

National Income: Concepts and Measurement

INTRODUCTION

As noted in Chapter 1, macroeconomics deals with national aggregates like gross national product, employment, price levels, consumption and investment, money supply and demand, balance of payments, and so on. Of these, the gross national product (*GNP*) is the most important macro variable. The *GNP* is, in fact, the source and pivot of all macro variables. For instance, the level of employment in a country depends largely on the level of *GNP*; given the money supply, price level depends on the change in *GNP*; the levels of consumption and savings are determined mainly by the *GNP*, and so on. Understanding the concept and measure of *GNP* is, therefore, an essential element in the study of macroeconomics. Therefore, we begin our study of macroeconomics with a brief discussion on the concept of national income, methods of its measurement and the related aggregates, both flow and stock.

3.1 NATIONAL INCOME AND RELATED CONCEPTS

National income is, broadly speaking, the money value of all final outcome of all economic activities of the people of a country. The term 'national income' is however used in a variety of senses depending on (i) what is included in and excluded from the national income concept, and (ii) what method is used for estimating national income. Macroeconomic analyses use different concepts and measures of national income—mainly Gross National Product (*GNP*) and Gross Domestic Product (*GDP*). Therefore, we discuss here briefly the various concepts of national income and the related macro variables used in macroeconomics.

Gross National Product (*GNP*)

The gross national product (GNP) is defined as the sum of market value of all final goods and services produced in a country during a specific period of time, generally one year. The 'market value' of the final 'national product' is the money value of all final goods and services. The market value of the national output is obtained at both *constant* and *current* prices. Accordingly *GNP* is known as '*GNP at constant prices*' and '*GNP at current prices*'.

respectively.' (Measuring *GNP* as 'the market value of all final goods and services' is beset with the problems of (i) determining what is 'final' and what is not, to avoid the problem of double counting, (ii) evaluation of non-marketed goods and services, e.g., farm products produced and consumed by farmers themselves and rental value of owner-occupied houses, etc., (iii) accounting for incomes from illegal activities and professions, e.g., smuggling, production and sale of prohibited goods like narcotics and arms, etc., (iv) unsold stocks and inventories, and (v) distortion of prices due to indirect taxes.) National income estimating agency (e.g., CSO in India) finds ways and means to account for these problems.

Alternatively, the *GNP* can also be defined and measured as the *sum of all factor payments* (wages, interest, rent, profits and depreciation). It is then called '*GNP at factor cost.*'

Gross Domestic Product (GDP)

The Gross Domestic Product (*GDP*) is another measure of national income which often figures in macroeconomic analysis and policy formulations. The concept of *GDP* is similar to that of *GNP* with a significant difference, of course. *The concept of GNP includes the income of the resident nationals which they receive abroad, and excludes the incomes generated locally but accruing to the non-nationals.* In case of *GDP*, however, it is just the otherway round. *The GDP includes the incomes locally earned by the non-nationals and excludes the incomes received by the resident nationals from abroad.* A comparative definition of *GNP* and *GDP* is given below.

GNP = Market value of domestically produced goods and services
 plus incomes earned by the residents of a country in foreign countries
 minus incomes earned by the foreigners in the country.

GDP = Market value of goods and services produced by the residents in the country
 plus incomes earned in the country by foreigners
 minus incomes received by residents of a country from abroad.

Net National Product (NNP)

Net National Product (*NNP*) is another concept of national income often used in macroeconomic analyses. The concept of *NNP* is closely related to the concept of *GNP*. The concept of *GNP* includes the output of both final consumer and capital goods. However, a part of capital goods is used up or consumed in the process of production of these goods. This is called *depreciation* or capital consumption. While *GNP* is gross of depreciation, *NNP* is net of depreciation. *NNP* is obtained by subtracting depreciation from *GNP*. That is,

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

The *NNP* is the measure of national income which is available for consumption and net investment to the society. The *NNP* is, in fact, the actual measure of national income. The *NNP* divided by the population of the country gives the per capita income.

Personal Incomes (PI)

Personal income (PI) can be defined as the sum of all kinds of incomes received by the individuals from all sources of incomes. Personal income includes wages and salaries, fees and commission, bonus, fringe benefits, dividends, interest earnings and earnings from self-employment. It includes also transfer incomes like pensions, family allowances, unemployment allowances, sickness allowances, old age benefits and social security benefits.

Personal Income and NNP. It is important to note here that the sum of personal incomes is not exactly the same as *NNP*. The reason is that *NNP* excludes certain items included in personal incomes and it includes some other items not included in personal incomes. *NNP* does not include many items of personal income, for example, transfer payments like social security benefits, pensions, old age allowances, and such other benefits. And, it includes undistributed profits of private companies, surpluses of public undertakings, and rentals of the public properties. However, *NNP* can be measured by making some additions to *PI*.

$$NNP = PI + UDP + SPU + RPP$$

(where *UDP* = undistributed company profits; *SPU* = surplus of public undertakings; *RPP* = rentals of public properties.

National Income Concepts Summarised

1. *GNP* = Market value of final goods and services (including both consumer and capital)
 plus incomes earned by the national residents in foreign countries
 minus incomes earned locally but accruing to foreigners
2. *GDP* = Market value of goods and services produced by the residents in the country
 plus incomes earned locally by foreigners
 minus incomes received by the nationals from abroad.
3. *NNP* = *GNP* - Depreciation (or Capital Consumption)
4. *PI* = *NNP* - (Undistributed Company Profits + Surplus of Public Undertakings + Rentals of Public Property)
5. Disposable income (Y_d) = *PI* - Personal Taxes

Some Accounting Relationships

1. *GNP* at factor cost *plus* net indirect taxes *less* depreciation = *GNP* at market price
2. *GNP* (at market price) *less* depreciation = *NNP* at market price
3. *NNP* at market price *less* indirect taxes *add* subsidies = *NNP* at factor cost

The GNP Deflator and its Application

The GNP deflator is essentially an adjustment factor which is used to convert nominal GNP into real GNP. The GNP deflator is the ratio of price index number (PIN) of a chosen year to the price index number of the base year (PIN) of the base year = 100). The chosen year is the year whose real GNP is to be estimated. The method of working out GNP deflator is given below.

$$\text{GNP Deflator} = \frac{\text{PIN of the chosen Year}}{100}$$

The formula for converting nominal GNP of a year into real GNP may be written as follows.

$$\text{Real GNP} = \frac{\text{Nominal GNP}}{\text{GNP Deflator}}$$

or

$$\text{Real GNP} = \frac{\text{Nominal GNP}}{\text{PIN}_{cy}/100}$$

(where PIN_{cy} is the price index number of the chosen year).

For the application of GNP deflator, look at the national income estimates of India given in Table 3.1. Let us suppose, for example, that we want to know the real GNP of India for 1999–2000. As the Table shows nominal GNP for 1999–2000 is given at Rs 1740207 billion and WPI for the year is given at 145 (the base year PIN being 100). Given this data, the GNP deflator for the year 1999–2000 can be worked out as follows.

$$\text{GNP Deflator (1999–2000)} = \frac{\text{PIN in 1999–2000}}{100} = \frac{145.3}{100} = 1.453$$

Having worked out the GNP deflator, we can now estimate real GNP for 1999–2000 as follows.

$$\text{Real GNP (1999–2000)} = \frac{\text{Rs 1740207}}{1.453} = \text{Rs 1197664.83 billion}$$

Note that the amount Rs 1197665 billion (approximately) is only about 5% different from the actual estimate of Rs 1136898 billion in year 1999–2000. The difference might have arisen due to discrepancy in national income data or change in the base of WPI.

GNP Implicit Deflator

Another variant of GNP deflator is GNP implicit deflator, also called implicit price deflator. It is the ratio of nominal GNP to real GNP, i.e.,

$$\text{GNP Implicit Deflator} = \frac{\text{Nominal GNP}}{\text{Real GNP}}$$

The GNP implicit deflator can be used for the following purposes: (i) to construct price index number, and (ii) to measure the rate of change in prices.

For instance, as shown in Table 3.1, in 1999-2000, the nominal *GNP* was at Rs 1740207 billion and the real *GNP* was at Rs 1136898 billion. In that case,

$$\text{GNP Implicit Deflator} = \frac{1740207}{1136898} = 1.530$$

The *GNP* implicit deflator multiplied by 100 gives an approximate price index. That is,

$$\begin{aligned} \text{PIN (1999-2000)} &= 1.530 \times 100 \\ &= 153.00 \end{aligned}$$

This is an approximate price index number for the year 1999-2000. It can be seen from Table 3.1 that this number is fairly close to WPI (= 145.3) in 1999-2000.

Similarly, price index number for 2000-01 may be computed as

$$\begin{aligned} \text{PIN (2000-01)} &= (1878429/1181483) \times 100 \\ &= 158.99 \end{aligned}$$

Once *PINs* for different years are worked out, the same can be used to compute the change in price level—the rate of inflation or deflation. For example, a rough estimate of the rate of inflation in India between 1999-2000 and 2000-01 can be obtained as follows.

$$\begin{aligned} \text{Rate of inflation} &= [(PIN_{2000-01} - PIN_{1999-00})/PIN_{1999-00}] \times 100 \\ &= [(158.99 - 153.00)/153.00] \times 100 \\ &= 3.92 \% \end{aligned}$$

3.3 METHODS OF MEASURING NATIONAL INCOME

The process of income generation in a modern economy is an extremely complex process. Measuring *GNP* is therefore an extremely complicated and gigantic task. The economists¹ have however devised a system of estimating national income. The basic approach is to measure the two kinds of flows that economic activities generate, viz. *product flows* and *money flows*. The money flows can be looked upon from two angles: (i) money flow as factor payments, and (ii) money flow as payments for goods and services. Accordingly, there are three approaches to measuring national income, viz. (i) product flow approach, (ii) factor income approach, and (iii) expenditure approach. Based on these approaches, there are three methods of measuring national income:

(i) Net product method,

¹ Many economists consider the concept of *GNP* as one of the great inventions of the twentieth century. Though the invention of the *GNP* concept is not attributed to any one economist, Simon Kuznets of Harvard University, is accredited with pathbreaking work on *GNP* measurement for which he was awarded the Nobel Prize. For details, see his *National Income and Its Composition*, (New York, National Bureau of Economic Research, 1941).

- (ii) Factor income method, and
- (iii) Expenditure method.

All these methods are, in fact, used to measure the gross domestic product (*GDP*). The estimated *GDP* is then adjusted for net income from abroad to arrive at *GNP*. The three methods of measuring *GDP* based on three approaches are briefly described below. The treatment of net income from abroad is discussed in the following section.

Net Product Method

The *net product method* is also called the *value added method*. This method consists of three stages: "(i) estimating the gross value of domestic output in the various branches of production; (ii) determining the cost of material and services used and also the depreciation of physical assets; and (iii) deducting these costs and depreciation from gross value to obtain the net value of domestic output..."²

Measuring Gross Value. For measuring gross value of domestic product, output is classified under various categories. The classification of products varies from country to country depending on (i) the nature of domestic activities, (ii) their significance in aggregate economic activities, and (iii) the availability of requisite data. For example, seventy-one divisions and sub-divisions were sometime ago used in the US to classify the national output; in Netherlands the classification ranges from a dozen to a score; and only half-a-dozen classifications were used in Russia. According to the CSO publications, fifteen sub-categories of products are currently used in India.

After classifying the output in appropriate categories, the gross value of output of each category is computed by any of the two alternative methods: (i) by multiplying the output of each category or sector by their respective market prices and adding them together, (ii) by collecting the data on gross sales and inventories from the records of the companies and adding them up. If there are gaps in data, necessary adjustments in estimates are made therefore through interpolations.

Estimating Cost of Production. The next step in estimating the net national product is to estimate the intermediate cost of production including depreciation. Estimating cost of production is often a complicated and difficult task because of non-availability of necessary cost data. Much more difficult is the task of estimating depreciation as it involves both conceptual and statistical problems. For this reason, many countries adopt factor income method for estimating their national income.

However, countries adopting net product method find some ways and means to compute the deductible costs. The costs are computed either in

² Paul Studenski, *The Income Nations—Part Two: Theory and Methods*, (New York University Press, 1958).

absolute terms (where input data are adequately available) or as an overall ratio of input to the output. For estimating depreciation, the general practice is to follow the business practice of depreciation accounting. Conventionally, depreciation is estimated as some percentage of cost of capital permissible under the tax laws. In some countries, depreciation is estimated as some percentage of output rather than as a percentage of cost of capital. The estimated costs are then deducted from the estimated sectoral gross output to obtain the net sectoral product. The net sectoral products are then added together to obtain the national net product.

Factor Income Method

The factor income method is also known as *factor share method*. In this method, the national income is treated to be equal to all the "incomes accruing to the basic factors of production used in producing the national products." The factors of production are traditionally categorized as land, labour, capital and organisation. Accordingly, the national income is treated as the sum of factor payments, viz., rent, wages, interest, and profits, respectively, plus depreciation. Thus,

$$\text{National Income (GDP)} = \text{Rent} + \text{Wages} + \text{Interest} + \text{Profit} + \text{Depreciation}$$

In a modern economy, however, it is conceptually very difficult to distinguish between earnings from land and capital and between the earnings of ordinary labour and entrepreneurial efforts. For the purpose of estimating national income, therefore, factors of production are broadly grouped as labour and capital. Accordingly, the national income is supposed to originate from two primary factors—labour and capital. In some productive activities however, labour and capital are jointly supplied by the same person and it is very difficult to separate the labour and capital income contents from the total earning of the supplier. Such incomes are, therefore, termed as *mixed incomes*. Thus, the national income is considered to be comprised of three components : (i) labour incomes, (ii) capital incomes, and (iii) mixed incomes. These factor incomes have some specific connotation discussed below.

Labour Incomes Labour incomes include: (a) wages and salaries (including commission, bonus and social security payments) paid to the residents of the country; (b) supplementary labour incomes including employer's contribution to social security and employee's welfare funds and direct pension payments to retired employees³; and (c) supplementary labour incomes **paid in kind**, for example, free-of-cost health care, education, food, clothing, accommodation, and servant facility.

³. Conventionally, pension to the retired employees is considered to be a 'transfer payment' and is excluded from labour income and the national income accounting. In the US, however, this item is included in national income. For details, see Studenski, *op. cit.*, pp. 11 and 118-20.

Transfer payments like old-age pensions, service grants, compensation to war-affected people, etc. are not included in labour incomes and labour incomes from incidental jobs, gratuities, tips, and so forth are ignored for lack of data.

Capital Incomes. According to Studenski⁴, capital incomes include: (a) dividends excluding inter-corporate dividends, (b) undistributed before-tax profits of corporations, (c) interest on bonds, mortgages and saving deposits (but not on war bonds and consumer credits), (d) interest earned by insurance companies and credited to the insurance policy reserves, (e) net interest paid out by commercial banks, (f) net rents from land building, including imputed net rents on the owner occupied dwellings, (g) royalties, and (h) profit of the government enterprises.

The data for the first two items are obtained mostly from the books of accounts submitted by the corporations to the tax authorities for tax assessment purpose. Incidentally, the definition of profit used for national accounting purposes differs from one used by the tax authorities. Some adjustment in data, that is, some additions and some deductions are made in the assessment of profits in regard to (i) the excessive allowance of depreciation, if any, made by the tax authorities, (ii) elimination of capital gains and losses because these items do not reflect the change in the current output; and (iii) elimination of under- or over-valuation of inventories on book values.

Mixed Incomes. Mixed incomes include earnings from: (a) farming enterprises, (b) sole proprietorship (not included under profit and capital incomes), (c) other professions, including legal and medical practice, consultancy services, trading and transportation, and (d) mixed incomes of those who earn their living from various sources, including wages, rent on own property, interest on own capital and so forth.

All the three kinds of incomes, viz., labour incomes, capital incomes, and mixed are added together to obtain the estimate of the national income by factor-income method.

Expenditure Method

The expenditure method, also known as the *final product method*, measures national income at the final expenditure stage. In order to estimate the aggregate expenditure, any of the following two methods may be followed.

- (i) *Income Disposal Method.* Under this method, all the money expenditures at market prices are added up together to obtain the total final expenditure.
- (ii) *Product Disposal Method.* Under this method the value of the products finally disposed of are computed and added together. This gives

⁴ Paul Studenski, *op. cit.*, pp. 118–20.

a measure of the total final expenditure and, hence, a measure of the national income by expenditure method.

Under the *first method*, the items of expenditure that are taken into account are: (i) private consumption expenditure, (ii) direct tax payments, (iii) payments made to the non-profit institutions and charitable institutions like schools, hospitals, orphanage, etc., and (iv) private savings (or investments). Under the *second method*, the following items of expenditure are included (i) private consumer goods and services, (ii) private investment goods, (iii) public goods and services, and (iv) net investment abroad.

The second method is far more extensively used compared to the first method because the data required by the second method can be collected with greater ease and accuracy.

3.4 TREATMENT OF NET INCOME FROM ABROAD

As mentioned above, the three methods of estimating national income give the measure of *GDP* pertaining to a closed economy. In reality, however, most modern economies are, 'open economies' in the sense that they have trade relations and other economic transactions with the rest of the world. In the process, some countries make net gains and some net losses. The net gains and losses are, in fact, additions to or deductions from the national income stream. Therefore, in estimating the national income, net incomes from abroad are added to *GDP* and net losses are subtracted from *GDP* to arrive at the national income figure of an open economy. It is important to note here that *GDP* adjusted for net income from abroad is called Gross National Income (*GNI*).

In practice, all the exports of merchandise and of services like shipping, insurance, banking, tourism and gifts are added to the national income. All the imports of goods and services like shipping, insurance, banking, tourism and gifts are subtracted from the national income. The final outcome of these adjustment is a measure of the national income.

SUGGESTED READINGS

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