



Chapter 11

Index Number

INDEX NUMBERS - MEANING AND DEFINITION

Index numbers are devices for measuring the net amount of change in a group of related variables over a certain period of time. Index numbers are used to measure the changes in the price level over a period of time. Index numbers are a special kind of averages by which a measurement of central tendency of time series and special series can be made possible.

2. CHARACTERISTICS OF INDEX NUMBERS

Following are the main characteristics of index numbers:

- 1. Expressed in Numbers.** The index numbers express the changes in numbers. The changes can only be expressed in numbers. For example, increase in prices, decrease in production, etc.
- 2. Relative Measure.** Index numbers measure changes in a group of related variables from time to time.
- 3. Average of Percentages.** Index numbers are expressed in terms of percentage in order to show the extent of relative change however without using the sign of percentage.
- 4. Basis for Comparison.** Index numbers facilitate the comparative study over different time periods.
- 5. Universal Utility.** Index numbers play a very important role in economic and business problems.

USES, IMPORTANCE, AND ADVANTAGE OF INDEX NUMBER

1. It simplifies complexities. Index numbers are compiled to compare physical changes over a period of time. Such changes relate to industrial production, sales, volume of imports or exports, etc.

2. It facilitates comparative study. Index number is of great help for doing comparative study and analysis of changes in two or more series. It means with the help of index numbers, the comparative change in two variables become easy.

3. Use in business sphere. With the help of index numbers the businessmen get the knowledge of sale and prices. The businessmen become aware of the increase or decrease in the sale of their produced commodities. They can be aware of the goods at a proper time.

4. Helpful in fixation of salary and allowances. The cost of living index number is a useful guide to the government and private enterprises to make necessary adjustments in salaries and allowances of the workers. Increase in the cost of living index numbers suggests increase in salaries and allowances.

5. To measure the changes in the value of money. Index numbers are widely used in the measurement of changes in the value of money. The value of money depends on its purchasing power. The change in prices inversely affects the value of money.

4. TYPES OF INDEX NUMBERS

Mainly, there are following three types of Index Numbers

1. Price Index Numbers. Price index numbers measure changes in the prices of commodities between the current year and base year. These can be of two types:

(i) Wholesale Price Index (WPI). It measures the changes in the general price level of a country. It measures the relative changes in the prices of commodities traded in the wholesale markets.

(ii) Consumer Price Index (CPI). It measures the average change in prices paid by the specific base year. It measures the relative changes in the retail prices. Accordingly it is also called Retail Price Index. Change in the retail price, affects the cost of living of the specific class of consumers. So, CPI is also called cost of living Index.

2. Quantity Index Numbers. Quantity index numbers measure changes in the physical volume of goods, produced and consumed in a given time period.

3. Value Index Numbers. The value of a commodity is the product of its price and quantity Value Index numbers measure, changes in the total value of items take sales, profit etc. However, these are not very popular in use.

PROBLEMS IN THE CONSTRUCTION OF INDEX NUMBERS

There are a number of problems/difficulties faced while constructing index numbers. Some of the problems are discussed as under

1. The purpose of index numbers. There are various types of index numbers, constructed with different objectives. Before constructing an index number, the purpose must be clearly decided.

2. Selection of commodities. Depending upon the purpose of index number, list of commodities should be prepared. All commodities are not included in the construction of index number. However, in the selection of sample commodities, we must take the following points into consideration:

(i) Commodities must be representative.

(ii) Commodities should be easily recognised.

(iii) Commodities must be popular.

(iv) Commodities must satisfy the criterion of comparability.

3. Selection of base year. Prices in the base year is taken as 100 and then indices for other year are prepared.

There are two types of base periods:

(i) Fixed Base Method.

(ii) Chain Base Method.

4. Selection of representative prices. We may take either wholesale or retail prices of the selected commodities. Wholesale prices are generally lower than the retail prices. The consumer is required to pay only retail prices. Therefore, to prepare the consumer index number only the retail prices should be taken. But if our objective is to measure changes in general price level, we should take wholesale prices into consideration.

5. System of weighting. Following are two methods of system of weighing:

(i) Aggregate Value Method

(ii) Weighted Relative Method

6. Selection of Appropriate Average. There are various types of average, such as Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean which can be used in the construction of index numbers.

7. Selection of appropriate formula. The last step involved in the construction of an index number is to select an appropriate formula.

6. METHODS OF CONSTRUCTION OF INDEX NUMBERS

Following are the main methods of construction of index numbers

1. Simple or Unweighted Index Numbers

2. Weighted Index Numbers

1. SIMPLE OR UNWEIGHTED INDEX NUMBERS

In calculating index numbers by simple index numbers all the items are given equal weightage. Following are the two methods of constructing index numbers by simple index numbers:

(i) Simple Aggregative Method

$$P_{01} = \frac{\sum P_1}{\sum P_0} \times 100$$

P_{01} = Price index of current year

$\sum P_1$ = Total of price of current year

$\sum P_0$ = Total of price of base year

(ii) Simple Average of Price Relatives

$$P_{01} = \frac{\sum \frac{P_1}{P_0} \times 100}{N}$$

2. WEIGHTED INDEX NUMBERS

According to weighted index number, weights are assigned to various commodities to reflect their relative importance in the group. Using the weights, we can find weighted average of price relatives or weighted aggregate index numbers. The weighted index numbers are more realistic than the simple index number. Weighted index numbers are of the following two types:

(i) Weighted Average of Price Relatives

(ii) Weighted Aggregative Method

(i) Weighted Average of Price Relatives.

$$P_{01} = \frac{\sum PV}{\sum V}$$

$$P = \frac{P_1}{P_0} \times 100$$

$$V = P_0 q_0$$

(ii) Weighted Aggregative Method.

There are various methods and formulae of calculating index numbers by using weighted aggregative, method. Some of them are given below:

1. Laspeyre's Index Number:

$$P_{01} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100$$

2. Paasche's Index Number

$$P_{01} = \frac{\sum P_1 q_1}{\sum P_0 q_1} \times 100$$

3. Fisher's Ideal Index Number

$$P_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 q_0} \times \frac{\sum P_1 q_1}{\sum P_0 q_1}} \times 100$$

SOME IMPORTANT INDEX NUMBERS

Consumer price index

Consumer price index (CPI), also known as the cost of living index measures the average change in retail prices.

Consumer Price Index

Number Government agencies in India prepare a large number of consumer price index numbers. Some of them are as follows:

- **Consumer Price Index Numbers for Industrial Workers with base 2001=100. Value of Index in May 2017 was 278.**
- **All-India Consumer Price Index Numbers for Agricultural Labourers with base 1986- 87=100. Value of Index in May 2017 was 872.**
- **All-India Consumer Price Index Numbers for Rural Labourers with base 1986-87=100. Value of Index in May 2017 was 878.**
- **All-India Rural Consumer Index with base 2012 = 100. Value of Index in May 2017 was 133.3**

• **All-India Urban Consumer Price Index with base 2012 = 100. Value of Index in May 2017 was 129.3**

All-India Combined Consumer Price with base 2012 = 100. Value of Index in May 2017 was 131.4 In addition, these indices are available at the state level.

The Reserve Bank of India is using the All-India Combined Consumer Price Index as the main measure of how consumer prices are changing.

Methods of Construction of Consumer Price Index Number

There are following two methods:

- 1. Aggregative Expenditure Method or Weighted Aggregative Method**
- 2. Family Budget Method or Weighted Average of Price Relatives Method**

1. Aggregative Expenditure Method.

The following formula will be applied for calculating index number by aggregative expenditure method.

$$\text{CPI} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100$$

2. Family Budget Method.

The following formula will be applied for calculating index number by using Family Budget Method.

$$\text{CPI} = \frac{\sum WR}{\sum W}$$

Uses of Consumer Price Index

- 1. At governmental level, the index numbers are used for wage policy, price policy, rent control, taxation and general economic policies.**
- 2. The index numbers are also used to measure changing purchasing power of the country, real income etc.**
- 3. Index numbers are also used for analysing market for particular kinds of goods and services.**

7. WHOLESALE PRICE INDEX

Wholesale price index is that index which represents general change in the prices of the commodities. In India the wholesale price index numbers are constructed on weekly basis. The wholesale price index series with base year 1993-94 became effective in India from April 1, 2000 shifting from the earlier base year of 1981-82. In India for the construction of wholesale price index (WPI), goods are mainly classified into the following three main groups:

(i) Primary Groups. Primary goods include 98 commodities like rice, fruits, pulses, vegetables and non-food articles like cotton, jute, metals. These are given weight as 22.02

(ii) Fuel, power, light, and lubricants. In this category 19 items like coal, petroleum products, electricity, etc. are included and are given weight as 14.23.

(iii) Manufacturing. Under this category 318 articles like textiles, sugar, paper, machinery, chemicals, fertilizers, leather, etc., are included and are given weight as 63.75

UTILITY/USES OF WHOLESALE PRICE INDEX

1. Forecasting Demand and Supply. If wholesale price index increases, it indicates a situation of excess demand over supply of goods. On the other hand, if wholesale price decreases, it will be a situation of excess supply over demand for goods.

2. Determination of Real Changes in Aggregates. The wholesale price index enables us to find out the real changes in aggregates like national income and national expenditure.

Real change in National Incomes

$$= \text{National Income at current prices} \times \frac{\text{wholesale price of base year}}{\text{Whole sale price of current year}}$$

3. Indicator of Rate of Inflation. The Wholesale Price Index (WPI) is also applied to determine the rate of inflation in a country. It refers to the rate at which prices tend to increase over time. The rate of inflation in a country is given by the following formula:

$$\text{Rate of Inflation} = \frac{\text{Current year WPI} - \text{Previous Year WPI}}{\text{Previous year WPI}} \times 100$$

INDEX NUMBER OF INDUSTRIAL PRODUCTION

The index number of industrial production is designed to measure the change in the level of industrial production in a given period compared to some base period.

$$\text{Index of Industrial production} = \frac{\sum \frac{q_1}{q_0} W}{\sum W} = \frac{\sum RW}{\sum W}$$

INFLATION AND INDEX NUMBER

Inflation is a state in which prices of goods and services are rising i.e., value of money is falling. Many economists believe that it is a situation in which prices of goods and services i.e., general level of prices are constantly rising over a period of time.

LIMITATIONS OF INDEX NUMBERS

Though index number is a very useful technique, but we must also be aware of its following limitations:

- 1. Estimated. Index numbers are approximate indicators of the change of phenomenon. Hence, fail to exhibit completely true picture.**
- 2. International comparison is not possible. Different countries have different basis of index numbers. These do not help international comparisons.**
- 3. Limited use. Index numbers are constructed largely with some particular objective in mind and, therefore, serve only that particular purpose.**