

Index Number

1. Define Index numbers.

⇒ An index number is a statistical device designed to measure average relative changes in magnitude in a variable or a group of related variables over two different situations which may be two different time points or two different places.

2. Why is the price index number called the 'Economic Barometer'?

⇒ An index number is a statistical device designed to measure average relative changes in magnitude in a variable or a group of related variables. These may be changes in prices, cost of living, industrial production, agricultural production, income, expenditure etc. over two time periods or two different geographical regions etc. An index number is a very special type of average which reflects the pulse of an economy and serves as the indicator of

inflationary deflationary tendencies. A careful look at the important indices such as whole-sale price, industrial production etc. gives fairly good idea of the prevailing economic situation of a country. Therefore, just as barometer measures the atmospheric pressure in Meteorology, index number measure the pressure of economic activities and are correctly termed as "Economic Barometer".

Q. 3 Explain the terms current year, base year, and price relative.

2) Suppose we want to compare the retail price level of consumer goods for the year 2003 with that of 2000 in the State of Assam. For this purpose we need to construct retail price index for Assam. Here the year 2003 is called the current year (denoted by 1) and 2000 is called the base year (denoted by 0). Thus the year which we want to compare is called the current year and the year with

which current year is compared is called the base year. This definition is same for all types of index number.

Price Relative :-

Suppose P_{0i} is the price of i th commodity in the base year (denoted by 0) and P_{1i} is the price of the commodity in the current year (denoted by 1). Then price relative for the i th commodity is defined as the ratio.

$$\text{Price relative} = \frac{P_{1i}}{P_{0i}}$$

Q.4. Explain the different uses and limitations of Index numbers.

Ans :-

uses of Index numbers,

i) Index number as Economic Barometer

Index number measure the pressure of the economic behaviour and they are rightly termed as barometer of economic activities since a lot at some of

the important indices like - index no. of whole-sale prices, industrial production, agricultural production etc. gives a fairly good idea as to what is happening to the economy of a country.

(ii) Index number help in studying trend and tendencies:-

Since index number study the relative changes in the level of a phenomenon at different period of time, they are specially useful for the study of the general trend for a group of phenomenon in a time series data.

(iii) Index numbers help in formulating decisions and policies:-

Index no. of data relating to prices, production, profits imposts and exports, personal and financial matters are indispensable for any organisation in efficient planning and formulation of executive decisions and revising their policies from time to time.

The ~~cost~~ index nos are also used for

- iv) Measuring deflation of time series data
- v) Determine the purchasing power of money.
- vi) Removing bias due to productivity and quality improvement
- vii) Determining parity ratios and terms of exchange.

Limitations of Index Numbers

(i) Since index numbers are computed from sample data, all the errors inherent in any sampling procedure creep in its construction. Hence the index no. reflects only approximate changes in the relative level of a phenomenon.

(ii) At each stage of the construction of the index no., there is a likelihood of the error being introduced.

(iii) Index no. may not be able to keep pace with the change in the nature and quality of the commodities consumed at two different periods under

consideration and hence they may not be truly representative.

(iv) None of the formula for the construction of index no. is exact and contains the so called 'formula error'.

(v) Index no. are special averages and thus they contain relative limitations of all the averages.

(vi) To obtain desired results, sometimes index no. are manipulated by subjective selection of base year, commodities, prices and quantities.

Q. 5. Discuss the problems involved in the construction of a price index number.

Ans :- The problems involved in the construction of a price index number are :-

- a) Purpose of the index number.
- b) Choice of base period.

- (c) Choice of commodities
- (d) Collection of data
- (e) Method of combining data
- (f) Choice of weights
- (g) Interpretation of the index.

(a) Purpose of the index number:

Purpose of construction of the index no. should be clearly stated and there should be no ~~to~~ doubt about it.

For example, if we are interested to measure the change in cost to maintain a given standard of living, we have to take retail prices of consumer goods and services.

(b) Choice of base period:

The base period should be a normal period not too far from the current period. It should be normal in the sense that the prices of that period should not be subjected to boom or depression or effects of

events like war, flood, famines etc.
The base period should not be too short (eg. one day) or too long (say 20 yrs)

The base period should be a period which is of some economic importance for the country so that reliable figures are available.

(c) Choice of Commodities.

It is not possible to include all the items in the construction of an index no. The reason is that it takes too much time, labour and costs.

The only soln of this problem is to select a representative sample from all the items. Since we to select important and relevant commodities, selection should be made by judgement or purposive sampling.

(d) Collection of Data:-

For whole sale price index the whole sale price quotations for the selected commodities

(b) should be collected, while for consumer price index, retail price should be collected. Care should be taken to obtain accurate and complete data.

(c) Method of Combining Data :-

To get a single number to measure the change in price level, data collected ~~should~~ should be combined. So we are to consider some means of combining the price relatives. Amongst the various measures of central tendency, A.M. and G.M. of price relatives are generally used for this purpose.

(d) Choice of weights :-

The commodities included in the index number are not of equal importance. For instance, in constructing a whole sale price index no. for Assam, 'rice' should have greater importance than 'tobacco'. So, we must consider the problem of weighing the different commodities

included in the index number according to their importance. The quantity used for determining weight may be the ^{quality} quantity of the commodity produced, marketed or sold, imported or exported. If w_i is the weight attached to the price of the i th commodity, then the weighted aggregative index is given

by

$$I_{01} = \frac{\sum P_{1i} w_i}{\sum P_{0i} w_i}$$

(g) Interpretation of the index:

Once the index no. is obtained, its interpretation should be made.

The interpretation depends on the purpose of the index no. While the whole sale price index measures the changes in the general price level, the consumer price index measures the change in cost of living.

Usually index no. are expressed in percentage form and index for base is taken as 100. The statement that "wholesale price index no. for Assam for 2001 during Jan with 1991 as base is 178.85" has the interpretation that — compared to 1991, the general price level in Assam has increased by 78.85% or 1.79 (approx) times. Accordingly, Rs 178.85 is required to purchase a basket of goods in 2001 which one could purchase with Rs 100 in the year 1991.

Q. 6 Explain the different methods of construction of price index no. (11)

Ans! — Let

n = No. of commodities

P_{0i} = Price of the i th commodity in the base year

P_{1i} = " " " "

" " " " current year.

2) Simple (Unweighted) aggregate Method :-

$$I_{01} = \frac{\sum_{i=1}^k P_{1i}}{\sum_{i=1}^k P_{0i}} \times 100$$

The drawbacks of this method are

- (i) The prices of various commodities may be in different units.
- (ii) Relative importance (weights) of various commodities is ignored.

3) Weighted Aggregate Method :-

$$I_{01} = \frac{\sum_{i=1}^k P_{1i} w_i}{\sum_{i=1}^k P_{0i} w_i} \times 100$$

where w_i is the weight of the i th commodity.

Now, let us consider some particular weighted price index numbers.

a) Laspeyres' formula : if we take

$w_i = q_{0i}$, then $I_{01}^{(L)} = \frac{\sum_{i=1}^k P_{1i} q_{0i}}{\sum_{i=1}^k P_{0i} q_{0i}} \times 100$

(b) Paasche's Formula:

If we take $w_i = q_{ii}$, then,

$$I_{01}^{(P)} = \frac{\sum_{i=1}^k P_{ii} q_{ii}}{\sum_{i=1}^k P_{0i} q_{ii}} \times 100$$

(c) Edge worth - Marshall formula:

If we take $w_i = (q_{ii} + q_{0i})/2$

then,

$$I_{01}^{(E-M)} = \frac{\sum_{i=1}^k P_{ii} (q_{ii} + q_{0i})}{\sum_{i=1}^k P_{0i} (q_{ii} + q_{0i})} \times 100$$

(d) Fisher's Ideal Index number

Formula: -

It is given by,

$$I_{01}^{(F)} = \sqrt{\frac{\sum_{i=1}^k P_{ii} q_{0i}}{\sum_{i=1}^k P_{0i} q_{0i}} \times \frac{\sum_{i=1}^k P_{ii} q_{ii}}{\sum_{i=1}^k P_{0i} q_{ii}}} \times 100$$

n? or $I_{01}^{(F)} = \sqrt{I_{01}^{(L)} \times I_{01}^{(P)}}$