

CHAPTER 3

INCOME AND RELATED AGGREGATES - BASIC CONCEPTS AND MEASUREMENTS

INTRODUCTION TO MACROECONOMICS

It is the branch of economics that deals with the study of the overall behavior and performance of an economy. Unlike microeconomics, which focuses on individual consumers and firms, macroeconomics looks at the economy as a whole. It examines aggregate indicators such as national income, unemployment rates, inflation, and the overall growth rate of the economy. Macroeconomics seeks to understand how the economy functions at a large scale, how different sectors interact, and how government policies can influence the overall economic environment.



KEY CONCEPTS

1. **National Income:** The total income earned by a country's residents and businesses, including any income earned abroad.
2. **Gross Domestic Product (GDP):** The total value of all goods and services produced within a country over a specific period.
3. **Unemployment Rate:** The percentage of the labor force that is unemployed and actively seeking employment.
4. **Inflation:** The rate at which the general level of prices for goods and services is rising, and subsequently, eroding purchasing power.

NATIONAL INCOME



The total income earned by a country's residents and businesses, including any income earned abroad.

GROSS DOMESTIC PRODUCT (GDP)



The total value of all goods and services produced within a country over a specific period.

UNEMPLOYMENT RATE



The percentage of the labor force that is unemployed and actively seeking employment.

INFLATION



The rate at which the general level of prices for goods and services is rising, and subsequently, eroding purchasing power.

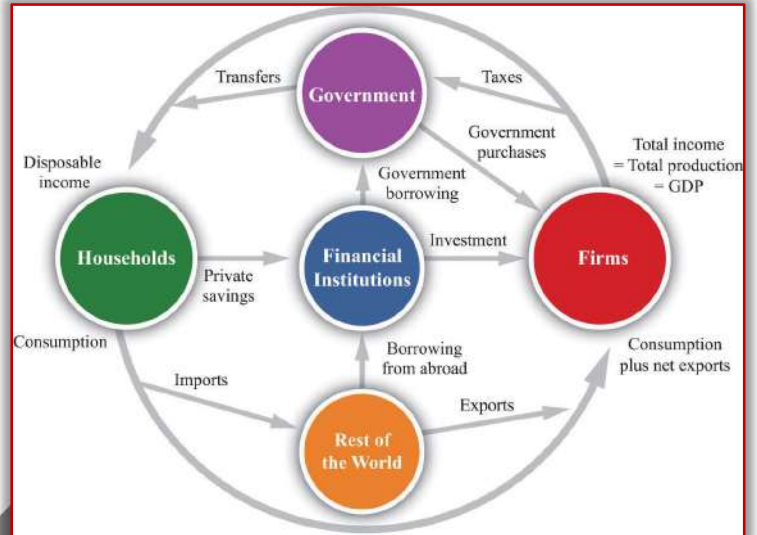
CIRCULAR FLOW OF INCOME

The Circular Flow of Income is a key concept in macroeconomics that illustrates **how money moves through an economy**. It shows the interactions between different sectors, such as households, firms, government, and the foreign sector. This flow of income reflects the production, distribution, and consumption of goods and services, and how they are financed.

1. TWO-SECTOR MODEL

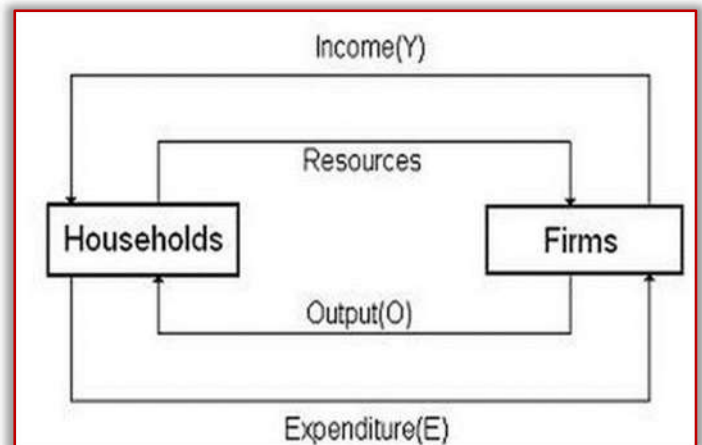
The Two-Sector Model is the simplest form of the circular flow of income. It consists of only two sectors: households and firms.

- **HOUSEHOLDS:** In this model, households provide the factors of production (land, labor, capital) to firms. In return, they receive income in the form of wages, rent, interest, and profits.
- **FIRMS:** Firms use the factors of production provided by households to produce goods and services. They sell these goods and services to households, who spend their income on purchasing these goods and services.



DIAGRAMMATIC EXPLANATION

A simple diagram of the Two-Sector Model would show two rectangles representing households and firms. Arrows would illustrate the flow of factors of production (resources) from households to firms and the flow of goods and services (output) in the opposite direction. Another set of arrows would show the flow of income from firms to households and the expenditure on goods and services from households to firms.



Example:

Consider a small closed economy where households provide labor to a local farm (a firm). The farm pays wages to the households, and the households use this income to buy the farm's produce. This creates a continuous flow of income and expenditure within the economy.

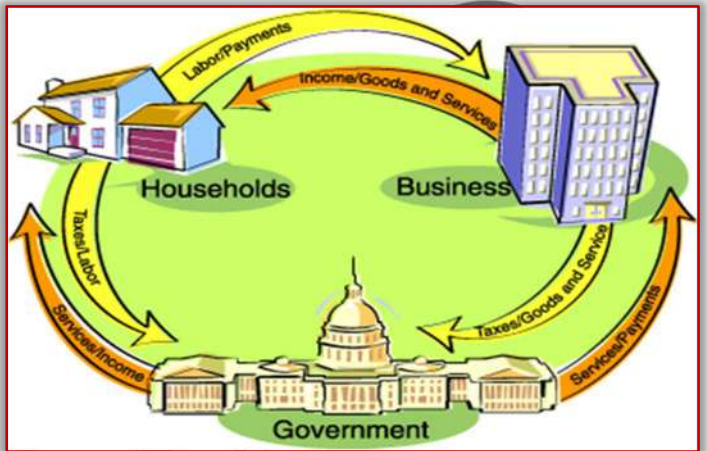
2. THREE-SECTOR MODEL

The Three-Sector Model builds on the Two-Sector Model by adding the government sector. This model introduces the role of government in the economy, focusing on taxation and public spending.

- Households and Firms: The interaction between households and firms remains the same as in the Two-Sector Model.
- Government: The government collects taxes from both households and firms. It uses these tax revenues to provide public goods and services, such as infrastructure, education, and healthcare.

DIAGRAMMATIC EXPLANATION:

In the Three-Sector Model, the diagram would add a third circle representing the government. Arrows would show the flow of taxes from households and firms to the government, and the flow of public goods and services from the government to households and firms.



Example:

In a country, households pay income taxes, and firms pay corporate taxes to the government.

The government uses this revenue to build roads, which both households and firms benefit from. The roads make it easier for firms to transport goods and for households to commute to work, enhancing productivity in the economy.

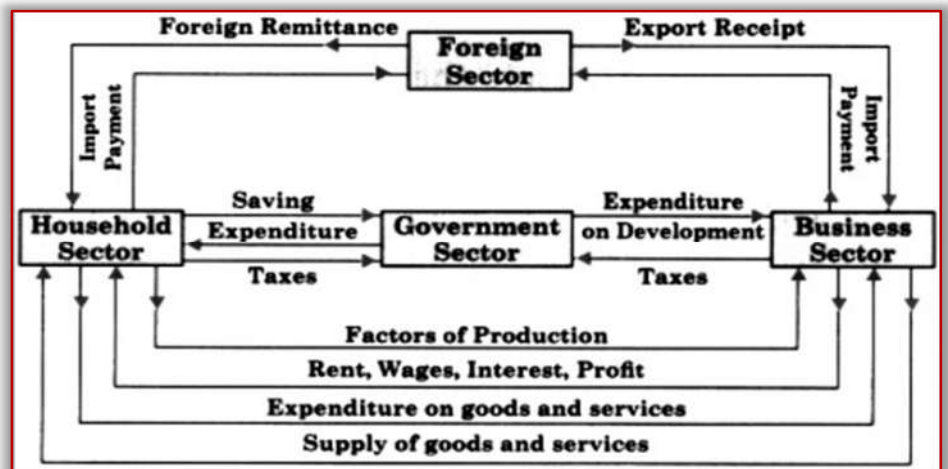
3. FOUR-SECTOR MODEL

The Four-Sector Model is the most comprehensive version of the Circular Flow of Income. It includes the foreign sector, which accounts for international trade.

- Households, Firms, and Government: The interactions among households, firms, and government remain as described in the Three-Sector Model.
- Foreign Sector: The foreign sector is introduced to represent trade with other countries. Households and firms engage in importing goods and services from abroad, and they also export goods and services to foreign markets.

DIAGRAMMATIC EXAMPLE:

In the Four-Sector Model, a fourth box is added to represent the foreign sector. Arrows would illustrate the flow of exports and imports between the domestic economy and the foreign



sector. The flow of money between the sectors for these international transactions would also be represented.

Example: Consider a country that exports automobiles and imports electronics. Households may buy imported electronics, and firms may export automobiles. The revenue from exports adds to the national income, while the money spent on imports leaves the economy. The balance of these flows influences the overall economy's health.

Data Insight:

According to recent data from the World Bank, countries with high levels of international trade (as a percentage of GDP) tend to have more complex circular flows involving significant interactions with the foreign sector. For instance, Germany, a highly export-oriented economy, shows a large volume of income generated from its export sector, contributing substantially to its national income.

MEASURING NATIONAL INCOME

National income is a crucial indicator of an economy's health. It represents the total value of all income earned by residents of a country over a specific period. There are three main approaches to measuring national income:

1. PRODUCT METHOD (VALUE ADDED METHOD)

This method measures the value added by each firm in the production process. The national income is calculated by summing up the value added at each stage of production across all firms in the economy.

Formula: $\text{National Income} = \sum (\text{Value of Output} - \text{Intermediate Consumption})$

Example: Consider a textile industry where raw cotton is processed into fabric, and fabric is then made into garments. The value added at each stage (from cotton to fabric to garments) contributes to the total national income.

2. INCOME METHOD

The Income Method calculates national income by summing up all the incomes earned by individuals and businesses in the economy, including wages, rents, interests, and profits.

Formula: $\text{National Income} = \text{Wages} + \text{Rents} + \text{Interests} + \text{Profits}$

Example: In an economy, a company earns profits, pays wages to its workers, pays rent for its premises, and earns interest on its investments. The sum of these incomes constitutes the national income.

3. EXPENDITURE METHOD

The Expenditure Method measures national income by adding up all the expenditures made in the economy, including consumption, investment, government spending, and net exports.

Formula:

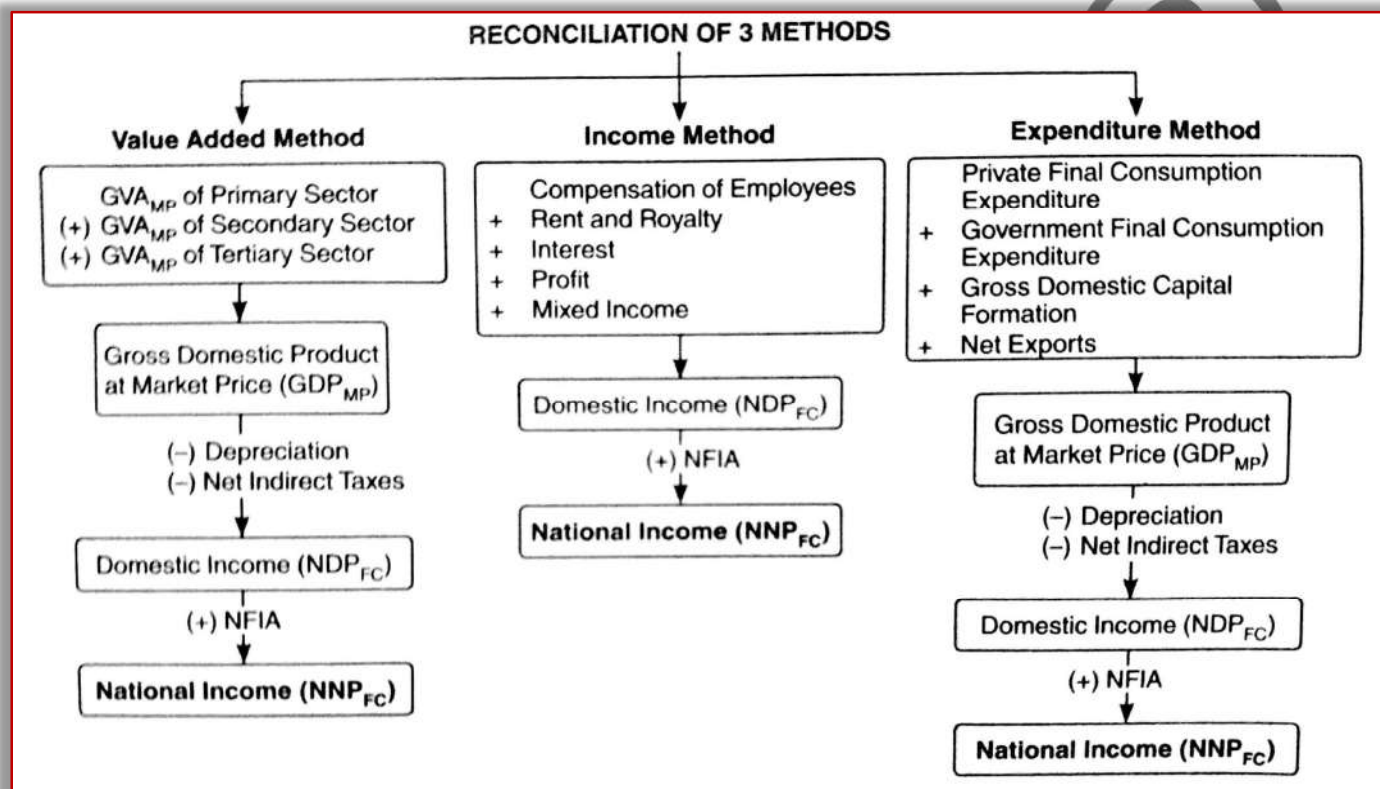
$\text{National Income} = C + I + G + (X - M)$

- C = Consumption expenditure

- I = Investment expenditure

- G = Government expenditure
- X = Exports
- M = Imports

Example: In a given year, if households spend ₹500 billion on consumption, businesses invest ₹300 billion, the government spends ₹200 billion, and net exports amount to ₹100 billion, the national income would be ₹1,100 billion.



IMPORTANCE OF NATIONAL INCOME

National income is a critical indicator for economists, policymakers, and businesses. It reflects the overall economic activity and helps in comparing the economic performance of different countries. National income data is used to formulate economic policies, set targets for economic growth, and assess the standard of living in a country.

Data Insight: According to the International Monetary Fund (IMF), the global GDP in 2023 was estimated to be around \$95 trillion. This figure represents the total national incomes of all countries combined and reflects the scale of global economic activity.

Understanding the concepts of national income and the circular flow of income is fundamental in macroeconomics. These concepts provide a framework for analyzing the overall economic environment, the interaction between different sectors, and the impact of government policies and international trade on the economy. By measuring national income through various methods,

economists can assess the health of an economy and make informed decisions to foster economic growth and stability.

CIRCULAR FLOW OF INCOME AND NATIONAL INCOME CONCEPTS

CIRCULAR FLOW OF INCOME

The circular flow of income is a model that illustrates the movement of goods, services, and money in an economy. It shows how income flows from producers to workers as wages, and then flows back to producers as payment for goods and services.

There are two main types of circular flows:

1. TWO-SECTOR MODEL: In a simplified economy with only households and firms, households provide factors of production (land, labor, capital) to firms, and in return, they receive wages, rent, interest, and profits. Firms produce goods and services, which households purchase using the income they have earned.

2. FOUR-SECTOR MODEL: This includes households, firms, government, and the foreign sector. Households provide factors of production to firms, which in turn produce goods and services. The government collects taxes from households and firms and provides public goods and services. The foreign sector involves exports and imports of goods and services.

CONCEPTS OF GDP, GNP, NDP, AND NNP

NATIONAL INCOME CONCEPTS AT MARKET PRICE VS. FACTOR PRICE

When measuring national income, it's crucial to understand the difference between market price and factor price:

- **Market Price:** This includes the actual price consumers pay for goods and services, which incorporates indirect taxes (like GST) and excludes subsidies.
- **Factor Price:** This reflects the cost of factors of production (land, labor, capital, and entrepreneurship) without including indirect taxes but includes subsidies

GDP, GNP, NDP, AND NNP IN MARKET PRICE AND FACTOR PRICE

1. GROSS DOMESTIC PRODUCT (GDP)

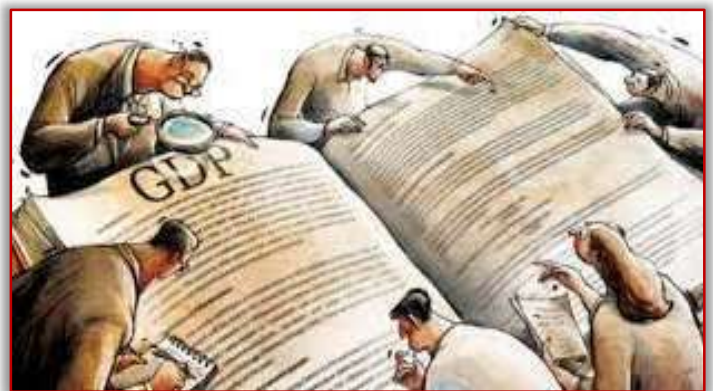
At Market Price (GDP at MP):

Definition: The total market value of all final goods and services produced within a country's borders, including taxes and excluding subsidies.

Formula: $GDP \text{ at MP} = C + I + G + (X - M)$

At Factor Price (GDP at FP):

Definition: The total value of all final goods and services produced within a



country's borders, excluding taxes and including subsidies.

Formula: $GDP\ at\ FP = GDP\ at\ MP - Indirect\ Taxes + Subsidies$

Example: If India's GDP at MP is ₹190 lakh crore, indirect taxes are ₹20 lakh crore, and subsidies are ₹5 lakh crore: $GDP\ at\ FP = 190 - 20 + 5 = ₹175\ lakh\ crore$

2. GROSS NATIONAL PRODUCT (GNP)

At Market Price (GNP at MP):

Definition: The total market value of all final goods and services produced by the residents of a country, including net income from abroad, taxes, and excluding subsidies.

Formula: $GNP\ at\ MP = GDP\ at\ MP + NFIA$

At Factor Price (GNP at FP):

Definition: The total value of all final goods and services produced by the residents of a country, excluding taxes, including subsidies, and net income from abroad.

Formula: $GNP\ at\ FP = GNP\ at\ MP - Indirect\ Taxes + Subsidies$

Example: If India's GNP at MP is ₹195 lakh crore, indirect taxes are ₹20 lakh crore, and subsidies are ₹5 lakh crore: $GNP\ at\ FP = 195 - 20 + 5 = ₹180\ lakh\ crore$

3. NET DOMESTIC PRODUCT (NDP)

At Market Price (NDP at MP):

Definition: The GDP at market price adjusted for depreciation.

Formula: $NDP\ at\ MP = GDP\ at\ MP - Depreciation$

At Factor Price (NDP at FP):

Definition: The GDP at factor price adjusted for depreciation.

Formula: $NDP\ at\ FP = NDP\ at\ MP - Indirect\ Taxes + Subsidies$

Example: If India's NDP at MP is ₹180 lakh crore, indirect taxes are ₹20 lakh crore, and subsidies are ₹5 lakh crore: $NDP\ at\ FP = 180 - 20 + 5 = ₹165\ lakh\ crore$

4. NET NATIONAL PRODUCT (NNP)

At Market Price (NNP at MP):

Definition: The GNP at market price adjusted for depreciation.

Formula: $NNP\ at\ MP = GNP\ at\ MP - Depreciation$

At Factor Price (NNP at FP):

Definition: Also known as National Income, this is the GNP at factor price adjusted for depreciation.

Formula: $NNP\ at\ FP = NNP\ at\ MP - Indirect\ Taxes + Subsidies$

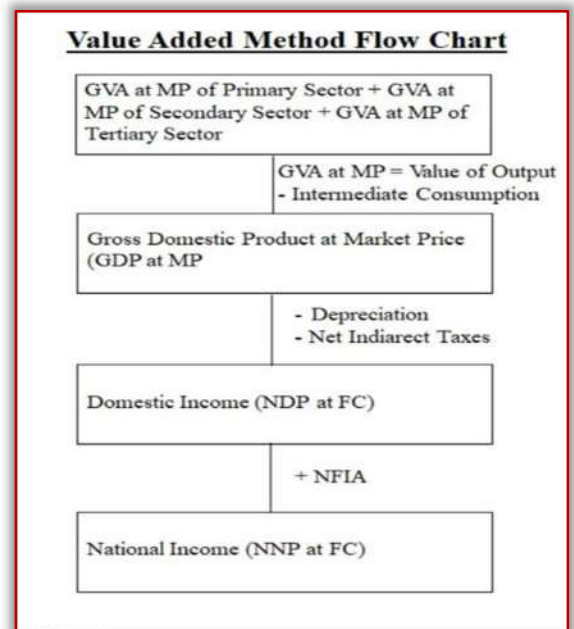
Example: If India's NNP at MP is ₹185 lakh crore, indirect taxes are ₹20 lakh crore, and subsidies are ₹5 lakh crore: $NNP\ at\ FP = 185 - 20 + 5 = ₹170\ lakh\ crore$

DATA INSIGHT IN CONTEXT OF INDIA

1. **GDP at Market Price (2023-2024):** Approximately ₹295.36 lakh crore.
2. **GDP at Factor Price:** Would be lower, adjusted for taxes and subsidies.
3. **GNP at Market Price:** Slightly higher than GDP due to NFIA.

4. **NNP at Factor Price:** Represents the national income, crucial for understanding the true income generated by residents after accounting for capital depreciation and adjustments for taxes and subsidies.

Understanding the concepts of GDP, GNP, NDP, and NNP is essential for assessing the economic performance and sustainability of an economy. These indicators provide different perspectives on the value of goods and services produced within a country and by its residents. They are crucial for economic planning, policy formulation, and international comparisons. By analyzing these measures along with relevant data and diagrams, economists can gain insights into the health and efficiency of an economy, guiding decisions that impact both short-term growth and long-term development.



DETAILED ANALYSIS OF THE MEASUREMENT OF NATIONAL INCOME

INTRODUCTION TO NATIONAL INCOME MEASUREMENT

National income measurement is a vital tool in economics that provides an overall picture of the economic performance of a country. It is essential for understanding the economy's health, guiding government policies, and comparing the economic performance of different countries. The three primary methods used to measure national income are the Value Added Method (Production Method), Income Method, and Expenditure Method. Each method offers a unique perspective on how income is generated and distributed in the economy.

1. VALUE ADDED METHOD (PRODUCTION METHOD)

Steps in the Value Added Method

Gross Value Added (GVA) Calculation:

- GVA is calculated by subtracting intermediate consumption (the value of goods and services used up in the production process) from the value of output.
- Formula: $GVA = \text{Value of Output} - \text{Intermediate Consumption}$

Summing GVA Across All Stages:

- The sum of GVA across all stages of production provides the Gross Domestic Product (GDP).
- Formula: $GDP \text{ at Market Prices} = \sum GVA + \text{Net Indirect Taxes}$
- GDP at Factor Cost: $GDP \text{ at Factor Cost} = GDP \text{ at Market Prices} - \text{Net Indirect Taxes}$

Example: Consider a manufacturing process that involves three stages: raw materials, processing, and final goods. If the value of output at each stage is \$500 million, \$1 billion, and \$1.5 billion, and

the intermediate consumption is \$300 million, \$700 million, and \$1 billion, respectively, the GVA at each stage would be:

1. **Stage 1:** $GVA = 500 - 300 = 200$ million dollars
2. **Stage 2:** $GVA = 1,000 - 700 = 300$ million dollars
3. **Stage 3:** $GVA = 1,500 - 1,000 = 500$ million dollars

Summing these, the GDP at market prices would be \$1 billion. If net indirect taxes are \$100 million, the GDP at factor cost would be \$900 million.

2. INCOME METHOD

- Components of Income Method:
- Wages and Salaries: Income earned by labor.
- Rent: Income earned by property owners.
- Interest: Income earned by capital.
- Profits: Income earned by entrepreneurs.
- Mixed Income: Income earned by self-employed individuals who combine multiple factors of production.

Formula:

GDP at Factor Cost = Wages and Salaries + Rent + Interest + Profits + Mixed Income

GDP at Market Prices = GDP at Factor Cost + Net Indirect Taxes

Example: In an economy, suppose the total wages and salaries amount to \$400 billion, rent is \$100 billion, interest is \$50 billion, profits are \$150 billion, and mixed income is \$100 billion. The GDP at factor cost would be:

GDP at Factor Cost = $400 + 100 + 50 + 150 + 100 = 800$ billion dollars

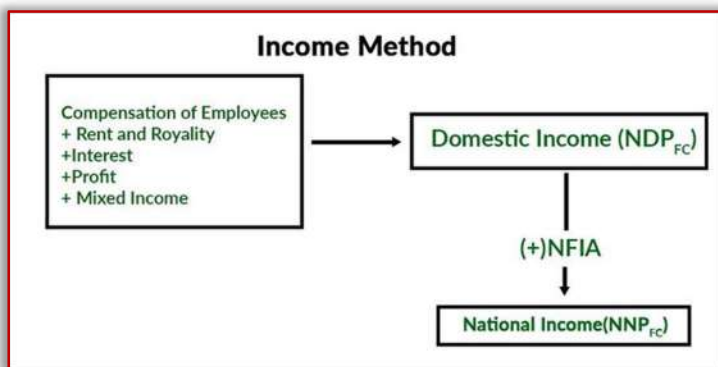
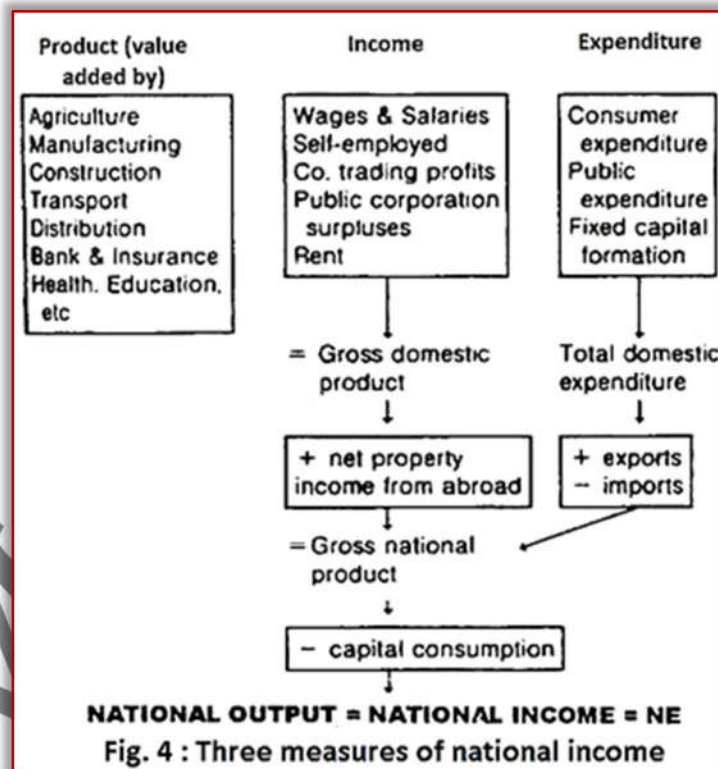
If net indirect taxes are \$200 billion, the GDP at market prices would be:

GDP at Market Prices = $800 + 200 = 1,000$ billion dollars

3. EXPENDITURE METHOD

Components of Expenditure Method:

- Consumption (C): Total spending by households on goods and services.
- Investment (I): Total spending on capital goods that will be used for future production.



- Government Spending (G): Total government expenditures on goods and services.
- Net Exports (X - M): The difference between exports and imports.

Formula:

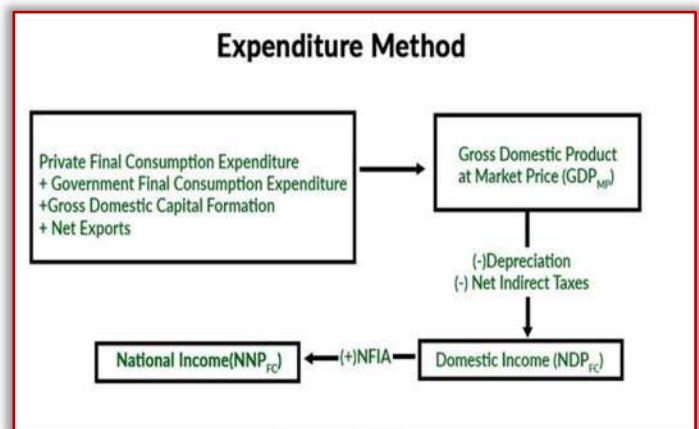
- $GDP \text{ at Market Prices} = C + I + G + (X - M)$
- $GDP \text{ at Factor Cost} = GDP \text{ at Market Prices} - \text{Net Indirect Taxes}$

Example: Suppose in an economy, consumption is \$600 billion, investment is \$200 billion, government spending is \$150 billion, exports are \$100 billion, and imports are \$50 billion. The GDP at market prices would be:

$GDP \text{ at Market Prices} = 600 + 200 + 150 + (100 - 50) = 1,000 \text{ billion dollars}$

If net indirect taxes are \$100 billion, the GDP at factor cost would be:

$GDP \text{ at Factor Cost} = 1,000 - 100 = 900 \text{ billion dollars}$



REAL AND NOMINAL GDP & GNP

1. NOMINAL GDP

Definition: Nominal GDP refers to the total market value of all final goods and services produced within a country in a given period, valued at current market prices.

$Nominal\ GDP = \sum (\text{Quantity of goods/services produced}) \times (\text{Current prices})$

Example: If a country produced 100 units of a product priced at ₹10 each in 2022, the nominal GDP for that product would be ₹1000.

Nominal GDP does not account for inflation or deflation, meaning it reflects both changes in the quantity of goods and services and changes in price levels.

2. REAL GDP

Definition: Real GDP measures the total value of all final goods and services produced within a country, but valued at constant prices (base-year prices). It adjusts for inflation or deflation, giving a more accurate picture of economic growth.

$Real\ GDP = \sum (\text{Quantity of goods/services produced}) \times (\text{Base year prices})$

Example: Using the previous example, if the base year price of the product is ₹8, the real GDP would be ₹800, indicating that the economy's actual output value has increased by 800 units, independent of price changes.

Real GDP is a better indicator of an economy's true growth as it eliminates the effect of price level changes.

3. NOMINAL GNP

Definition: Nominal GNP (Gross National Product) measures the market value of all final goods and services produced by the residents of a country (whether within or outside the country) in a given period, valued at current prices.

Example: If Indian residents produce goods worth ₹5000 globally and the price level has increased, the nominal GNP might overstate the actual increase in production. Similar to nominal GDP, nominal GNP is influenced by price level changes.

4. REAL GNP

Definition: Real GNP is the total value of all final goods and services produced by the residents of a country, adjusted for inflation or deflation, valued at constant base-year prices.

Example: If in the base year the price level was lower, the real GNP would reflect this, showing true growth in production by Indian residents.

Real GNP provides a clearer picture of the economic well-being of the residents by removing the effects of price changes.

COMPARISON BETWEEN REAL AND NOMINAL GDP & GNP

- Inflation Adjustment:** Real GDP & GNP is adjusted for inflation, while nominal GDP/GNP is not.
- Economic Growth:** Real measures provide a more accurate depiction of an economy's growth.
- Price Changes:** Nominal measures include changes in price levels, while real measures exclude these effects.

KEY CONCEPTS IN MEASUREMENT

1. NET FACTOR INCOME FROM ABROAD (NFIA)

Net Factor Income from Abroad (NFIA) is the difference between the income earned by residents from abroad and the income earned by foreigners within the domestic country.

The infographic compares Nominal GDP and Real GDP across eight categories:

- #1. Meaning:** Nominal GDP is the sum-total of the economic output produced in a year valued at the current market price. Real GDP is the sum-total economic output produced in a year's values at a predetermined base market price.
- #2. Based on:** Nominal GDP is based on Current Market Price. Real GDP is based on Base Year's Market Price.
- #3. How does inflation affect it?:** Nominal GDP does not take inflation into account. Real GDP takes inflation into account and is called inflation-adjusted GDP.
- #4. Value of GDP:** Nominal GDP is much higher since current market changes are taken into effect. Real GDP is much lower since the market price of the base year is taken into consideration.
- #5. Popularity:** Nominal GDP is less popular. Real GDP is more popular.
- #6. Complexity:** Nominal GDP is very easy to calculate. Real GDP is a bit complex to ascertain.
- #7. Comparison with earlier GDPs:** Nominal GDP can be compared with previous quarters. Real GDP can be compared with the last financial years.
- #8. Growth of the economy:** From Nominal GDP, economic growth is analyzed easily. From Real GDP, economic growth is explored easily.

Source: www.wallstreetmojo.com

Formula:

$$\text{GNP} = \text{GDP} + \text{NFIA}$$

2. GDP DEFLATOR

Definition: The GDP deflator is a measure of the price level of all domestically produced goods and services in an economy. It is the ratio of nominal GDP to real GDP, multiplied by 100.

Formula:

$$\text{GDP Deflator} = (\text{Nominal GDP} / \text{Real GDP}) \times 100$$

Example: Suppose a country's nominal GDP in 2024 is \$1,100 billion, and its real GDP (using 2020 as the base year) is \$1,000 billion.

$$\text{GDP Deflator} = (1100/1000) \times 100 = 110$$

This indicates that prices have increased by 10% since the base year.

3. GNP DEFLATOR

Definition: The GNP deflator is similar to the GDP deflator but is used to measure the price level of goods and services produced by the residents of a country, including income from abroad (Gross National Product, GNP).

Formula:

$$\text{GNP Deflator} = (\text{Nominal GNP} / \text{Real GNP}) \times 100$$

Example:

If a country's nominal GNP is \$1,200 billion and real GNP is \$1,000 billion:

$$\text{GNP Deflator} = (1200/1000) \times 100 = 120$$

This implies that prices have increased by 20% since the base year.

4. GREEN GDP

Green GDP is an adjusted version of Gross Domestic Product (GDP) that accounts for the environmental costs of economic activity, such as the depletion of natural resources and environmental degradation.

Green GDP subtracts the economic cost of environmental degradation (e.g., pollution, deforestation) from the traditional GDP to provide a more sustainable measure of economic growth.

Example:

If a country's GDP is \$1,500 billion, but the estimated cost of environmental degradation is \$200 billion: $\text{Green GDP} = 1500 - 200 = 1300$ billion

This suggests that the economy's effective GDP, considering environmental costs, is \$1,300 billion.

HOW IS GREEN GDP CALCULATED?

Calculating Green GDP is a complex task that requires data on various environmental indicators. These indicators can include air and water pollution levels, carbon emissions, deforestation rates, and the depletion of natural resources.



By quantifying the environmental impact of economic activities, economists can estimate the costs associated with environmental degradation. These costs can then be subtracted from the conventional GDP figure to arrive at the Green GDP.

5. GREEN GNP



Green GNP adjusts the Gross National Product (GNP) by accounting for the environmental costs associated with production, including the costs of resource depletion and environmental damage.

Like Green GDP, Green GNP aims to provide a more comprehensive understanding of economic well-being by including environmental factors.

Green GNP subtracts the environmental costs from GNP, reflecting a more sustainable level of national income.

Example: Suppose a country's GNP is \$1,800 billion, and the environmental degradation cost is \$300 billion: $\text{Green GNP} = 1800 - 300 = 1500$ billion

This indicates that the sustainable national income, after accounting for environmental costs, is \$1,500 billion.

6. DEPRECIATION (CAPITAL CONSUMPTION ALLOWANCE)

Depreciation represents the decrease in the value of capital goods due to wear and tear, obsolescence, or age.

Formula:

- $\text{NDP} = \text{GDP} - \text{Depreciation}$
- $\text{NNP} = \text{GNP} - \text{Depreciation}$



7. INDIRECT TAXES AND SUBSIDIES

- Indirect Taxes: Taxes on goods and services (e.g., sales tax, excise duty).
- Subsidies: Financial assistance given by the government to reduce the cost of goods and services.
- Net Indirect Taxes: Indirect taxes minus subsidies.

Formula: $\text{GDP at Factor Cost} = \text{GDP at Market Prices} - \text{Net Indirect Taxes}$

CONCLUSION

National income is a critical indicator of the economic health and overall performance of a country. It reflects the total value of goods and services produced, offering insights into the nation's wealth, productivity, and living standards. A rise in national income signifies economic growth, improved employment opportunities, and enhanced public welfare, while a decline often signals economic distress. Policymakers use national income data to formulate fiscal and monetary policies, drive investment decisions, and allocate resources effectively. Understanding national income helps in assessing income distribution, reducing inequalities, and ensuring sustainable development across sectors, contributing to long-term prosperity.