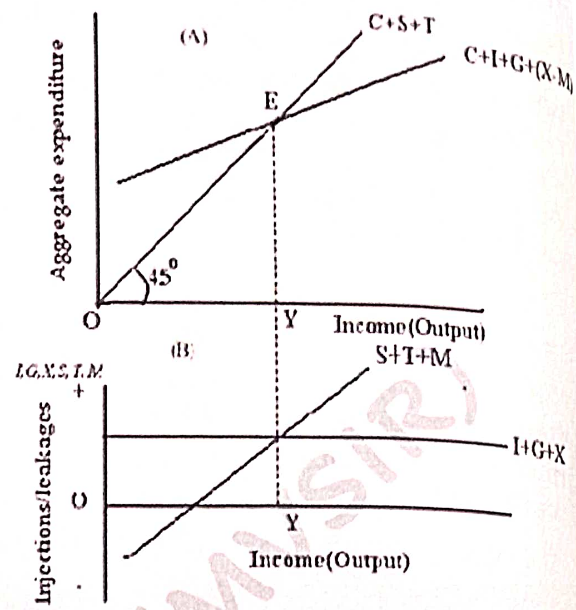
Where $C = a + b(Y - \bar{T} - tY + TR)$ $M = \bar{M} + mY$.

The equilibrium level of National Income can now be expressed as:

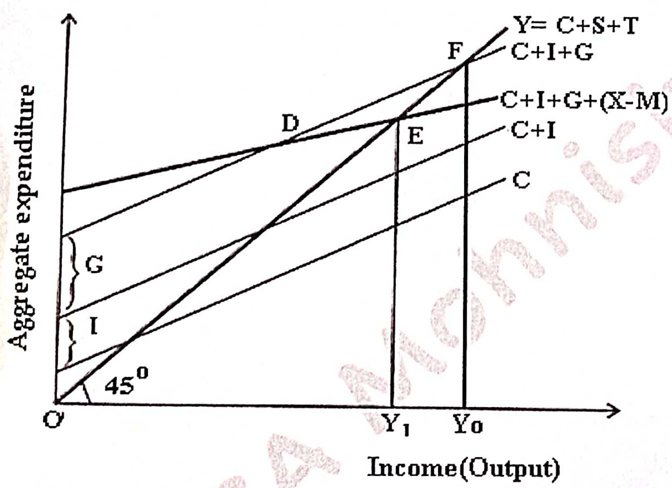
$$Y = \frac{1}{1-b+m}(a - b\bar{T} + bTR + I + G + X - \bar{M})$$

Determination of Equilibrium Income: Four Sector Model

- Equilibrium is identified as the intersection between the C + I + G + (X - M) line and the 45-degree line. The equilibrium income is Y.
- From panel B, we find that the leakages (S+T+M) are equal to injections (I+G+X) only at equilibrium level of income.
- 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. The figure in next page depicts a case of (X < M).



Effects on Income When Imports are Greater than Exports



We have seen above that equilibrium income is expressed as a product of two terms: $\Delta Y = k\ \Delta I$; i.e. the level of autonomous investment expenditure and the investment multiplier. The autonomous expenditure multiplier in a four sector model includes the effects of foreign transactions and is stated as $\frac{1}{1-b+m}$

where 'm' is the propensity to import which is greater than zero. You may recall that the multiplier in a closed economy is $\frac{1}{1-b}$

- The greater the value of 'm', the lower will be the autonomous expenditure multiplier. The more open an economy is to foreign trade, (the higher m) 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, larger the proportion of this induced effect on demand for foreign, not domestic, consumer goods. Consequently, the induced effect on demand for domestic goods and, hence on domestic income will be smaller.
- The increase in imports per unit of income constitutes an additional leakage from circular flow of (domestic) income at each round of multiplier process & reduces value of autonomous exp. multiplier.

- An increase in demand for exports of a country is an increase in aggregate demand for domestically produced output & will increase equilibrium income just as an increase in govt spending or an autonomous increase in investment.
- In summary,
  - an increase in 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, & trade increases 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.

Illustration - 17

The consumption function is C = 40 + 0.8Yd,T= 0.1Y, I = 60 Crores G = 40 Crores, X = 58 and M = 0.05 Y. Find out equilibrium level of income, Net Export, net export if export were to increase by 6.25.

Solution - 17

C= 40+ 0.8Yd
C= 40 + 0.8 (Y- 0.1Y)
Y= C + I+ G + (X – M)
Y= 40+0.8(Y-0.1Y)+60+40+(58-0.05Y)
Y= 40+0.8(0.9Y)+60+40+58-0.05Y
Y-0.72Y+0.05Y =198
Y(1-0.72+0.05) =198
Y(0.33) =198
Y= 198/0.33 = 600 Crores
Net Export= X-M = 58 – 0.05Y 58 – 0.05 (600) =58- 30= 28
If exports increase by 6.25, then exports = 64.25
Then, Y = 40+ 0.8 (Y- 0.1Y) + 60 + 40 + (64.25- 0.05Y)
Y(1-0.72+0.05) = 204.5
Y(0.33) = 204.5
Y=204.5/0.33 = 619.697
Then import = .05 × 619.697= 30.98
Net Export= 64.25- 30.98= 33.27 Crores
Thus, there is surplus in balance of trade as Net Exports are positive.

Illustration - 18

An economy is characterized by the following equation-

Consumption	C= 60+0.9Yd
Investment	I = 10
Government expenditure	G = 10
Tax	T = 0
Exports	X = 20
Imports	M = 10 +0.05 Y

What is the equilibrium income?
Calculate trade balance and foreign trade multiplier.

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Solution - 18

$Y = C + I + G + (X - M)$
$= 60+0.9(Y - 0) + 10 + 10 + (20 - 10 - 0.05Y)$
$= 60 + 0.9\,Y + 30 - 0.05\,Y$
$Y = 600$
Trade Balance $= X - M = 20-10-0.05(600) = -20$
Thus, trade balance in deficit.

Foreign trade multiplier$= \dfrac{1}{1-b+m} = \dfrac{1}{1-0.9+0.05} = 6.66$

8. CONCLUSION

According to the Keynesian theory of income and employment, national income depends upon the aggregate effective demand. If the aggregate effective demand falls short of that output at which all those who are both able and willing to work are employed, it will result in unemployment in the economy. Consequently, there will be a gap between the economy's actual and optimum potential output. On the contrary, if the aggregate effective demand exceeds the economy's full employment output (production capacity), it will result in inflation. Nominal output will increase, but it simply reflects higher prices, rather than additional real output. It is not necessary that the equilibrium aggregate output will also be the full employment aggregate output. It is undesirable and a cause of great concern for the society and government if a large number of people remain unemployed. In the absence of government policies to stabilise the economy, incomes will be unstable because of the instability of investment. By making appropriate changes in government spending (G) and taxes, the government can counteract the effects of shifts in investment. Appropriate changes in fiscal policy by adjusting government expenditure and taxes could keep the autonomous expenditure constant even in the face of undesirable changes in the investment.

Notes