

GNP:

Gross national product or GNP may be defined as the total market value of all-final goods and services produced by the economy of a country within a certain period (generally one year). It doesn't include nonproductive transactions (i.e. sale of stock and bond).

Characteristics of GNP:

1. It has monetary value.
2. Flow variable.
3. It has three aspects:
 - a) Production.
 - b) Income.
 - c) Expenditure.
4. It only includes final goods and services.
5. It doesn't include transfer payments.

Three important macroeconomics concepts are output, income and expenditure. Firms produce goods and services, which in total are the nation's output. Productions require factors of production whose owners are paid for their services and properties. It thus generates income. Expenditure is the amount required to purchase goods and services.

There are three methods of measuring GNP corresponding to these three concepts and they are:

1. Product method.
2. Income method.
3. Expenditure method.

Product method: According to this method the value of the output of each firm is added up to get the total value of nation's output. The output can be grouped into more or less aggregated categories corresponding to industries, to sectors or to any desired categories. It includes only the final goods and services. Symbolically this method can be expressed as:

$$\text{GNP} = P_1Q_1 + P_2Q_2 + \dots + P_nQ_n \\ = \sum P_iQ_i$$

Here, P => Price Q => Quantity i = number of sectors in the economy.

The advantage of this method is that it reveals the importance of different sectors of the economy by showing their contribution to national income.

Income method: This method approaches the nation's GNP from the distribution side. According to this method GNP is obtained by summing up the incomes of the individuals in the country who contribute their services and properties in the production process. It can indicate the distribution of national income among the factors of production. Symbolically this method can be expressed as:

$$\text{GNP} = \text{TR} + \text{TW} + \text{TI} + \text{TP}$$

Where TR = Total rent.

TW = Total wage.

TI = Total interest.

TP = Total profit.

Expenditure method: This method arrives at the GNP by adding up the expenditure made by the individuals on goods and services. Hence GNP is found by adding up

1. Personal consumption expenditure (i.e. household expenses)
2. Gross private domestic investment (i.e. Purchases of new capital by business firms.
3. Net foreign investment. (i.e. Excess export over import)
4. Govt. expenditure (i.e. Purchases by the govt.)

Symbolically this method can be expressed as:

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

Where C = Consumption.

I = Investment.

G = Govt. expenditure.

X = Total export and M = Total import

So far, three alternative methods of calculating GNP have been explained, the best way to arrive at GNP will be to employ all these three methods so as to permit them cross checking inquiry and to have greater accuracy.

Why 'Real GNP' is superior to 'Money GNP'?

A serious difficulty arises in comparing GNP of several years because of inflation. Say for example over one year all prices remain unchanged, the quantity of the output increases by 10% and as result GNP will increase by 10%. Again in the following year the quantity remains unchanged but the price level increase by 10% and as result GNP will increase by 10%. But these two cases are different. To avoid this confusion we use 'Real GNP'.

Nominal GNP: Money GNP / nominal GNP / GNP at market price / GNP at current price is the market value of a nation's aggregate production of final output based on current price of the corresponding year. Nominal GNP is of only limited use in measuring changes in aggregate production over the time. This is because nominal GNP can rise from one year to the next as result of increase in market price level of goods even when the nation's aggregate production of final products doesn't increase. If market prices were to fall substantially during a year, nominal GNP might fall even if the nation's aggregate production goes up.

Real GNP: Real GNP / GNP at constant price / base year GNP is the measure of value of the nation's aggregated output of final product obtained by using the market price prevailing for product during a certain single year called base year. For example if the base year is 1972, output in each year will be valued at the 1972's price level and results will be referred to as GNP valued at 1972's price.

Because the price used to valued all product remain unchanged from year to year, changes in GNP must be due to the changes in quantity of output.



How to convert Money GNP into Real GNP:

To convert Money GNP into Real GNP we must follow the following procedure:

1. First we have to select a base year.
2. Then we will have to construct a price index.
$$\text{Price index} = (\text{Present year price level} / \text{Base year price level}) \times 100$$
3. Then Real GNP will be
$$(\text{Money GNP} / \text{Price index}) \times 100$$

Potential GNP: Potential output or full employment output or expected GNP refers to what the economy could produce over a given time period if all resources are fully employed. When the economy is producing its potential output the actual output is then equal to potential GNP and will remain on the production possibility boundary.

Actual GNP: Actual GNP refers to what is actually produced by a nation over a given period. When there are some unemployed resources so that the actual GNP is less than the potential GNP, the output point is somewhere inside the transformation curve.



What items are included / excluded in / from GNP:

1. Only final goods and services are included and intermediate goods are excluded.
2. Services free of charges are excluded from GNP.
3. Transfer payments are excluded from GNP.

4. Subsidies will be excluded.
5. Illegal transactions are excluded.
6. Only the goods services of the concern year are included.
7. Reselling of goods are excluded.
8. Transactions, which are not related with productive effort, are excluded.
9. Capital gains and loses are excluded.

GNP deflator:

GNP deflator = Money GNP / Real GNP = Rate of inflation.

GNP gap:

GNP gap = Potential GNP – Actual GNP.

Personal income (PI): personal income is a measure of income available to household in a given period of time. To obtain the PI the subtraction from and addition to national income are required: –

1. Subtract all net interest and corporate profit from national income because these accrue to business rather than to households.
2. Subtract social security taxes, as they are not available for households to spend.
3. Add all personal interest income in national income.
4. Add personal dividend payment, the portion of corporate profits paid to individuals.
5. Add all govt. transfer payment to individual.

Thus PI can be written as:

$PI = NI - \text{Corporate profit} - \text{Social security} + \text{Transfer payment} + \text{Interest adjustment} + \text{Dividend}.$

Personal income is useful to measure of the ability of the households to make purchases, save and pay taxes.

Disposable income (DI): The income that individuals have to spend or to save after the payment of personal taxes is called disposable income. It is obtained by simply deducting personal tax and non-tax payment to the govt. from personal income. Thus DI can be written as:

$$DI = PI - T_i.$$

GDP: Gross domestic product measures the market value of final product produced within the boundary of the country by deducting citizens earning living abroad from GNP while adding the earning of foreign corporation with operation in the state. Thus GDP is a measure of income resulting from the use of all resources within the border of the nation. To accurately reflect on domestic production, international comparisons of output of nations are sometimes based on GDP rather than GNP.

NNP (National income at market price): GNP includes investment purchases reflecting replacement of existing capital goods that have worn out or become obsolete. To account a net new addition to capital stock these capital expenditure must be deducted from GNP. Net national product or NNP is a measure of national production that only includes net addition to capital while excluding any purchases for the replacement of worn out or obsolete capital goods. Symbolically

$$NNP = GNP - \text{Capital consumption allowance}.$$

Because capital consumption allowances are only very rough estimates of actual depreciation most economists believe that NNP is not a very reliable indicator of net production.

National income (NNP at factor cost): National income is a measure of household and business earnings from the use of productive resources over a period of one year. It can be calculated by subtracting Capital consumption allowance (CCA), Indirect business taxes (Ti), transfer payments (Tr), Surplus of govt. enterprises (Sg) and adding Subsidies (Sb) to GNP. Thus National income can be written as:

$$\text{National income} = GNP - CCA - T_i - Tr - S_g + S_b$$

National income can also be measured by summing up the compensation of employees, rental income, net interest income earned by those who make loans to finance production process and profit.

Significance of national income:

There are several important uses of national income statistics. National income estimates provide not only a single figure showing the national income, but also supply the detailed figure in regard to the various components of the national income. Thus it throw light on the functioning and performance of the economy.

The following are some of the important uses of the national income estimates:

- ❖ First, national income estimates reveal the overall production performance of the economy. Beside this per capita income, which is found by dividing the total national income by the population gives us an idea about the average standard of living of the people.
- ❖ Secondly, by comparing national income of different years, we can know whether the economy is growing, stagnant or declining.
- ❖ Thirdly, the national income estimates show the contribution made by the various sectors of the economy.
- ❖ Fourthly, national income estimates throw light on the distribution of national income among different categories of income such as wages, profits, rents and interest.
- ❖ Fifthly, the national income estimates also contain the figures of consumption, saving and investment in the economy.
- ❖ Sixthly, by the figures of the real national income per capita, we can compare the standard of living or levels of welfare in different countries of the world.
- ❖ Finally, national income estimates are valuable guide to economic policy. By looking at national income statistics, the govt. can decide if the economy or its various sectors need any stimulus or regulation.



Output determination in two sector economy / Private economy

Consumption expenditure $C = f(Y)$

$$= C + cY \quad ; C = \text{Autonomous Consumption}$$

$Y = \text{National Income}$

$cY = \text{Induced Consumption}$

$c = \text{MPC (Marginal propensity to consume)} = \Delta c / \Delta Y$

Savings function $S = f(Y)$

$$= -C + (1 - c) Y \quad ; C = \text{Autonomous Consumption}$$

$Y = \text{National Income}$

$(1 - c) = \text{MPS (Marginal propensity to save)} = \Delta S / \Delta Y$

$c = \text{MPC} = \Delta c / \Delta Y$

Average propensity to consume (APC)

$APC = C / Y \quad ; C = \text{Consumption expenditure, } Y = \text{National Income.}$

$$= C / Y + cY / Y$$

$$= C / Y + C$$

Average propensity to save (APS)

$$\begin{aligned} \text{APS} &= S / Y \quad ; S = \text{Savings, } Y = \text{National Income.} \\ &= -C / Y + (1 - c)Y / Y \\ &= -C / Y + (1 - c) \end{aligned}$$

Consumption function:

Assumptions:

1. Consumption expenditure varies directly with disposable income.
2. As income increases consumer will spend part of it but not all and rest will be saved.
3. All other influences on consumption remain constant except income.

The relationship between consumption and income that emerge from the above assumptions is referred to as consumption function. Thus consumption function may be described as the relationship between disposable income and consumption expenditure with all other influences kept constant. The consumption function here employed holds that the aggregated consumption varies directly but not proportionately with income. Symbolically:

$$C = f(Y) \quad ; C = \text{consumption expenditure, } Y = \text{Disposable income.}$$

More specifically consumption function can be written as

$$C = C + cY \quad ; C = \text{autonomous consumption, } c = \text{marginal propensity to consume, } Y \text{ disposable income.}$$

Consumption equation:

A consumption equation is the specific version of consumption function. A consumption function shows that there is a relation between consumption expenditure and income. But consumption equation shows how proportionately they are related. A simple specimen of consumption equation is as follows:

$$C = C + cY \quad C = \text{autonomous consumption, } c = \text{marginal propensity to consume, } Y \text{ disposable income } C = \text{consumption expenditure}$$

In the above consumption equation ‘C’ implies the aggregated consumption expenditure. ‘C’ is autonomous consumption expenditure. That is the consumption purchases that are not affected by the income (i.e. necessary for existence). ‘cY’ is the induced consumption that is dependent on income. Here ‘c’ represent the marginal propensity to consume that is the rate at which the consumer will increase the consumption for per unit increase in income.

$$\text{Let } C = 100 \text{ and } \text{mpc} = 0.8$$

$$\therefore C = 100 + .8Y$$

Consumption schedule:

A consumption schedule is a table that shows how consumption expenditure increases as income increases or vice versa.

Let the consumption equation of an economy is as below

$$C = C + cY; C = \text{autonomous consumption} = 400, c = \text{marginal propensity to consume} = 0.8, Y \text{ disposable income } C = \text{consumption expenditure}$$

| Y_d | C | Savings (S) |
|-------|------|-------------|
| 0 | 400 | -400 |
| 1000 | 1200 | -200 |
| 2000 | 2000 | 0 |
| 3000 | 2800 | 200 |
| 4000 | 3600 | 400 |

Above we have drawn a hypothetical consumption schedule of an economy. The table shows the relationship between possible levels of annual disposable income and aggregated consumer purchases for the hypothetical economy. The first column shows the possible level of disposable income (y_d) and the second column show the consumer purchases (C) associated with the possible income level. It is assumed that \$400 billion consumption expenditure is independent of income (autonomous consumption) and occurs during the year even if the disposable income is zero. The rest of the data in column 2 is obtained by assuming MPC = 0.8

Consumption curve:

A consumption curve is a graphical representation of a consumption function. It shows graphically how consumption varies with change in income. We know

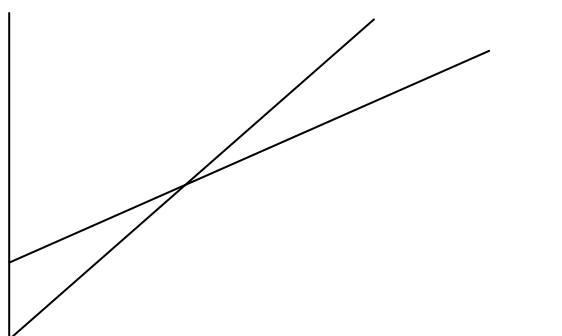
Consumption expenditure $C = C + cY$; $C =$ autonomous consumption, $c =$ marginal propensity to consume, Y disposable income.

Now let $C = 400$ and $c = .8$

∴ Consumption equation $C = 400 + .8Y$

Determining the value of C with change in Y

| | | | | | |
|---|-----|------|------|------|------|
| Y | 0 | 1000 | 2000 | 3000 | 4000 |
| C | 400 | 1200 | 2000 | 2800 | 3600 |



The consumption function based on the data is plotted on the graph above. The line labeled C in the figure shows the relationship between income level and corresponding consumption expenditure. The other line is 45° guideline; any point on this line is equidistant from the vertical and horizontal axis. We know by definition that any portion of disposable income that is not consumed must be saved. The guideline and the hypothetical 'C' line show how people plan to allocate any given level of disposable income between spending and savings. For example: when income is 3000 then consumption is 2800. So savings must be equal the balance of income – consumption = 3000 – 2800 = 200.

When income level is 2000 at that time the planned consumption is exactly equal to income (point E). This is referred as break even level of income. Any level above it will encourage people to save. At any level below 'E' people spend more than their income.

MPC: The marginal propensity to consume is the fraction of each additional unit of annual disposable income that is allocated to the consumer purchases. In other words MPC is the rate by which consumer will increase the consumption for per unit increase in disposable income. MPC can be calculated from the following formula.

$$MPC = \text{change in consumption} / \text{change in disposable income} = \Delta C / \Delta Y_d$$

For example: Let the income of the consumers of an economy is 1000 and they spend 800. Now if the income goes up by 1000 unit and as a result expenditure goes by 800 unit then MPC will be $\Delta C / \Delta Y = (1600 - 800) / (2000 - 1000) = 0.8$.

MPS: The marginal propensity to save is the fraction of each additional unit of annual disposable income that is saved. In other words MPC is the rate by which consumer will increase the consumption for per unit increase in disposable income. MPC can be calculated from the following formula.

$$MPS = \text{change in savings} / \text{change in disposable income} = \Delta S / \Delta Y_d$$

For example: Let the income of the consumers of an economy is 1000 and they save 200. Now if the income goes up by 1000 and as a result savings goes by 200 then MPC will be $\Delta S / \Delta Y = (400 - 200) / (2000 - 1000) = 0.2$

APC: Average propensity to consume is the average amount of all income spent on consumption. It is obtained by dividing the total consumption by total income. Symbolically:

$$APC = C / Y$$

For example: Let the total income of the consumers of an economy is 1000 unit and they spend 800 unit for consumption then the average propensity to consume will be $800 / 1000 = 0.8$

APS: Average propensity to save is the average amount of all income spent on savings. It obtained by dividing the total savings by total income. Symbolically:

$$APS = S / Y$$

For example: Let the income of the consumers of an economy is 1000 and they save 200 then average propensity to save will be $200 / 1000 = 0.2$

Savings function:

Assumption:

1. A portion of income is saved.
2. All other influences on savings are kept constant
3. Autonomous consumption of a consumer comes from previous savings or loan and is considered as dis-savings.

The theory:

A savings function is counterpart of consumption function. Savings function may be defined as the relationship between total saving and total income. Symbolically

$$S = f(Y_d). \text{ Here } S = \text{Total savings, } Y_d = \text{Disposable income.}$$

The amount of savings at any level of income is the difference between consumption expenditure and total income and autonomous consumption of a consumer is considered as dis-savings. Thus more specifically savings function can be written as

$$S = -C + (1 - c) Y_d ;$$

Let autonomous consumption is 400 and $mpc = .8$ then

$$S = -400 + (1 - .8) Y_d$$

Savings equation:

A savings equation is the specific version of savings function. A savings function shows that there is a relation between savings and income. But savings equation shows how proportionately they are related. A simple specimen of savings equation is as follows:

$$S = -C + (1 - c) Y_d$$

In the above equation S represent the total savings. If disposable income is very low or zero in any given year, households will reduce their savings and sell some of their assets or will use previous savings to meet their autonomous consumption. In the equation $-C$ represent that portion. As we know income that is not consume must be saved, so $1 - MPC = MPS$. Here $1 - c$ represent MPS.

Let the autonomous consumption of the households of an economy is 100 and $MPS = 0.2$. So the savings equation will be $S = -100 + 0.2Y_d$. Now if the annual disposable income is 1000 then annual savings will be

$$S = -100 + 0.2 \times 1000 \\ = 100$$

Savings schedule:

A Savings schedule is a table that shows how Savings increases as income increases or vice versa.

Let the Savings equation of an economy is as below

$S = -C + (1 - c)Y$; $C = \text{dis-saving} = 400$, $(1 - c) = \text{marginal propensity to save} = 0.2$, Y disposable income $S = \text{Total savings}$

| Y_d | Savings (S) |
|-------|-------------|
| 0 | -400 |
| 1000 | -200 |
| 2000 | 0 |
| 3000 | 200 |
| 4000 | 400 |

Above we have drawn a hypothetical Savings schedule of an economy. The table shows the relationship between possible levels of annual disposable income and aggregated savings for the hypothetical economy. The first column shows the possible level of disposable income (y_d) and the second column shows the savings (S) associated with the possible income level. It is assumed that 400 unit Savings dis-savings or autonomous consumption expenditure. The rest of the data in column 2 is obtained by assuming $MPS = 0.2$

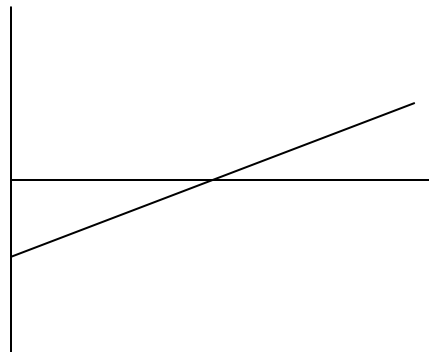
Savings curve:

A Savings curve is a graphical representation of a Savings schedule. It shows graphically how Savings varies with change in income. We know Savings $S = -C + (1 - c)Y$; $C = \text{dis-Savings}$, $(1 - c) = \text{marginal propensity to save}$, $Y \text{ disposable income}$.

Now let $C = 400$ and $1 - c = 0.2$
 .. Savings equation $S = -400 + 0.2Y$

Determining the value of S with change in Y

| | | | | | |
|---|------|------|------|------|------|
| Y | 0 | 1000 | 2000 | 3000 | 4000 |
| S | -400 | -200 | 0 | 200 | 400 |



The savings schedule has been plotted on the graph above with disposable income on horizontal axis and savings on vertical axis. The graph shows that savings in the economy is negative if disposable income is less than 2000. Negative savings means people consume more than their present income by converting some of savings from years past into cash. Again savings is zero when the disposable income is 2000 unit for the year. The graph also shows that for each 1000 unit increase in disposable income savings goes up 200 unit.

Multiplier

A multiplier is a number that indicates the increase in real GNP results from increase in consumption. For example a multiplier of 5 indicates that each 1 unit increase in consumption will increase the GNP by 5 units. Multiplier can be expressed as the ratio of change in GNP to change in autonomous purchases. Thus

$$\text{Multiplier} = \text{Change in GNP} / \text{Change in autonomous purchases}$$

To see how multiplier works let assume in a two sector economy ($Y = C + S$) $MPC = 0.8$ and initial level of equilibrium GNP is 4000. Under this circumstance a 200 unit increase in consumption purchase will increase the income of some people by 200 unit. But the increase in equilibrium income is much larger than the initial income. Because those who earn 200 will spend it on their needs @ $MPC = 0.8$ that is 160 unit will be spend in the second round of spending. But the process doesn't end here. The 160 unit will result 128 unit consumer purchases ($160 * 0.8$). The 128 unit will then generate 128 income and the spending process will commence again. As the process continues, the change in income for the subsequent rounds become smaller and smaller because MPC is less than 1. We can show the value of multiplier depending on MPC in the following way

$$\Delta \text{Real GNP} = 200 + 200 * 0.8 + (200 * 0.8) * 0.8 + \{(200 * 0.8) * 0.8\} * 0.8 + \dots$$

At each stage 0.8 of the previous change in income is represented. The infinite progression of numbers can be solved with the following formula.

$$\Delta \text{Real GNP} = (\text{Increase in investment purchases}) * 1 / 1 - MPC$$

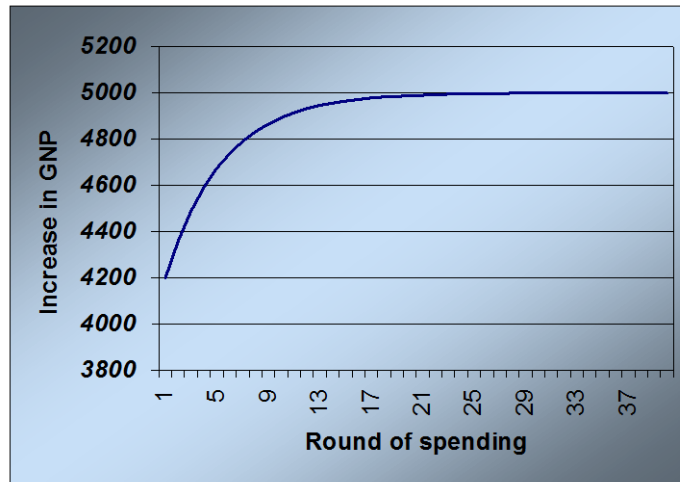
Thus in case of our hypothetical economy $\Delta \text{Real GNP} = 200 + 1 / 1 - 0.8 = 1000$

So multiplier of the economy is

$$\text{Multiplier} = \text{Change in GNP} / \text{Change in autonomous purchases}$$

$$= 1000 / 200 = 5$$

Graphical analysis:



The graph above shows how each additional round of re-spending results in more consumption, more production, and therefore still increase in income. As the process goes on and on, the graph shows that equilibrium GNP eventually grows by 1000 unit.

Money is what money does – Walker.

Anything which is widely accepted in payment for goods or in discharge of other kinds of obligations – Robertson.

Functions of money

1. A medium of exchange: The most important function of money is to serve as a medium of exchange. As a medium of exchange money solves all the difficulties of barter system. For example:
2. A standard value: Money provides a unit of account that serves as a standard to measure value. For example we measure our income in Taka. The concept of GNP is useless without a standard of value.
3. A standard of deferred payment: Many contracts involve promises to pay sums of money in future. Lending and borrowing, therefore, must take place in terms of such commodity which will keep its value stable over time and the value of money can be kept more stable than that of other articles. By serving as a standard measure of payments over time, money makes borrowing and lending much less risky.
4. A store of value: Money serves as a store of value or more correctly, it enables a person to keep a portion of his assets liquid. That means money can instantaneously be converted to goods and services without any inconvenience or cost. Other assets like bond, share must be sold to be converted into a generally accepted medium of exchange. Thus money is best kept as a store of value.
5. A means of transferring value: One cannot take his land and other immovable assets to another place. But he can sell it and with the money so acquired, he can buy them elsewhere. Value will thus be transferred.

