

CHAPTER 2 : INDEX NUMBERS

ONE MARK,TWO MARKS QUESTIONS

1. Define Index Number.

Ans: Index number are statistical devices designed to measure the relative changes in the level of a phenomenon with respect to time, income etc.

2. Why index numbers are called as economic barometer ?

Ans: Index numbers measure the pulse of the economy and act as a barometer to find the variations in economic condition of the country. Hence index number acts as an economic barometer.

3. What is price relative?

Ans: Price relative is the price of the current year expressed as the percentage of the price in the base year. $P = (p_1/p_0) \times 100$.

4. What is quantity relative?

Ans: Quantity relative is the quantity of the current year expressed as the percentage of the quantity in the base year. $Q = (q_1/q_0) \times 100$.

5. What is value relative?

Ans: Value relative is the value of the current year expressed as the percentage of the value in the base year. $P = (v_1/v_0) \times 100$.

6. State the characteristics of index number.

Ans: a) Index numbers are specialized type of averages.

a) it facilitates comparison.

7. Mention the uses of index number.

Ans: a) index numbers are used in studying trend and tendencies.

b) it simplifies the data and hence facilitates comparison.

8. Mention the steps used in the construction of index number.

Ans: a) defining the purpose of the index number.

b) selection of the base period.

c) selection of commodities.

d) obtaining price quotations

e) choice of an average.

f) selection of weights.

g) selection of suitable formula.

9. Name the index number that satisfies TRT.

Ans: Marshall Edgeworth index number, Fisher's index number and Kelly's index number satisfies TRT.

10. Name the index number that satisfies that FRT.

Ans: Fisher's index number

11. What is consumer price index number?

Ans: CPI is the index number of the cost met by a specified class of consumers in buying

a 'basket of goods and services'.

12. What are the uses of CPI?

Ans : They are used in granting allowances and other facilities to employees.

They are used for the evaluation of purchasing power of money.

FIVE MARKS QUESTIONS

1. Calculate cost of living index number using Family Budget method from the following data.

Items	Weight	Price in Base year	Price in Current year
Food	10	150	225
House Rent	5	50	150
Clothing	2	30	60
Fuel	3	30	75
Others	5	50	75

Solution :

Items	W = p ₀ q ₀	p ₀	p ₁	P = p ₁ /p ₀ × 100	PW
Food	10	150	225	150	1500
House Rent	5	50	150	300	1500
Clothing	2	30	60	200	400
Fuel	3	30	75	250	750
Others	5	50	75	150	750
Total	25				4900

$$CPI = \frac{\sum WP}{\sum W} = \frac{4900}{25} = 196$$

5. Explain briefly the steps in the construction of consumer price index number.

Step 1 : Defining Scope and coverage

At the outset it is necessary to decide the class of consumers for which the index number is required. The class may be that of bank employees, government employees, merchants, farmers etc. In any case, the geographical coverage should also be decided. That is the locality, city or town where the class dwells should be mentioned. Any how the consumer in the class should have almost the same pattern of consumption.

Step 2: Conducting Family Budget enquiry and selecting the weights

The next step is to conduct a sample survey of consumer families regarding their budget on various items. The survey should cover a reasonably good number of representative families. It should be conducted during a period of economic stability. In the survey information commodities consumed by the families, their quality, and the respective budget are collected. The items included in the index number are generally classified under the heads (i) Food (ii) clothing (iii) Fuel and lighting and (iv) others. Sufficiently large number of representative items are included under each head.

Step 3: Obtaining Price Quotations

The quotations of retail prices of different commodities are collected from local market. The quotations are collected from different agencies and from different places. Then they are averaged and these averages are made use in the construction of index numbers. The price quotations of the current period and that of the base period should be collected.

Step 4: Computing the index number.

a) Aggregative expenditure method

$$CPI = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$$

b) Family Budget Method

$$CPI = \frac{\sum PW}{\sum W}$$

TEN MARKS QUESTIONS

1. Compute Laspeyre's, Paasche's, Marshall-Edgeworth, Drobish – Bowley, and Fisher's Index numbers for 2000 from the following data. Show that Fisher's index numbers satisfies TRT and FRT.

Items	1995		2000	
	Price	quantity	Price	Quantity
A	6	50	10	56
B	2	100	2	120
C	4	60	6	60
D	10	30	12	24
E	8	40	12	36

Solution :

Items	p ₀	q ₀	p ₁	q ₁	p ₀ q ₀	p ₁ q ₀	p ₀ q ₁	p ₁ q ₁
A	6	50	10	56	300	500	336	560
B	2	100	2	120	200	200	240	240

C	4	60	6	60	240	360	240	360
D	10	30	12	24	300	360	240	288
E	8	40	12	36	320	480	288	432
Total					1360	1900	1344	1880

Laspeyres Price Index Number is

$$P_{01} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100 = \frac{1900}{1360} \times 100 = 139.71$$

Paasche's Price Index Number is

$$P_{01} = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100 = \frac{1880}{1344} \times 100 = 139.88$$

Marshall Edge worth Price index number is

$$P_{01} = \frac{\sum p_1 q_0 + \sum p_1 q_1}{\sum p_0 q_0 + \sum p_0 q_1} \times 100 = \frac{1900 + 1880}{1360 + 1344} \times 100 = 139.79$$

Dorbish Bowley Price Index Number is

$$P_{01} = \frac{L+P}{2} = \frac{139.71+139.88}{2} = 139.795$$

Fisher's Price index number is

$$P_{01} = \sqrt{L \times P} = \sqrt{139.71 \times 139.88} = 139.7949$$

Time reversal Test (TRT)

$$P_{01} \times P_{10} = 1$$

$$\begin{aligned} \text{L.H.S.} = P_{01} \times P_{10} &= \sqrt{\frac{\sum p_1 q_0 \times \sum p_1 q_1 \times \sum p_0 q_1 \times \sum p_0 q_0}{\sum p_0 q_0 \times \sum p_0 q_1 \times \sum p_1 q_1 \times \sum p_1 q_0}} = \sqrt{\frac{1900 \times 1880 \times 1344 \times 1360}{1360 \times 1344 \times 1880 \times 1900}} \\ &= 1 = \text{R.H.S.} \end{aligned}$$

TRT is verified

Factor reversal Test (FRT)

$$P_{01} \times Q_{01} = \frac{\sum p_1 q_1}{\sum p_0 q_0}$$

$$\begin{aligned} \text{L.H.S.} = P_{01} \times Q_{01} &= \sqrt{\frac{\sum p_1 q_0 \times \sum p_1 q_1 \times \sum q_1 p_0 \times \sum q_1 p_1}{\sum p_0 q_0 \times \sum p_0 q_1 \times \sum q_0 p_0 \times \sum q_0 p_1}} = \sqrt{\frac{1900 \times 1880 \times 1344 \times 1880}{1360 \times 1344 \times 1360 \times 1900}} \\ &= \frac{1880}{1360} = \frac{\sum p_1 q_1}{\sum p_0 q_0} = \text{R.H.S.} \end{aligned}$$

FRT is verified.

2.. Compute Laspeyre's , Paasche's, Marshall- Edgeworth, Dorbish – Bowley, and Fisher's Index numbers for 2000 from the following data.

Items	Base Year		Current Year	
	Price	Expenditure	Price	Expenditure
A	50	100	60	180
B	40	120	40	200
C	100	100	120	12
D	20	80	25	100

Solution :

Expenditure = price x quantity

Items	p0	Expenditure= p0q0	p1	Expenditure = p1q1	q0	q1	p0q1	p1q0
A	50	100	60	180	2	3	150	120
B	40	120	40	200	3	5	200	120
C	100	100	120	12	1	1	100	120
D	20	80	25	100	4	4	80	100
Total		400		600			530	460

Laspeyers Price Index Number is

$$P_{01} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100 = \frac{460}{400} \times 100 = 115$$

Paasche's Price Index Number is

$$P_{01} = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100 = \frac{600}{530} \times 100 = 113.21$$

MarshallEdge worth Price index number is

$$P_{01} = \frac{\sum p_1 q_0 + \sum p_1 q_1}{\sum p_0 q_0 + \sum p_0 q_1} \times 100 = \frac{460 + 600}{400 + 530} \times 100 = 113.97$$

Dorbish Bowley Price Index Number is

$$P_{01} = \frac{L+P}{2} = \frac{115+113.21}{2} = 114.105$$

Fisher's Price index number is

$$P_{01} = \sqrt{L \times P} = \sqrt{115 \times 113.21} = 114.1$$

3. Compute Laspeyre's , Paasche's, Marshall- Edgeworth, Dorbish – Bowley, and Fisher's Quantity Index numbers for 2000 from the following data.

Items	Price		Quantity	
	Base year	Current year	Base year	Current year
A	400	85	100	120
B	320	690	20	60
C	720	1600	10	10
D	720	2100	10	20

Solution :

Items	p ₀	p ₁	q ₀	q ₁	p ₀ q ₀	p ₁ q ₀	p ₀ q ₁	p ₁ q ₁
A	400	85	100	120	40000	85000	48000	102000
B	320	690	20	60	6400	13800	19200	41400
C	720	1600	10	10	7200	16000	7200	16000
D	720	2100	10	20	7200	21000	14400	42000
Total					60800	135800	88800	201400

Laspeyers quantity Index Number is

$$P_{01} = \frac{\sum q_1 p_0}{\sum q_0 p_0} \times 100 = \frac{88800}{60800} \times 100 = 146.05$$

Paasche's quantity Index Number is

$$P_{01} = \frac{\sum q_1 p_1}{\sum q_0 p_1} \times 100 = \frac{201400}{135800} \times 100 = 148.31$$

MarshallEdgeworth quantity index number is

$$P_{01} = \frac{\sum q_1 p_0 + \sum q_1 p_1}{\sum q_0 p_0 + \sum q_0 p_1} \times 100 = \frac{88800 + 201400}{60800 + 135800} \times 100 = 147.61$$

Dorbish Bowley quantity Index Number is

$$P_{01} = \frac{L+P}{2} = \frac{146.051+148.31}{2} = 147.18$$

Fisher's quantity index number is

$$P_{01} = \sqrt{L \times P} = \sqrt{146.51 \times 148.31} = 147.18$$