

UNIT 6

National Income Accounting

(6 Hrs) — Applied Economics (CAEC353), BCA III/VI

⚠ Please Take Care — This May Contain Errors

These notes were prepared from the course syllabus and may contain errors, omissions or over-simplifications — including in numerical examples, diagrams, and Nepal-specific facts and figures (which change over time). Please take care: cross-check every formula, number and definition with your prescribed textbook, class notes and the official syllabus before relying on it for study or examination.

6.1 Circular Flow of Income and Expenditure

The **circular flow of income** shows how money income and real goods/services flow continuously between the sectors of an economy. Production creates income for the owners of factors of production; this income is spent on goods and services, which becomes the receipts of producers and pays for further production. Thus **income = output = expenditure**.

6.1.1 Two-Sector Economy (Households and Firms)

Assumptions: only households and firms; no government or foreign trade; households spend all their income (no saving); firms distribute all receipts as factor payments. **Households** own the factors of production and sell them to firms in the **factor market**, receiving wages, rent, interest and profit. They spend this income on goods and services in the **product market**. Thus $Y = C$, and the flow is continuous.

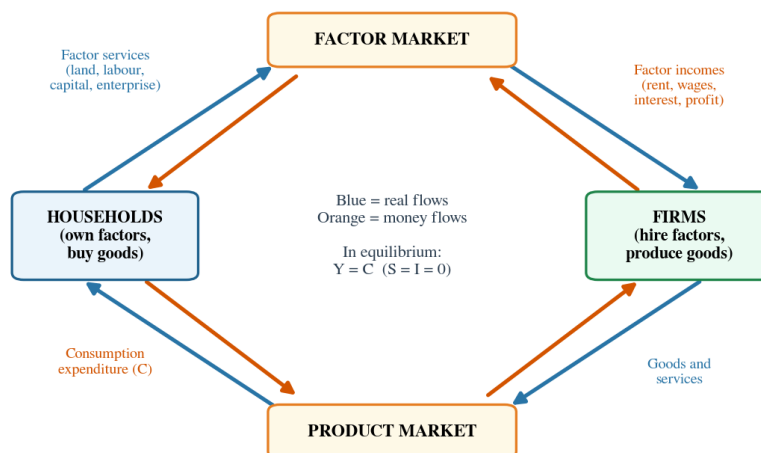


Figure 6.1 — Circular flow in a two-sector economy (real and money flows)

With saving and investment: if households save (S), part of income leaks out of the flow; the saving reaches firms via **financial markets** as investment (I), which is an injection. Equilibrium requires $S = I$ and $Y = C + I$.

6.1.2 Three-Sector Economy (Add Government)

The government **collects taxes (T)** from households and firms (a leakage), pays **transfers** to households, and **purchases goods and services (G)** from firms (an injection). Equilibrium: $Y = C + I + G$, and the leakage–injection condition is $S + T = I + G$.

6.1.3 Four-Sector (Open) Economy (Add Foreign Sector)

The foreign sector adds **exports (X)**, an injection (foreigners buy our goods), and **imports (M)**, a leakage (we buy foreign goods). Equilibrium:

$$Y = C + I + G + (X - M) \text{ and } S + T + M = I + G + X$$

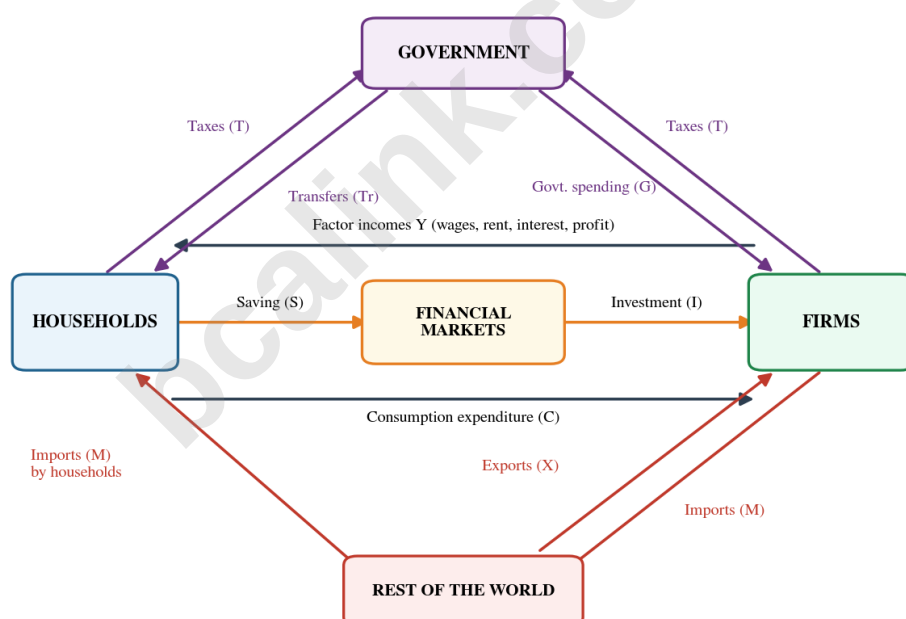


Figure 6.2 — Circular flow in a four-sector economy

Sector	Leakages (withdrawals) from the flow	Injections into the flow
Two-sector	Saving (S)	Investment (I)
Three-sector	S, Taxes (T)	I, Government spending (G)
Four-sector	S, T, Imports (M)	I, G, Exports (X)

Example 6.1 — Check the four-sector equilibrium

Given $C = 600$, $I = 200$, $G = 150$, $X = 100$ and $M = 80$ (Rs. million). Find income and verify that leakages equal injections.

Solution

$$Y = C + I + G + (X - M) = 600 + 200 + 150 + (100 - 80) = \mathbf{970}.$$

Since $Y = C + S + T$, $S + T = 970 - 600 = 370$. Leakages: $S + T + M = 370 + 80 = \mathbf{450}$.

Injections: $I + G + X = 200 + 150 + 100 = \mathbf{450} \checkmark$ — leakages equal injections, so income is in equilibrium.

6.2 Meaning and Different Concepts of National Income

National income in the broad sense is the total value of goods and services produced by an economy in a year (or the total income earned by its factors of production). It is a flow measured over a period and is the main yardstick of economic performance, growth and living standards. In Nepal the estimates are prepared by the **National Statistics Office (NSO)** on a fiscal-year basis.

Basic Terms

- **Final goods** are goods ready for use by the final consumer or investor; **intermediate goods** (used up in production) are excluded to avoid double counting.
- **Domestic** refers to production within the geographical boundary; **National** refers to production by the country's residents (nationals), wherever it takes place.
- **Gross** includes depreciation (capital consumption); **Net** excludes it.
- **Market price (MP)** includes indirect taxes and excludes subsidies; **factor cost (FC)** is the sum of incomes actually received by factors: $FC = MP - \text{indirect taxes} + \text{subsidies}$.
- **Net factor income from abroad (NFIA)** = income earned by nationals abroad – income earned by foreigners in the domestic economy.

6.2.1 Concepts and Formulas

Concept	Meaning	Formula
GDP (at market price)	Total market value of all final goods and services produced within domestic territory in a year.	$C + I + G + (X - M)$
GNP (at MP)	Value of output produced by nationals of the country, anywhere in the world.	$GDP + NFIA$

Concept	Meaning	Formula
NDP (at MP)	GDP after deducting the value of capital wear-and-tear.	$GDP - \text{Depreciation}$
NNP (at MP)	GNP after deducting depreciation.	$GNP - \text{Depreciation} = NDP + NFIA$
National income at factor cost (NI)	Total income earned by all factors of production (= NNP at factor cost).	$NNP \text{ at MP} - \text{Indirect taxes} + \text{Subsidies}$
Personal income (PI)	Income actually received by households (including transfers), before personal taxes.	$NI - \text{Corporate profit taxes} - \text{Undistributed profits} - \text{Social-security contributions} + \text{Transfer payments}$
Disposable personal income (DI)	Income households can spend or save.	$PI - \text{Personal (direct) taxes}; DI = C + S$
Per capita income (PCI)	Average income per person; a rough index of living standard.	$PCI = \text{National income (or GDP)} \div \text{Population}$

Note: GDP (domestic) and GNP (national) differ by NFIA. For countries with many workers abroad, such as Nepal, remittances are large; they appear in national accounts mainly as current transfers, so gross national disposable income (GNDI) is considerably higher than GDP. Check how your textbook treats remittances in GNP.

6.2.2 What Is (Not) Included in GDP

- **Excluded:** intermediate goods, transfer payments (pensions, scholarships, remittances as such), sale of second-hand goods (only the dealer's commission counts), purchase of shares/bonds, illegal activities, and most unpaid household work.
- **Included:** final goods and services, imputed rent of owner-occupied houses, output consumed by producers (e.g., subsistence farming, which is important in Nepal), government services valued at cost, and changes in inventories.

6.2.3 Limitations of GDP as a Measure of Welfare

- Excludes non-market activities and the informal economy; ignores leisure and quality of life.
- Does not show income distribution (inequality); PCI is only an average.
- Ignores environmental damage and depletion of resources.
- Includes 'bads' such as defence or clean-up spending; price changes distort nominal values (hence real GDP).

6.3 Real and Nominal GDP; GDP Deflator

Nominal (money, current-price) GDP values the current year's output at the **current year's prices**; it can rise merely because prices rise. **Real (constant-price) GDP** values the current output at the **prices of a base year**, removing the effect of inflation; it measures actual changes in output.

GDP deflator = $(\text{Nominal GDP} \div \text{Real GDP}) \times 100$. It is a price index covering all goods and services produced in the economy. **Real GDP** = $(\text{Nominal GDP} \div \text{GDP deflator}) \times 100$. The **growth rate** of real GDP = $(\text{Real GDP}_2 - \text{Real GDP}_1) / \text{Real GDP}_1 \times 100$ and the **inflation rate** (by deflator) = $(\text{Deflator}_2 - \text{Deflator}_1) / \text{Deflator}_1 \times 100$.

Example 6.2 — Real GDP and deflator

An economy produces only rice and mobile data. Year 1 is the base year.

Year 1: rice — price Rs. 40, quantity 100; data — price Rs. 10, quantity 200.

Year 2: rice — price Rs. 50, quantity 110; data — price Rs. 12, quantity 250.

Find nominal GDP and real GDP for both years, the GDP deflator, and the growth rates.

Solution

Year 1: nominal GDP = $40 \times 100 + 10 \times 200 = 4,000 + 2,000 = 6,000$; real GDP (base year) = 6,000; deflator = 100.

Year 2: nominal GDP = $50 \times 110 + 12 \times 250 = 5,500 + 3,000 = 8,500$.

Real GDP (year-1 prices) = $40 \times 110 + 10 \times 250 = 4,400 + 2,500 = 6,900$.

GDP deflator = $8,500 \div 6,900 \times 100 = 123.19 \rightarrow$ prices rose about 23.19%.

Nominal GDP growth = $(8,500 - 6,000) / 6,000 = 41.67\%$; **real GDP growth** = $(6,900 - 6,000) / 6,000 = 15\%$. Much of the nominal rise was due to inflation.

Note: In Nepal, real GDP growth is measured at constant prices of a chosen base fiscal year (currently 2010/11 in NSO series — verify the latest base year, as it is updated from time to time).

6.4 Computation of National Income

Since production creates income which is then spent, national income can be measured at three stages of the circular flow. In principle all three give the **same** result (in practice, statistical discrepancies exist).

Method	Measures	Basic idea
Product (value-added / output) method	Output stage	Sum of value added by all productive units

Method	Measures	Basic idea
Income method	Income distribution stage	Sum of factor incomes earned by all factors
Expenditure method	Spending stage	Sum of final expenditure on domestic output

6.4.1 Product (Value-Added) Method

Value added = value of output – value of intermediate consumption. GDP is the sum of gross value added of all sectors — agriculture, industry and services (plus taxes less subsidies on products for GDP at market price). Summing final goods, or the value added at each stage, avoids **double counting**.

Example 6.3 — Value added

A farmer sells wheat for Rs. 40 to a miller; the miller sells flour for Rs. 70 to a baker; the baker sells bread to consumers for Rs. 100. Compute GDP contribution.

Solution

Value added: farmer = $40 - 0 = 40$; miller = $70 - 40 = 30$; baker = $100 - 70 = 30$. Sum = **Rs. 100** = value of final good (bread). Adding all sales ($40 + 70 + 100 = 210$) would double count.

6.4.2 Income Method

Sum of incomes of all factors: **compensation of employees (wages and salaries), rent, interest, profit, and mixed income** of self-employed. This gives **net domestic product at factor cost**. Adding **net indirect taxes** gives NDP at market price; adding **depreciation** gives GDP at MP; adding **NFIA** gives GNP.

6.4.3 Expenditure Method

GDP = C + I + G + (X – M) where C = private consumption expenditure, I = gross domestic investment (fixed capital formation + change in inventories), G = government final consumption expenditure, X = exports of goods and services, M = imports.

Example 6.4 — Three methods for one economy (Rs. million, hypothetical data)

Expenditure data: C = 600, I = 200, G = 150, X = 100, M = 80.

Income data: wages 480, rent 60, interest 50, profits 130, mixed income 100; indirect taxes 90, subsidies 10; depreciation 70; NFIA = 30.

Product data: value added — agriculture 230, industry 190, services 550.

Find GDP (MP) by each method and then GNP, NNP, NI. Additional data: corporate profit taxes 40, undistributed profits 30, social-security contributions 20, transfer payments 60, personal taxes 100.

Solution

Expenditure method: $\text{GDP(MP)} = 600 + 200 + 150 + (100 - 80) = 970$.

Income method: $\text{NDP at FC} = 480 + 60 + 50 + 130 + 100 = 820$; + net indirect taxes $(90 - 10 = 80) = \text{NDP at MP } 900$; + depreciation 70 = **GDP(MP) 970 ✓**.

Product method: $230 + 190 + 550 = 970 \checkmark$ (all three agree).

$\text{GNP(MP)} = \text{GDP} + \text{NFIA} = 970 + 30 = 1,000$. $\text{NNP(MP)} = 1,000 - 70 = 930$. $\text{NI (NNP at FC)} = 930 - 80 = 850$ (check: $\text{NDP at FC } 820 + \text{NFIA } 30 = 850 \checkmark$).

$\text{PI} = \text{NI} - \text{corporate taxes} - \text{undistributed profits} - \text{social security} + \text{transfers} = 850 - 40 - 30 - 20 + 60 = 820$. $\text{DI} = \text{PI} - \text{personal taxes} = 820 - 100 = 720$. $\text{Saving} = \text{DI} - \text{C} = 720 - 600 = 120$.

Illustration of per capita income (separate, illustrative figures): if $\text{NI} = \text{Rs. } 850 \text{ billion}$ and $\text{population} = 30 \text{ million}$, $\text{PCI} = \text{Rs. } 850,000 \text{ million} \div 30 \text{ million} \approx \text{Rs. } 28,333 \text{ per person}$.

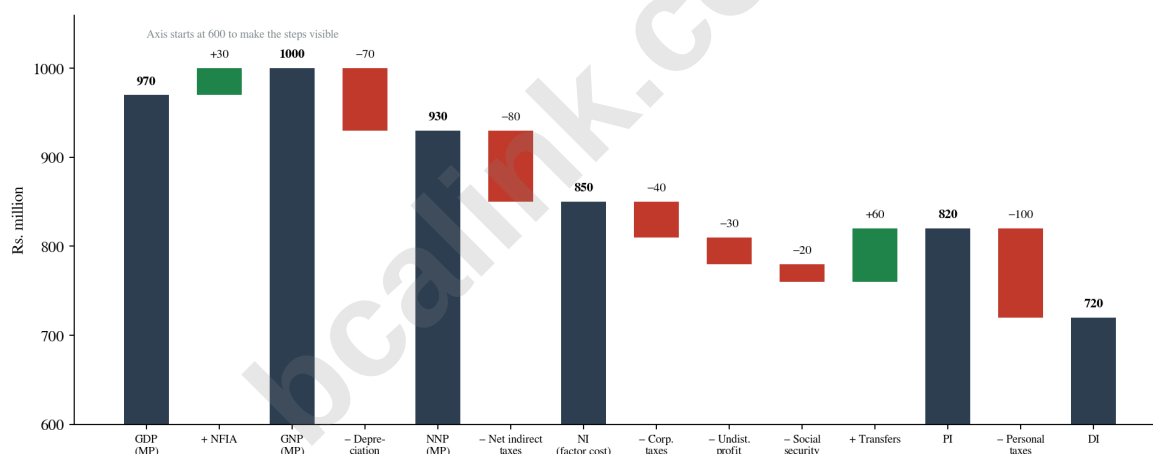


Figure 6.3 — From GDP to disposable income (Example 6.4)

6.4.4 Numerical Exercise Using Excel

Cell	Content	Formula
B2:B6	C, I, G, X, M	600, 200, 150, 100, 80
B8	GDP (expenditure)	=B2+B3+B4+(B5-B6)
E2:E6	Wages, rent, interest, profit, mixed income	480, 60, 50, 130, 100
E8	NDP at factor cost	=SUM(E2:E6)
E9	GDP (income method)	=E8+(90-10)+70
B10	GNP	=B8+30 (NFIA in a separate cell is better)

Cell	Content	Formula
B11, B12	NNP and NI	=B10-70 ; =B11-80
B13	Disposable income	=B12-40-30-20+60-100
G2:G3	Real GDP, deflator	=SUMPRODUCT(P_base,Q_new) ; =Nominal/Real*100
G4	Real growth rate	=(Real2-Real1)/Real1

Note: Use named ranges or absolute references for base-year prices and use SUMPRODUCT to compute nominal and real GDP directly from price and quantity columns.

Key Takeaways — Unit 6

- ✓ Circular flow: two-sector $Y = C (+ I \text{ with } S = I)$; three-sector adds G and T ; four-sector adds X and M . Leakages ($S + T + M$) = injections ($I + G + X$) at equilibrium.
- ✓ $GNP = GDP + NFIA$; $NDP = GDP - \text{depreciation}$; $NI = NNP(MP) - \text{indirect taxes} + \text{subsidies}$; $PI = NI - \text{undistributed profit, corporate tax, social security} + \text{transfers}$; $DI = PI - \text{personal tax}$; $PCI = NI \div \text{population}$.
- ✓ Nominal GDP uses current prices; real GDP uses base-year prices; GDP deflator = nominal $\div$ real $\times 100$.
- ✓ National income is measured by the product (value added), income and expenditure methods; all should give the same total.
- ✓ GDP has limitations as a measure of welfare (distribution, environment, non-market activity).

— End of Unit 6 —

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