Fundamentals of Macroeconomics

Unit-6 LH 6

Part 1

National Income Accounting

Objective

- Concept of Circular Flow of Income
- Concept of GDP, GNP, NNP, NI, PI and Per Capita Income
- Difference and calculation of Real and Nominal GDP
- Calculation of GDP Deflator.
- Concept Measurement of National INcome: Product, Income and Expenditure Methods.
- Difficulties in measuring National Income.

Introduction

- Macroeconomics concerned with determination of
  - Total Output
  - Price Level
  - Level of Employment
  - Interest Rates etc.
- All the above can be understood from determination of National Income Accounting
- So, NI is the comprehensive measure of the level of aggregate economic activity in the economy.
- This chapter is about circular flow of income and expenditure.

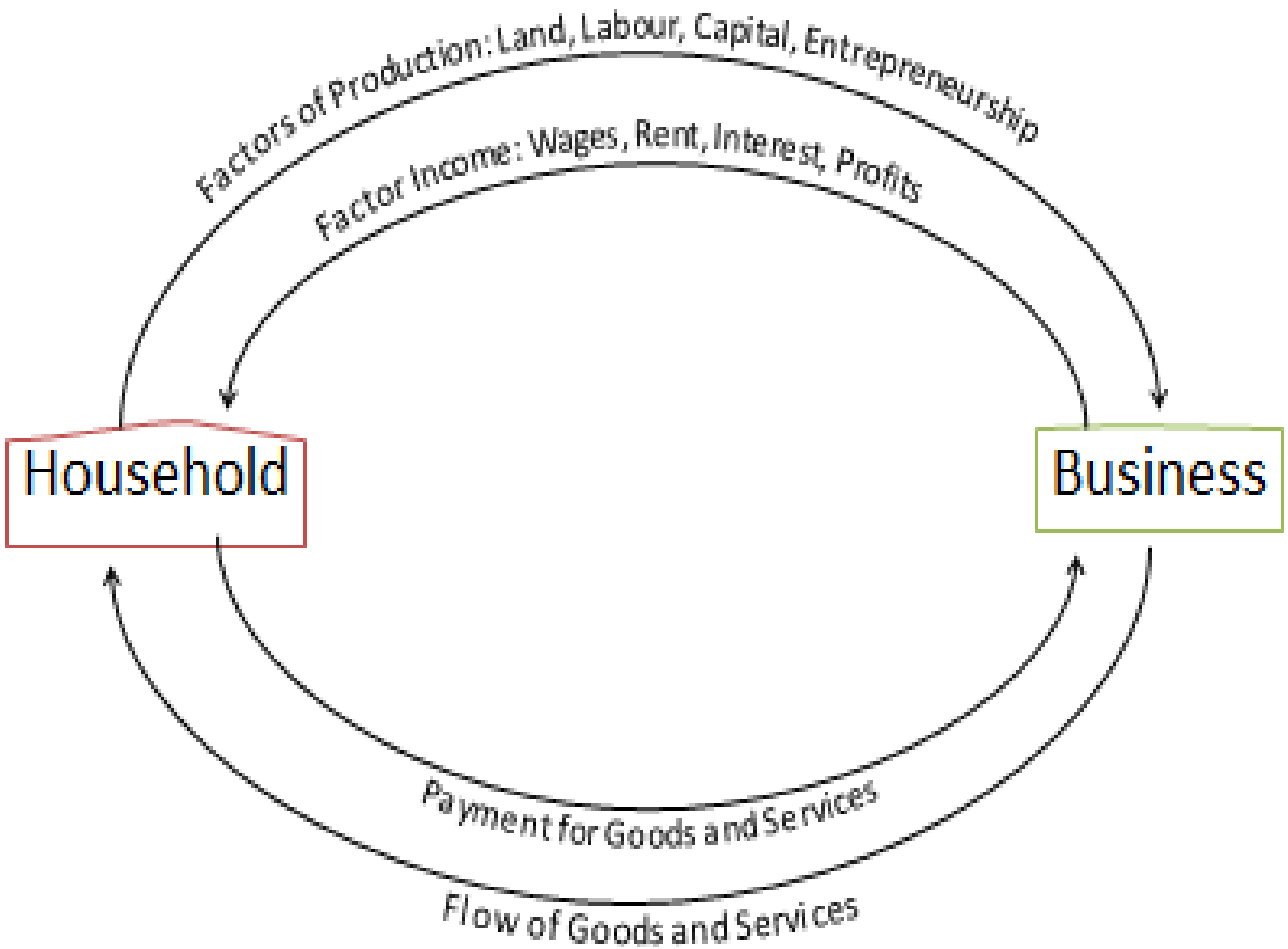
Concept of Circular Flow

- Circular flow refers to the flow of goods and services between different sectors of the economy, balanced by the flow of money payments made in exchange for those goods and services.
- Sectors of the economy:
  - Household
  - Business
  - Government
  - Foreign
- One sectors income is expenditure of another sector.

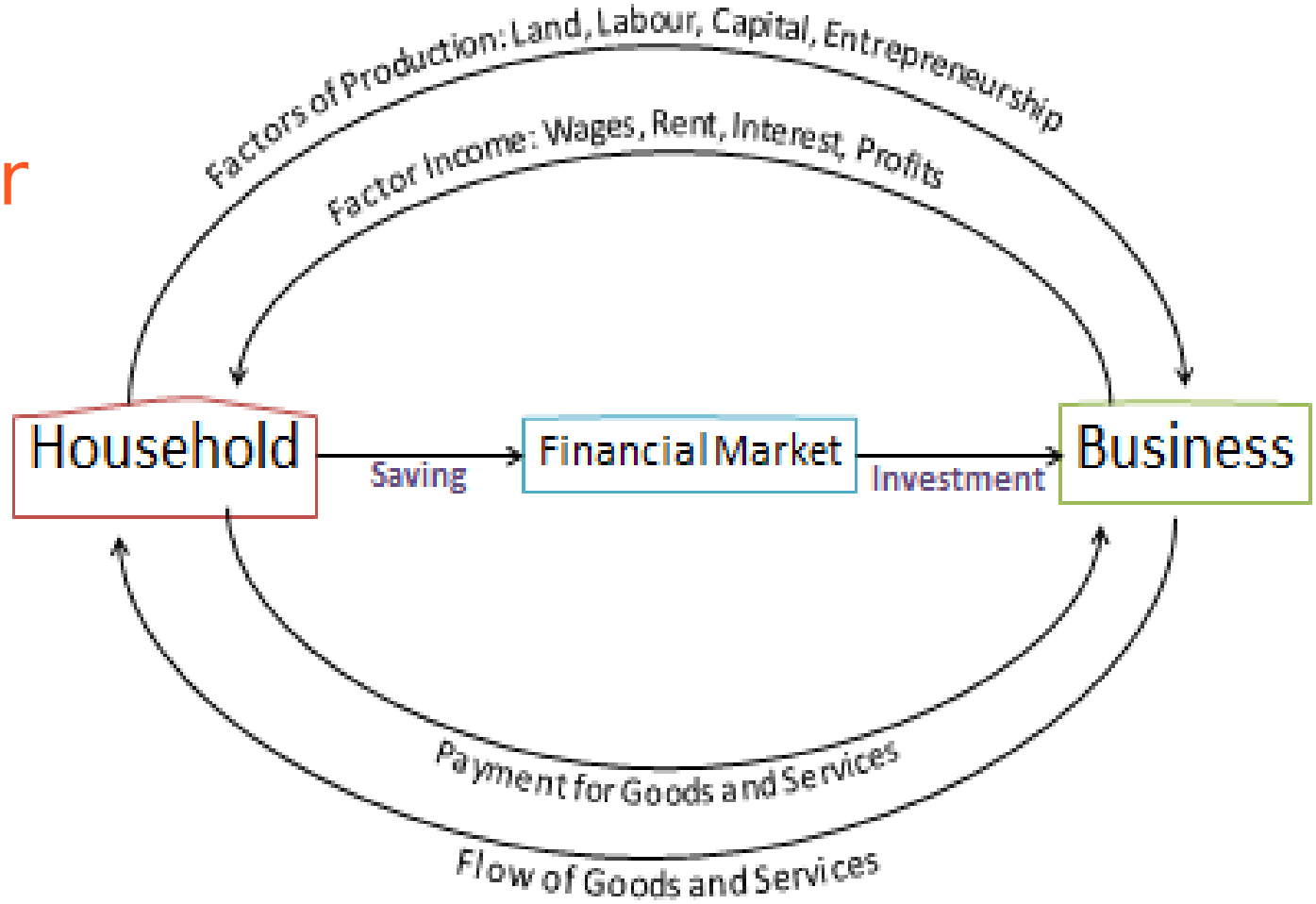
Two Sector Model of the Circular Flow of Income

- Household and Business Sector
- Assumption
  - Household spend all their income. No saving.
  - All output purchased by household.
  - No financial sector
  - No government sector
  - No foreign sector
  - It is a closed economy.

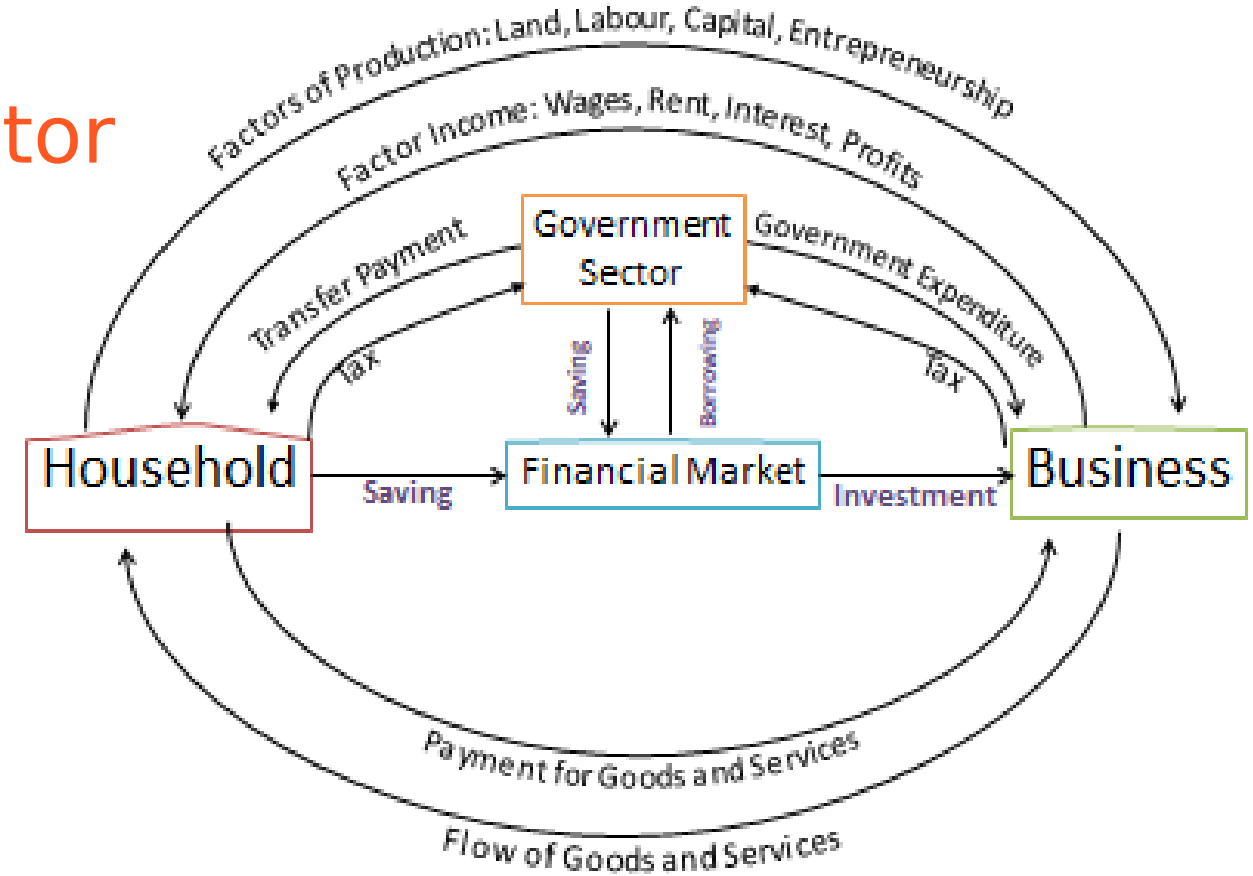
Two Sector Circular Flow Model



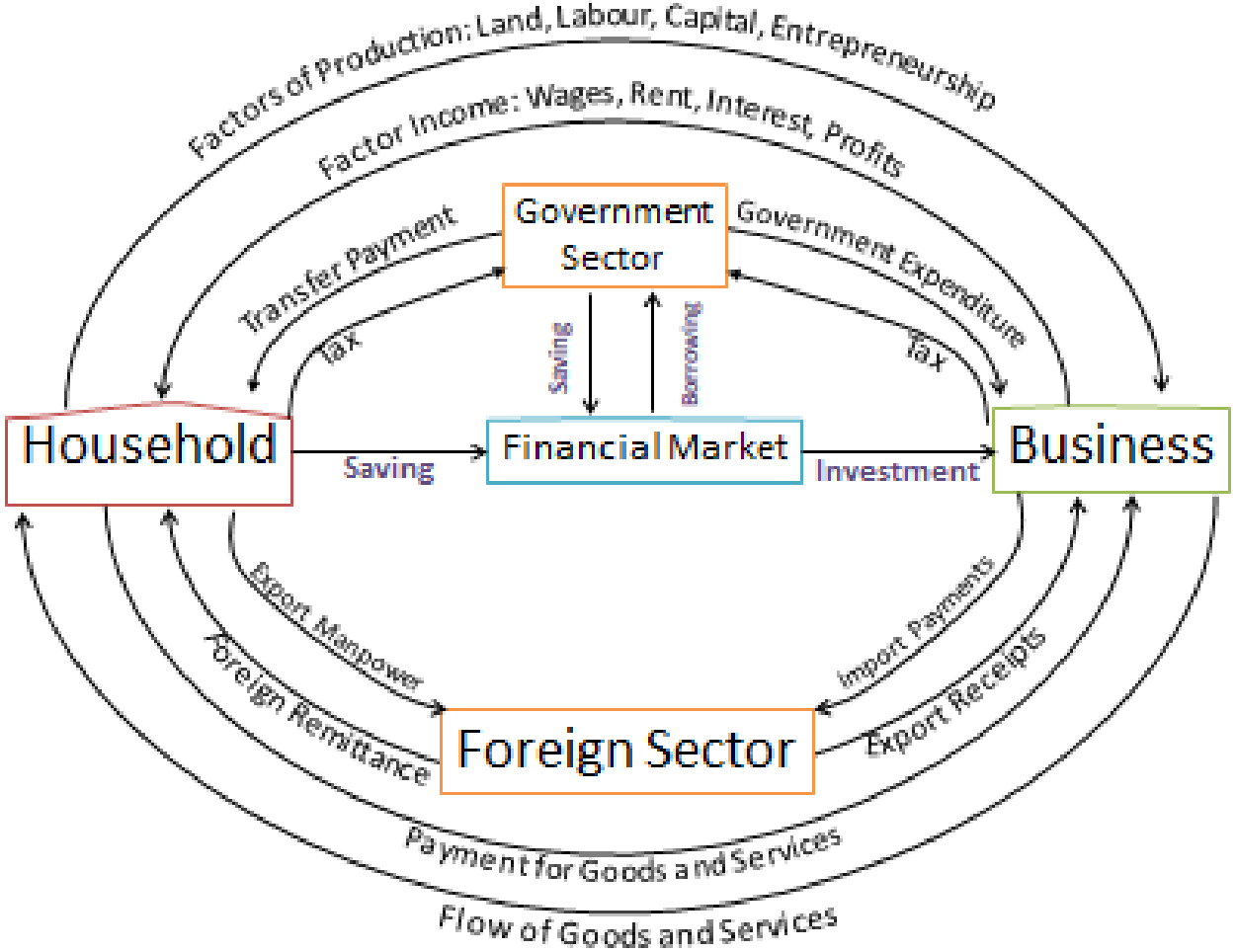
Two Sector Model



Three Sector Model



Four Sector Model



National Income

- Total value of final goods and services produced by a country, measured in terms of money.
- Summary statement of aggregate economic activities.
- Indicator of economic development.
  - Shows whether country’s economy is in growing stage or declining stage.
- Helps formulate economic plan and policies to the government.

Various Concepts of National Income

1. Gross Domestic Product at Market Price (GDP_{MP})

- GDP_{MP} is the total annual value of all the final goods and services produced within the domestic territory of a country.
- Includes income earned by foreigners but excludes income earned by nationals in foreign country.
- Does not include payments like pension, unemployment allowance, etc. and also capital gains or losses.
- **Calculated as per current market price.**

$$GDP_{MP} = P_1 \times Q_1 + P_2 \times Q_2 + \ldots\ldots\ldots\ldots + P_n \times Q_n$$

- **Expenditure Method** $GDP_{MP} = C + I + G$

Various Concepts of National Income

2. Gross Domestic Product at Factor Cost (GDP_{FC})

- Estimation of GDP in terms of factor earnings.
- Sum total of earnings received by various factors of production in terms of wages, interest, rent, profit within domestic territory.
- Market price differ from factor cost because of indirect taxes.
- **So, GDP_{FC} is calculated as**

  $GDP_{FC} = GDP_{MP}$ - *Net Indirect Taxes*

  Here, *Net Indirect Taxes = Indirect Taxes- Subsidies*

Various Concepts of National Income

3. Net Domestic Product at Market Price (NDP_{MP})

- It is the total annual value of all the final goods and services produced within the domestic territory of a country after making an allowance for depreciation.
- **So, NDP_{MP} is calculated as**

  $NDP_{MP} = GDP_{MP} - Depreciation$

3. Net Domestic Product at Factor Cost (NDP_{FC})

- It is the estimation of NDP in terms of factor earnings.
- Sum total of earnings received by various factors of production in terms of wages, interest, rent, profit, within the domestic territory of a country.
- Also called domestic factor income.
- **NDP_{FC} is calculated as**

  $NDP_{FC} = GDP_{FC} - Depreciation$

Various Concepts of National Income

5. Gross National Product at Market Price (GNP_{MP})

- Total annual value of all final goods and services produced by domestically owned factors of production. It does not matter where the output is actually produced.
- Here, income earned by nationals in foreign countries are added and income earned by foreigners in domestic countries is subtracted.
- **So, GNP_{MP} is calculated as**

  GNP_{MP}= GDP_{MP} - Net Factor Income from Abroad (NFIA)

Various Concepts of National Income

6. Gross National Product at Factor Cost (GNP_{FC})

- Estimation of GNP in terms of factor earnings.
- Sum total of earnings received by various factors of production in terms of wages, interest, rent, etc. by national residents of a country.
- Can be estimated by deducting net indirect taxes from GNP at Market Price
- **So, GNP_{FC} is calculated as**

$$GNP_{FC} = GNP_{MP} - Net\ Indirect\ Taxes$$

Various Concepts of National Income

7. Net National Product at Market Price (NNP_{MP})
    - During the production process, capital is consumed. The amount of used of capital is calculated in monetary terms called depreciation.
    - Depreciation is the loss of value.
    - **So, NNP_{MP} is calculated as**

$$NNP_{MP} = GNP_{MP} - Depreciation$$

8. Net National Product at Factor Cost (NNP_{FC})/ National Income (NI)
    - The market value of final goods and services include indirect taxes. We deduct them from **NNP_{MP}** and get national income or net national product at factor cost.
    - **So, NNP_{FC} is calculated as**

$$NNP_{FC} = GNP_{FC} - Depreciation$$

Also,

$$NNP_{FC} = NDP_{FC} + Net\ Income\ Factor\ from\ Abroad\ (NFIA)$$

Various Concepts of National Income

9. Personal Income (PI)

- It is the income earned by all individuals of a country from all the sources during a year.
- Refers to income that are only earned by individuals
- Deducts corporate income tax, undistributed profits, social security contribution and adding transfer payments.
- *PI = NI - Corporate income taxes - undistributed profit- social security contribution + transfer payment*

Various Concepts of National Income

10. Disposable Income (DI)

- The entire amount received by the individuals and households are not available for consumption. Some are paid in tax.
- So, income remaining after payment of direct taxes from personal income.
- *DI = PI - Direct taxes*
- *Also, DI = Consumption + Saving*

Various Concepts of National Income

11. Per Capita Income (PCI)

- The average earning of an individual in a particular year.
- Obtained by dividing national income of a country by its total population for the respective year.
- Shows the average living standard of the country. But unable to describe income inequality.

$$Per\ Capita\ Income = {National\ Income\ of\ a\ Country} \Big/ {Total\ Population\ of\ the\ Country}$$

Formula required for calculations

1. $GDP_{MP} = C + I + G + X-M$

    a. *Private Final Consumption Expenditure (C)*

    b. *Gross Private Domestic Investment (I) = Gross fixed Capital formation + Net change in Stock*

    c. *Government's final consumption expenditure (G)*

2. $GNP_{MP} = C + I + G + NFIA + X-M$

    b. *Net factor income from abroad (NFIA)*

Formula required for calculations

For DOMESTIC PRODUCT Calculations:

1. NDP_{FC}= *Compensation of Employees* + Interest + Rent + Profit + Mixed Income*
2. GDP_{FC}= NDP_{FC} + *Depreciation*
3. GDP_{MP} = GDP_{FC} + *Net Indirect Tax (NIT)*

For NATIONAL PRODUCT Calculations:

4. NNP_{FC}= *Compensation of Employees* + Interest + Rent + Profit** + Mixed Income + NFIA*
5. GNP_{FC}= NNP_{FC} + *Depreciation*
6. GNP_{MP}= GNP_{FC} + *NIT*

Note: *Compensation of Employees = Wages and Salaries + Employer's Compensation*

Formula required for calculations

For PERSONAL INCOME Calculations:

$$PI = NI \text{ or } NNP_{FC} - \text{Undistributed Profit- Corporate Tax - Social Security Contributions + Transfer Payments}$$

For DISPOSABLE INCOME Calculations:

$$DI = PI - \text{Personal Taxes}$$

Methods of Measurement of National Income

1. Expenditure Method

- Measures national income from expenditure perspective that are household, business, government and foreign sector.
- Expenditure made on those four sectors within territory of the country are added to calculate GDP.
- So, GDP by Expenditure Method formula is:

$$GDP_{MP} = C + I + G + (X-M)$$

  - *Private Final Consumption Expenditure (C)*
  - *Gross Private Domestic Investment (I) = Gross fixed Capital formation + Net change in Stock*
  - *Government's final consumption expenditure (G)*
- Here, all four sectors to estimate GDP is further explained as below:

Methods of Measurement of National Income

A. Personal Consumption Expenditure (C):

- Includes consumption expenditure for durable, non-durable goods and all kinds of services.

B. Gross Domestic Capital Formation or Investment (I)

- Includes Expenditure incurred by private enterprise on new investment and on replacement of old capital and also on inventory investment.
  - Gross domestic fixed capital investment/Gross Fixed Capital investment
    - Divided into Residential investment and Non Residential investment
  - Change in inventories or stock: Closing Stock - Opening Stock
- **I = Net Fixed Investment/Capital Formation + Changes in Inventories + Depreciation**

Methods of Measurement of National Income

C. Government (G):

- Expenditure made by the government on final goods or services, including those produced abroad.
- Security, administrative, infrastructures.
- But, **transfer payments are not included** because they are not part of government goods and services expenditure.

D. Net Export (X-M):

- Difference between exports and imports of goods and services.
- Value of export included and import excluded.

Net Factor Income from Abroad (R-P)

- **Needed for GNP calculations**
- It is the difference between factor income received from abroad by residents of a country for providing factor services and factor income paid to the foreign residents.

Methods of Measurement of National Income

2. Income Method

- This method is related to estimation of GDP and national income on the basis of sum of all factor incomes generated from all the productive sectors.
- Those factor incomes are in the form of compensation of employees, rent, interest, profits, etc.

For DOMESTIC PRODUCT Calculations:

- NDP_{FC} = *Compensation of Employees* + Interest + Rent + Profit + Mixed Income*
- GDP_{FC} = NDP_{FC} + *Depreciation*
- GDP_{MP} = GDP_{FC} + *Net Indirect Tax (NIT)*

Methods of Measurement of National Income

For NATIONAL PRODUCT Calculations:

1. *NNP_{FC}= Compensation of Employees* + Interest + Rent + Profit** + Mixed Income + NFIA*
2. *GNP_{FC}= NNP_{FC} + Depreciation*
3. *GNP_{MP}= GNP_{FC} + NIT*

Note: *Compensation of Employees = Wages and Salaries + Employer's Compensation*

Also, Corporate Profit = Dividend + Undistributed Profit + Corporate profit taxes

Methods of Measurement of National Income

Components of Income Method:

1. **Rent:** Includes rent of land, shops, houses, factories, etc., estimated rent of all assets used by owner themselves and royalty paid to authors and artists.
2. **Compensation of Employees:** All payments made by producers to employees including wages and salaries, bonus, commission, overtime, housing, medical and educational facilities and employer's contribution to social security.

   Compensation of Employees = Wages and Salaries + Employer's Compensation
3. **Net Interest Payments:** Payment made by business on borrowing of capital. It is interest earned by individual and firms from business and foreign resources minus interest paid by individuals and firms.

Methods of Measurement of National Income

Components of Income Method:

4. **Profits:** This basically includes corporate profits.
   Corporate Profit = Dividend + Undistributed Profit + Corporate profit taxes
5. **Mixed Income of Self Employed:** Income of own account workers like farmers, doctors, barbers, etc. and unincorporated businesses like repair shops, retailers, etc.
6. **Depreciation/ Capital Consumption Allowance/ Consumption of Fixed Capital:** Expenditure due to wear out and depreciation of machine, plants and equipment.
7. **NFIA:** Defined in previous slide.
8. **Net Indirect Taxes**: It is the difference between indirect taxes and subsidies.

Methods of Measurement of National Income

3. Product Method

- Also called inventory method.
- National income is measured from the output of the economy in a given period.
- Economy is divided into three sectors: Agriculture, Industrial and Tertiary. The final output of each sector in monetary value is summed up to find GDP.
- But due to problem of double counting two approaches is used

i. Final Goods Approach

- GDP includes market value of all final goods and services and excludes value of all intermediate goods. Intermediate goods are used to produce final goods. To avoid double counting only final produced goods for consumption is used.

ii. Value Added Approach

- Difference between value of material output and input at each stage of production is called value added.

Methods of Measurement of National Income

Value Added = Value of Output - Cost of Intermediate Goods

Example below:

Producer	Stage of Production	Value of Output	Cost of Intermediate Goods	Value Added
Farmer	Wheat	100	-	100
Miller	Flour	150	100	50
Baker	Bread	250	150	100
	Total	500	250	250

Nominal GDP, Real GDP and GDP Deflator

Nominal GDP :

It is the total monetary value of the final product in terms of current market prices produced from all productive sectors within a country during a year.

$$\textbf{Nominal GDP} = P_0Q_0 + P_1Q_1 + P_2Q_2 + \ldots\ldots\ldots\ldots\ldots + P_nQ_n$$

If the GDP rises from one year to the next, it means that either larger quantity of goods and services are produced or goods and services are sold at higher prices.

Real GDP:

To see if the economy is producing increased quantity of goods and services, the real GDP measurement is used.

Real GDP is the total monetary value of final goods and services produced from all productive sectors in terms of constant prices or base year prices within a country during a year.

$$\textbf{Real GDP} = P_0Q_0 + P_0Q_1 + P_0Q_2 + \ldots\ldots\ldots\ldots\ldots + P_0Q_n$$

Nominal GDP, Real GDP and GDP Deflator

GDP Deflator :

It measures the current level of prices relative to the level of prices in the base year. It tells the rise in nominal GDP that is an indicator of rise in prices rather than a rise in quantities produced.

$$GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP}\ x\ 100$$

GDP Deflator is a measure of inflation because real GDP is the change in quantity at base price at Nominal GDP whereas Nominal GDP is the change in price levels with quantity.

So,

$$Rate\ of\ Inflation\ =\ \frac{Change\ in\ GDP\ Deflator}{GDP\ Deflator\ in\ Previous\ Year} X\ 100$$

Problems with measuring National Income

Conceptual Difficulties

Conceptual difficulties relate to the definitions of national income.

1. **Definition of a nation:**
   - Although nation is fixed geographical boundaries but national income includes income received from other countries as well.
2. **Selection of Method:**
   - Each method (Product, Income, Expenditure) has limitation and no single method is adequate in measuring national income.
3. **Difference between final and intermediate goods:**
   - Difficult to differentiate final and intermediate goods. A good can be both final to some consumer while intermediate to other consumer. Example: flour.
4. **Change in price:**
   - Continuous fluctuation of price levels of goods and services makes measurement inconsistent.

Problems with measuring National Income

5. **Services without reward:**
   - Services like housewife contribution to family, volunteer teaching, etc. are not included despite their socio-economic value.
6. **Double Counting:**
   - Calculation of item more than once. When the intermediate goods produced are added to final product double counting error is observed which happens due to complex differentiation between intermediate and final goods. This make national income measurement complex and erroneous.
7. **Income of Foreign Companies:**
   - Difficult to count the foreign companies income because all their income may not move to foreign countries even the dividend is paid.
8. **Calculation of Depreciation:**
   - A machine with claimed life of 10 years and depreciated accordingly may run more or less.

Problems with measuring National Income

Practical Difficulties in Estimating National Income

1. **Existence of Barter System of Exchange:**
   - Still exists in many underdeveloped countries. These exchanges does not show up in National Income Data making difficult to correctly estimate the data.
2. **Unrealistic Statistics:**
   - In underdeveloped countries lack and fear of survey may tend participants to respond incorrect data either due to lack of knowledge or with intention of tax evasion. So, data is always doubtful.
3. **Lack of Occupational Classification:**
   - People may engage in more than one occupation for their livelihood. A multiple part time worker may provide data about his/her one job and hide others. Others involved in agriculture may work part time in urban area.

Problems with measuring National Income

Practical Difficulties in Estimating National Income

4. **Production of self-consumption:**
    - Subsistence farming output is not recorded and hence value of output produced may show less in National income data.
5. **Non-availability of Data:**
    - Small firms usually cannot keep records properly as they cannot hire professionals. So their income data may not be accurate.
6. **Illegal Business:**
    - Illegal business underestimates national income. For example: local liquor manufacturer selling alcohol data is not recorded.