Index Numbers

EXERCISE [PAGES 59 - 60]

Exercise | Q 1.1 | Page 59

Choose the correct option:

Statements that are incorrect in relation to index numbers.

a) Index number is a geographical tool.

b) Index numbers measure changes in the air pressure.

c) Index numbers measure relative changes in an economic variable.

d) Index numbers are specialized averages.

1. **c and d**
2. a and b
3. b and c
4. a and d

Solution: c and d

Exercise | Q 1.2 | Page 59

Choose the correct option:

Statements that highlight the significance of index numbers.

a) Index numbers are useful for making future predictions.

b) Index numbers help in the measurement of inflation.

c) Index numbers help to frame suitable policies.

d) Index numbers can be misused.

1. b, c and d
2. a, c and d
3. a, b and d
4. **a, b and c**

Solution: a, b and c

Exercise | Q 1.3 | Page 59

Choose the correct option:

Statements that apply to weighted index numbers.

a) Every commodity is given equal importance.

b) It assigns suitable 'weights' to various commodities.

c) In most of the cases, quantities are used as weights.

d) Laaspeyre's and Paasche's method is used in the calculation of weighted index numbers.

1. **b, c and d**
2. a, c and d
3. a, b and d
4. a, b, c and d

Solution: b, c and d

Exercise | Q 1.4 | Page 59

Choose the correct option:

Statements related to limitations of index numbers.

a) Index numbers are not completely reliable.

b) There may be a bias in the data collected.

c) Every formula has some kind of defect.

d) Index numbers ignore changes in the qualities of products.

1. a, c and d
2. a, b, c and d
3. **a, b and d**
4. b, c and d

Solution: a, b and d

Exercise | Q 1.5 | Page 59

Choose the correct pair:

Group A	Group B
1) Price Index	a) $\frac{\sum p_1 q_1}{\sum p_0 q_0} \times 100$
2) Value Index	b) $\frac{\sum q_1}{\sum q_0} \times 100$
3) Quantity Index	c) $\frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$
4) Paasche's Index	d) $\frac{\sum p_1}{\sum p_0} \times 100$

1. 1-d, 2-c, 3-a, 4-b
2. **1-d, 2-a, 3-b, 4-c**
3. 1-b, 2-c, 3-d, 4-a
4. 1-c, 2-d, 3-a, 4-b

Solution:

1-d, 2-a, 3-b, 4-c

Group A	Group B
1) Price Index	d) $\frac{\sum p_1}{\sum p_0} \times 100$
2) Value Index	a) $\frac{\sum p_1 q_1}{\sum p_0 q_0} \times 100$
3) Quantity Index	b) $\frac{\sum q_1}{\sum q_0} \times 100$
4) Paasche's Index	c) $\frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$

Exercise | Q 2.1 | Page 60

Complete the Correlation:

Price Index : Inflation :: _____ : Agricultural production

Solution: Price Index : Inflation :: **Quantity Index** : Agricultural production

Exercise | Q 2.2 | Page 60

Complete the Correlation:

_____ : Base year prices :: p_1 : Current year prices

Solution: p_0 : Base year prices :: p_1 : Current year prices

Exercise | Q 2.3 | Page 60

Complete the Correlation:

Laaspeyre's index : _____ :: Paasche's index : Current year quantities

Solution: Laaspeyre's index : **Base year quantities** :: Paasche's index : Current year quantities

Exercise | Q 2.4 | Page 60

Complete the Correlation:

_____ : Single variable :: Composite index : Group of variables

Solution: univariate index : Single variable :: Composite index : Group of variables

Exercise | Q 3.1 | Page 60

Solve the following:

Calculate Price Index number from the given data:

Commodity	A	B	C	D
Price in 2005 (₹)	6	16	24	4
Price in 2010 (₹)	8	18	28	6

Solution:

Commodity	**Price in 2005 (₹) P_0**	**Price in 2010 (₹) P_1**
A	6	8
B	16	18
C	24	28
D	4	6
Total	$\sum P_0 = 50$	$\sum P_1 = 60$

⇒ Here, $\sum P_0 = 50$ and $\sum P_1 = 60$

Using Simple Aggregate Price Index formula

$$\therefore \text{Simple Aggregate Price Index} = \frac{\sum P_1}{\sum P_0} \times 100$$

$$= \frac{60}{50} \times 100$$

$$= 120$$

Exercise | Q 3.2 | Page 60

Solve the following:

Calculate Quantity Index number from the given data:

Commodity	P	Q	R	S	T
Base year quantities	170	150	100	195	205
Current year quantities	90	70	75	150	95

Solution:

Commodity	Base year quantities q_0	Current year quantities q_1
P	170	90
Q	150	70
R	100	75
S	195	150
T	205	95
Total	$\sum q_0 = 820$	$\sum q_1 = 480$

$$\text{Quantity Index Number} = \frac{\sum q_1}{\sum q_0} \times 100$$

$$= \frac{480}{820} \times 100$$

$$= 58.54$$

Exercise | Q 3.3 | Page 60

Solve the following:

Calculate Value Index number from the given data:

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	40	15	70	20
B	10	12	60	22
C	50	10	90	18
D	20	14	100	16
E	30	13	40	15

Solution:

Commodity	Base year	Current year

	p_0	q_0	p_0q_0	p_1	q_1	p_1q_1
A	40	15	600	70	20	1400
B	10	12	120	60	22	1320
C	50	10	500	90	18	1620
D	20	14	280	100	16	1600
E	30	13	390	40	15	600
Total	$\sum p_0q_0$	=	1890	$\sum p_1q_1$	=	6540

$$\text{value Index Number} = \frac{\sum p_1q_1}{\sum p_0q_0} \times 100$$

$$= \frac{6540}{1890} \times 100$$

$$= 346.03$$

Exercise | Q 3.4 | Page 60

Solve the following:

Calculate Laaspeyre's index from the given data:

Commodity	Base year		current year	
	Price	Quantity	Price	Quantity
X	8	30	12	25
Y	10	42	20	16

Solution:

Commodity	Base year		Current year			
	p_0	q_0	p_1	q_1	p_1q_0	p_0q_0
X	8	30	12	25	360	240
Y	10	42	20	16	840	420

Total					1200	660

$$\text{Laaspeyre's index} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$$

$$= \frac{1200}{660} \times 100$$

$$= 181.81$$

Exercise | Q 3.4 | Page 60

Solve the following:

Calculate Paasche's index from the given data:

Commodity	Base year		current year	
	Price	Quantity	Price	Quantity
X	8	30	12	25
Y	10	42	20	16

Solution:

Commodity	Base year		Current year			
	p_0	q_0	p_1	q_1	p_1q_1	p_0q_1
X	8	30	12	25	300	200
Y	10	42	20	16	320	160
Total					620	360

$$\text{Paasche's index} = \frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$$

$$= \frac{620}{360} \times 100$$

$$= 172.22$$

Exercise | Q 4.1 | Page 60

Distinguish between:

Simple Index Numbers and Weighted Index Numbers.

Solution: Simple Index Numbers:

- In this method, every commodity is given equal importance. It is the easiest method for constructing index numbers.
- This method can be applied to determine the Price Index Number, Quantity Index Number, and Value Index Number.

Weighted Index Number:

- In this method, suitable weights are assigned to various commodities. It gives relative importance to the commodity in the group. In most of the cases 'quantities' are used as weights.
- There are various methods of constructing weighted index numbers such as Laaspeyre's Price Index, Paasche's Price Index, etc.

Exercise | Q 4.2 | Page 60

Distinguish between:

Price Index and Quantity Index.

Solution:

Price Index	Quantity Index
1. Price Index Number is calculated by two methods, namely Simple Aggregative Method Simple Average of Price Relative Method	1. Quantity Index Number is calculated by two methods, namely Weighted Average of Price Relative Method Weighted Aggregative Method
2. Price Index number is also known as the Unweighted Index Number.	2. Quantity Index Number is also known as Weighted Index Number.
3. Price Index Number takes into account the prices of the commodity of the base year as well as of the current year.	3. Quantity Index takes into consideration the weights of goods assigned according to the quantity.

Exercise | Q 4.3 | Page 60

Distinguish between:

Laaspeyre's Index and Paasche's Index.

Solution:

Laaspeyre's Index

1. In Laspeyre's index, base year quantities are taken as weights.
2. The formula for calculating the index is:

$$P_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$$

Paasche's Index

1. In Paasche's index, current year quantities are taken as weights.
2. The formula for calculating the index is:

$$P_{01} = \frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$$

Exercise | Q 5.1 | Page 60

State with reason whether you agree or disagree with the following statement:

Index numbers measure changes in the price level only.

1. Agree
2. **Disagree**

Solution: Disagree

Index numbers are also used to measure changes in the price level from time to time. It enables the government to undertake appropriate anti-inflationary measures.

Exercise | Q 5.2 | Page 60

State with reason whether you agree or disagree with the following statement:

Index numbers are free from limitations.

1. Agree
2. **Disagree**

Solution: Disagree

Index numbers are generally based on samples. We cannot include all the items in the construction of the index numbers. Hence they are not free from sampling errors.

Exercise | Q 5.3 | Page 60

State with reason whether you agree or disagree with the following statement:

Index numbers can be constructed without the base year.

1. Agree
2. **Disagree**

Solution: Disagree

Index numbers can be misused. They compare a situation in the current year with a situation in the base year.

Exercise | Q 6.1 | Page 60

Answer the following:

Explain the features of index numbers.

Solution: Following are the various feature of index number:

1. **Measures of relative changes:** Index number measures relative or percentage changes in the variable over time.
2. **Quantitative expression:** Index numbers offer a precise measurement of the quantitative change in the concerned variable over time.
3. **Average:** Index numbers show changes in terms of average.

Exercise | Q 6.2 | Page 60

Answer the following:

Explain the significance of index numbers in economics.

Solution:
Significance of Index Numbers in Economics:
Index numbers are indispensable tools of economic analysis. Following points explain the significance of index numbers:

1. **Framing suitable policies:** Index numbers provide guidelines to policymakers in framing suitable economic policies such as agricultural policy, industrial policy, fixation of wages, and dearness allowances in accordance with the cost of living, etc.
2. **Studies trends and tendencies:** Index numbers are widely used to measure changes in economic variables such as production, prices, exports, imports, etc. over a period of time.
3. **Forecasting about the future economic activity**: Index numbers are useful for making predictions for the future based on the analysis of the past and present trends in the economic activities. For example, based on the available data pertaining to imports and exports, future predictions can be made. Thus, forecasting guides in proper decision making.
4. **Measurement of inflation:** Index numbers are also used to measure changes in the price level from time to time. It enables the government to undertake appropriate anti-inflationary measures. There is a legal provision to pay the D.A. (dearness allowance) to the employees in organised sector on the basis of changes in Dearness Index.

5. **Useful to present financial data in real terms:** Deflating means to make adjustments in the original data. Index numbers are used to adjust price changes, wage changes, etc. Thus, deflating helps to present financial data in real terms (at constant prices).

Exercise | Q 7.1 | Page 60

Answer in detail:

Explain the steps involved in the construction of index numbers.

Solution:

Following steps are involved in the construction of index numbers :

1. **Purpose of index number:** The purpose for constructing the index number, its scope as well as which variable is intended to be measured should be clearly decided to achieve fruitful results.
2. **Selection of the base year:** Base year is also called the reference year. It is the year against which comparisons are made. The base year should be normal i.e. it should be free from natural calamities. It should not be too distant in the past.
3. **Selection of items:** It is necessary to select a sample of the number of items to be included in the construction of a particular index number. For example, in the construction of price index numbers, it is impossible to include each and every commodity. The commodities to be selected should represent the tastes, habits, and customs of the people. Besides this, only standardized or graded items should be included to give better results.
4. **Selection of price quotations:** Prices of the selected commodities may vary from place to place and shop to shop in the same market. Therefore, it is desirable that price quotations should be obtained from an unbiased price reporting agency. To achieve accuracy, proper selection of representative places and persons is required.
5. **Choice of a suitable average:** Construction of index numbers requires the choice of a suitable average. Generally, the Arithmetic mean is used in the construction of index numbers because it is simple to compute compared to other averages.
6. **Assigning proper weights:** Weight refers to the relative importance of the different items in the construction of an index number. Weights are of two types i.e. quantity weights (q) and value weights (p x q). Since all items are not of equal importance, by assigning specific weights, better results can be achieved.

7. **Selection of an appropriate formula:** Various formulae are devised for the construction of index numbers. The choice of a suitable formula depends upon the purpose of the index number and availability of data.