

Pinky Rani
Assistant Professor (Guest Faculty)
Department of Economics
Maharaja College
Veer Kunwar Singh University, Ara
Class: B.A. Economics (Part-3)
Paper: 07
Topic: Index number
Date: 22-02-2024

Steps or Problems in the Construction of Price Index Numbers:
The construction of the price index numbers involves the following steps or problems:

1. Selection of Base Year:

The first step or the problem in preparing the index numbers is the selection of the base year. The base year is defined as that year with reference to which the price changes in other years are compared and expressed as percentages. The base year should be a normal year.

In other words, it should be free from abnormal conditions like wars, famines, floods, political instability, etc. Base year can be selected in two ways- (a) through fixed base method in which the base year remains fixed; and (b) through chain base method in which the base year goes on changing, e.g., for 1980 the base year will be 1979, for 1979 it will be 1978, and so on.

2. Selection of Commodities:

The second problem in the construction of index numbers is the selection of the commodities. Since all commodities cannot be included, only representative commodities should be selected keeping in view the purpose and type of the index number.

In selecting items, the following points are to be kept in mind:

- (a) The items should be representative of the tastes, habits and customs of the people.
- (b) Items should be recognizable.
- (c) Items should be stable in quality over two different periods and places.
- (d) The economic and social importance of various items should be considered
- (e) The items should be fairly large in number.
- (f) All those varieties of a commodity which are in common use and are stable in character should be included.

3. Collection of Prices:

After selecting the commodities, the next problem is regarding the collection of their prices:

- (a) From where the prices to be collected;
- (b) Whether to choose wholesale prices or retail prices;
- (c) Whether to include taxes in the prices or not etc.

While collecting prices, the following points are to be noted:

- (a) Prices are to be collected from those places where a particular commodity is traded in large quantities.
- (b) Published information regarding the prices should also be utilised,
- (c) In selecting individuals and institutions who would supply price quotations, care should be taken that they are not biased.

(d) Selection of wholesale or retail prices depends upon the type of index number to be prepared. Wholesale prices are used in the construction of general price index and retail prices are used in the construction of cost-of-living index number.

(e) Prices collected from various places should be averaged.

4. Selection of Average:

Since the index numbers are, a specialised average, the fourth problem is to choose a suitable average. Theoretically, geometric mean is the best for this purpose. But, in practice, arithmetic mean is used because it is easier to follow.

5. Selection of Weights:

Generally, all the commodities included in the construction of index numbers are not of equal importance. Therefore, if the index numbers are to be representative, proper weights should be assigned to the commodities according to their relative importance.

For example, the prices of books will be given more weightage while preparing the cost-of-living index for teachers than while preparing the cost-of-living index for the workers. Weights should be unbiased and be rationally and not arbitrarily selected.

6. Purpose of Index Numbers:

The most important consideration in the construction of the index numbers is the objective of the index numbers. All other problems or steps are to be viewed in the light of the purpose for which a particular index number is to be prepared. Since, different index numbers are prepared with specific purposes and no single index number is 'all purpose' index number, it is important to be clear about the purpose of the index number before its construction.

7. Selection of Method:

The selection of a suitable method for the construction of index numbers is the final step.

There are two methods of computing the index numbers:

- (a) Simple index number and
- (b) Weighted index number.

Simple index number again can be constructed either by – (i) Simple aggregate method, or by (ii) simple average of price relative’s method. Similarly, weighted index number can be constructed either by (i) weighted aggregative method, or by (ii) weighted average of price relative’s method. The choice of method depends upon the availability of data, degree of accuracy required and the purpose of the study.

Construction of Price Index Numbers (Formula and Examples):

Construction of price index numbers through various methods can be understood with the help of the following examples:

1. Simple Aggregative Method:

In this method, the index number is equal to the sum of prices for the year for which index number is to be found divided by the sum of actual prices for the base year.

The formula for finding the index number through this method is as follows:

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

Where P_{01} Stands for the index number
 ΣP_1 Stands for the sum of the prices for the year for which index number is to be found :
 ΣP_0 Stands for the sum of prices for the base year.

Commodity	Prices in Base Year 1980 (in Rs.) P_0	Prices in current Year 1988 (in Rs.) P_1
A	10	20
B	15	25
C	40	60
D	25	40
Total	$\Sigma P_0 = 90$	$\Sigma P_1 = 145$

$$\text{Index Number } (P_{01}) = \frac{\Sigma P_1}{\Sigma P_0} \times 100 ; P_{01} = \frac{145}{90} \times 100 ; P_{01} = 161.11$$

2. Simple Average of Price Relatives Method:

In this method, the index number is equal to the sum of price relatives divided by the number of items and is calculated by using the following formula:

$$P_{01} = \frac{\Sigma R}{N}$$

Where ΣR stands for the sum of price relatives i. e. $R = \frac{P_1}{P_0} \times 100$ and

N stands for the number of items.

Example

Commodity P_0	Base Year Prices (in Rs.) P_1	Current year Prices (in Rs.)	Price Relatives $R = \frac{P_1}{P_0} \times 100$
A	10	20	$\frac{20}{10} \times 100 = 200.0$
B	15	25	$\frac{25}{15} \times 100 = 166.7$
C	40	60	$\frac{60}{40} \times 100 = 150.00$
D	25	40	$\frac{40}{25} \times 100 = 160.0$
$N = 4$			$\Sigma R = 676.7$

$$\text{Index Number } (P_{01}) = \frac{\Sigma R}{N}$$

$$P_{01} = \frac{676.7}{4} ; P_{01} = 169.2$$

3. Weighted Aggregative Method:

In this method, different weights are assigned to the items according to their relative importance. Weights used are the quantity weights. Many formulae have been developed to estimate index numbers on the basis of quantity weights.

Some of them are explained below:

(i) **Laspeyre's Formula.** In this formula, the quantities of base year are accepted as weights.

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

Where P_1 is the price in the current year ; P_0 is the price in the base year ; and q_0 is the quantity in the base year.

(ii) **Paasche's Formula.** In this formula, the quantities of the current year are accepted as weights.

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

Where q_1 is the quantity in the current year.

(iii) **Dorbish and Bowley's Formula.** Dorbish and Bowley's formula for estimating weighted index number is as follows :

$$P_{01} = \frac{\frac{\sum P_1 q_0}{\sum P_0 q_0} + \frac{\sum P_1 q_1}{\sum P_0 q_1}}{2} \times 100 \quad \text{or} \quad P_{01} = \frac{L + P}{2}$$

Where L is Laspeyre's index and P is paasche's Index.

(iv) **Fisher's Ideal Formula.** In this formula, the geometric mean of two indices (i.e., Laspeyre's Index and paasche's Index) is taken :

$$P_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 q_0} \times \frac{\sum P_1 q_1}{\sum P_0 q_1}} \times 100 \quad \text{or} \quad P_{01} = \sqrt{L \times P} \times 100$$

where L is Lespeyre's Index and P is paasche's Index.

Example

Comm- odity	Base Year		Current Year		$P_0 q_0$	$P_1 q_0$	$P_0 q_1$	$P_1 q_1$
	P_0	q_0	P_1	q_1				
A	10	5	20	2	50	100	20	40
B	15	4	25	8	60	100	120	200
C	40	2	60	6	80	120	240	360
D	25	3	40	4	75	120	100	160
Total					265 $\sum P_0 q_0$	440 $\sum P_1 q_0$	480 $\sum P_0 q_1$	760 $\sum P_1 q_1$

(i) Laspeyre's Formula :

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

$$P_{01} = \frac{440}{265} \times 100 = 166.04$$

(ii) Paasche' Formula :

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

$$p_{01} = \frac{700}{480} \times 100 = 158.3$$

(iii) Dorbish and Bowley's Formula :

$$p_{01} = \frac{\frac{\sum P_1 q_0}{\sum P_0 q_0} + \frac{\sum P_1 q_1}{\sum P_0 q_1}}{2} \times 100 = 162.2$$

$$p_{01} = \frac{\frac{440}{265} + \frac{760}{480}}{2} \times 100 = 162$$

(iv) Fisher's Ideal Formula :

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

$$p_{01} = \sqrt{\frac{440}{265} \times \frac{760}{480}} \times 100 = 162.1$$

4. Weighted Average of Relatives Method:

In this method also different weights are used for the items according to their relative importance.

The price index number is found out with the help of the following formula:

$$P_{01} = \frac{\sum RW}{\sum W}$$

where $\sum W$ stands for the sum of weights of different commodities :

and $\sum R$ stands for the sum of price relatives.

Commodity	Weights W	Base Prices Year P_0	Current Year Prices P_1	Price Relatives $R = \frac{P_1}{P_0} \times 100$	RW
A	5	10	20	$20/10 \times 100 = 200.0$	1000.0
B	4	15	25	$25/15 \times 100 = 166.7$	666.8
C	2	40	60	$60/40 \times 100 = 150.0$	300.0
D	3	25	40	$40/25 \times 100 = 160.0$	480.0
Total	$\sum W=14$				$\sum RW = 2446.8$

$$\text{Index Number } (P_{01}) = \frac{\sum RW}{\sum W}$$

$$p_{01} = \frac{2446.8}{14} = 174.8$$
