Chapter - Index Number (Paper - VI)
Class - B.A. Part - 3 (Module - 5)
Economics Honours

Topic - Weight Aggregative Method

Under weighted Aggregated Index Numbers, weights are assigned to various items and instead of finding the simple aggregate of price, the weighted aggregate of the prices are obtained. There are various methods and formula for Calculating index number by using weighted aggregative method. Some of them are given below :-

(1.) Laspeyre's Index Number
(2) Paasche's Index Number
(3.) Fisher's Ideal Index Number

1) Laspeyre's Method :-

Laspeyre's uses base year quantities (q_0) as weights of different items. His formula for estimating index number is :-

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

Steps

1) Multiply the current year prices (P_1) by base year quantity weight (q_0) and totall all such products to get $\Sigma P_1 q_0$.

2) Similarly, multiply the base year prices (P_0) by base year quantity weight (q_0) and obtain the total to get $\Sigma P_0 q_0$.

3) Divide $\Sigma P_1 q_0$ by $\Sigma P_0 q_0$ and multiply the quotient by 100. This will be the index number on the bases of base year quantity.

(2) Paasche's Method

Paasche's uses current year's quantities (q_1) as weight. His formula to construct the Index value is :-

Formula

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

Steps :-

1) Multiply the current year prices (P_1) by current year quantities (q_1) and total all such products to get $\Sigma P_1 q_1$.

2) Similarly, multiply the base year prices (P_0) by Current year quantities (q_1) and obtain the total to get $\Sigma P_0 q_1$.

3) Divide $\Sigma P_1 q_1$ by $\Sigma P_0 q_1$ and multiply the quotient by 100. This will be the index number based on Current year quantity.

(3) Fisher's Method

Prof. Irving Fisher has combined the techniques of Laspeyre's and Paasche's method. He used both base year as well as Current year quantities as weight. The Fisher's Ideal Index is given by the following formula:

Formula :-

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

This formula has the following Characteristic

1.) The formula is based on geometric mean, which is considered to be the best average for Constructing index numbers.

2.) It Consider both base year and Current year quantities as weight. So it avoids the bias associated with the Laspeyre's and Paasche's indexes.

3) It satisfies time reversal test and factor reversal test.

From the above formula, it is clear that Fisher's Ideal Index is the geometric mean of the Laspeyre and Paasche indices. Fisher examined more than 100 formula for the construction of index number and ultimately derived this index number which he calls 'ideal' because of it's special characteristic.

Example :- For the data given in the following table, Compute index numbers by (i) Laspeyre's method (ii) Paasche's method (iii) Fisher's ideal Method

Commodity	Base year (1997)		Current year (2000)	
	Price	Quantity	Price	Quantity
A	10	30	12	50
B	8	15	10	25
C	6	20	6	30
D	4	10	6	20

Solution :-

Construction of Price Index Numbers

Commodity	P_0	q_0	P_1	q_1	P_1q_0	P_0q_0	P_1q_1	P_0q_1
A	10	30	12	50	360	300	600	500
B	8	15	10	25	150	120	250	200
C	6	20	6	30	120	120	180	180
D	4	10	6	20	60	40	120	80
					$\Sigma P_1q_0 =$ 690	$\Sigma P_0q_0 =$ 580	$\Sigma P_1q_1 =$ 1,150	$\Sigma P_0q_1 =$ 960

Here, P_0 = Price of base year
q_0 = Quantity of base year
P_1 = Price of current year
q_1 = Quantity of current year

i) Laspeyre's Method

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

$$= \frac{690}{580} \times 100$$

$$= 1.1896 \times 100$$

$$= 118.96$$

ii) Paasche's Method

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

$$= \frac{1150}{960} \times 100$$

$$= 1.1979 \times 100$$

$$= 119.79$$

iii) Fisher's Method:

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

$$= \sqrt{\frac{690}{580} \times \frac{1,150}{960}} \times 100$$

$$= \sqrt{1.1896 \times 1.1979} \times 100$$

$$= \sqrt{1.4250} \times 100$$

$$= 1.1937 \times 100$$

$$= 119.37$$

(6)

Assignment

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(Calculate Fisher's Ideal Index from the following data:)

Product	1975		1976	
	Price	Quantity	Price	Quantity
A	20	20	25	30
B	1	100	2	120
C	5	50	6	70