Economics

(Statistics)

Chapter 7: Index Numbers

Index Numbers

Introduction to index number –

An index number is a statistical device for measuring changes in the magnitude of a group of related variables.

Characteristics of Index Numbers –

❖ Index numbers are not qualitative statements like prices are rising or falling. It is a precise measurement of quantitiative changes in the concerned variable.

❖ Index numbers show changes in terms of averages. For example when it is said that price level has been increased it does not mean that price of all goods and services have been increased. But it means that on and average prices have been increased.

❖ An Index number, indicating change in magnitude, as of price, wage, employment, or production shifts, relative to the magnitude at a standard or base value usually taken as 100.
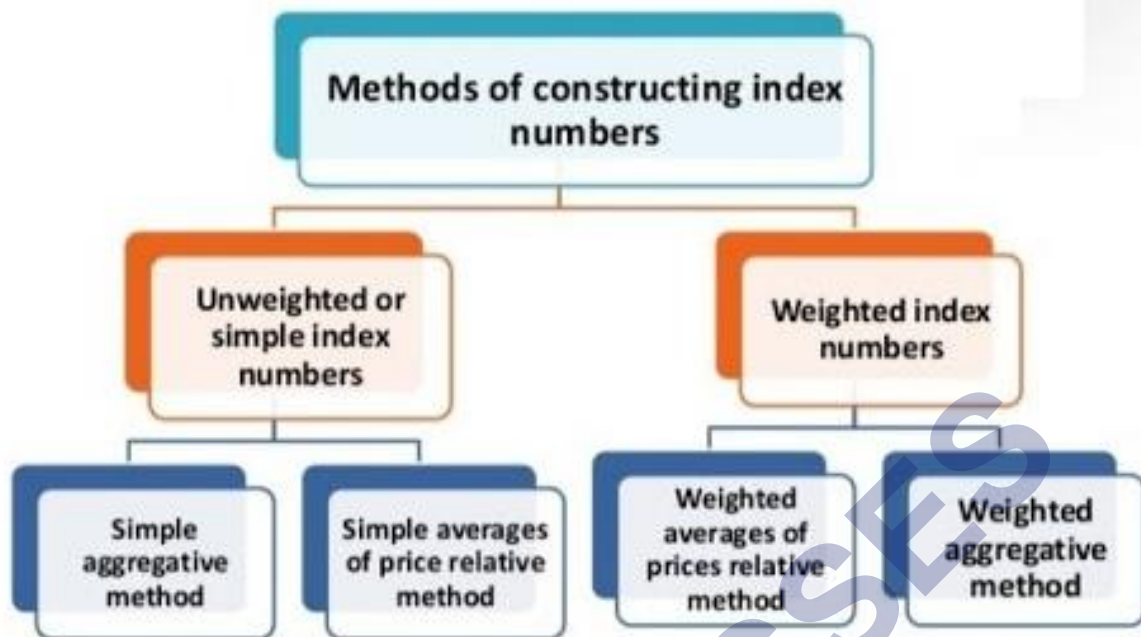
Types of Index Number –

Index numbers are names after the activity they measure.

Their types are as under:

❖ **Price Index:** Measure changes in price over a specified period of time. It is basically the ratio of the price of a certain number of commodities at the present year as against base year. Some price index numbers are Wholesale price Index (WPI), Consumer Price Index (CPI) or Cost of Living Index (COLI).

❖ **Quantity Index:** As the name suggest, these indices pertain to measuring change in volume of commodities like goods produced or goods consumed, etc.An important quantity index number is Index of Industrial Production (liP).

❖ **Value Index:** These pertain to compare changes in the monetary value of imports, exports, production or consumption of commodities.

Methods of Constructing Index Numbers –

(1)

Weighted Aggregative Method –

(i) Laspeyre's method :- $P01 = \dfrac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$

(ii) Pasche's method :- $P01 = \dfrac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$

(iii) Fisher's Method :- $P01 = \sqrt{\dfrac{\sum p_1 q_0}{\sum p_0 q_0} \times \dfrac{\sum p_1 q_1}{\sum p_0 q_1}} \times 100$

Fisher's Index Number - Is called ideal index number because:

- It considers both base year and current year quantity;
- It is based on Geometric Mean which is considered as best average.
- It satisfies time reversal & factor reversal test.

Weighted Average of Price Relative   -

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

Where $R = \frac{P_1}{P_0} \times 100$

$W = \text{Weight}$

❖ **Wholesales Price Index (WPI):**

(2)

WPI is used to measure the relative changes in the prices o commodities traded in the wholesale markets. presently 2011-12 i used as the base year. It is also used to calculate the rate of inflatio in a country.

❖ **Consumer Price Index (CPI) OR Cost of living Index (COLI):**

CPI can be measured through two methods:

➕ Aggregate expenditure method.

➕ Family budget method Aggregate expenditure method:

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

Family budget method :

$$CPI = \frac{\Sigma RW}{\Sigma W}$$

If W is not given ($W = p_0 q_0$)

$$R = \frac{p_1}{p_0} \times 100$$

❖ **Index of Industrial Production (IIP):**

The index of industrial production is a composite indicator that measures the short-term changes in the quantity of production of industrial products during a given period with respect to that in a chosen base period.

$$IIP = \frac{\Sigma \left(\frac{Q_1}{Q_0}\right) W}{\Sigma W} \times 100$$

Where Q_1 = Production level in current year

Q_0 = Production level in base year

W = Weightage of different industrial output

❖ **Inflation and Index Number:**

(3)

Inflation is the percentage increases in price level i.e prices of basket of goods and services over a specific period of time i respect of base year.
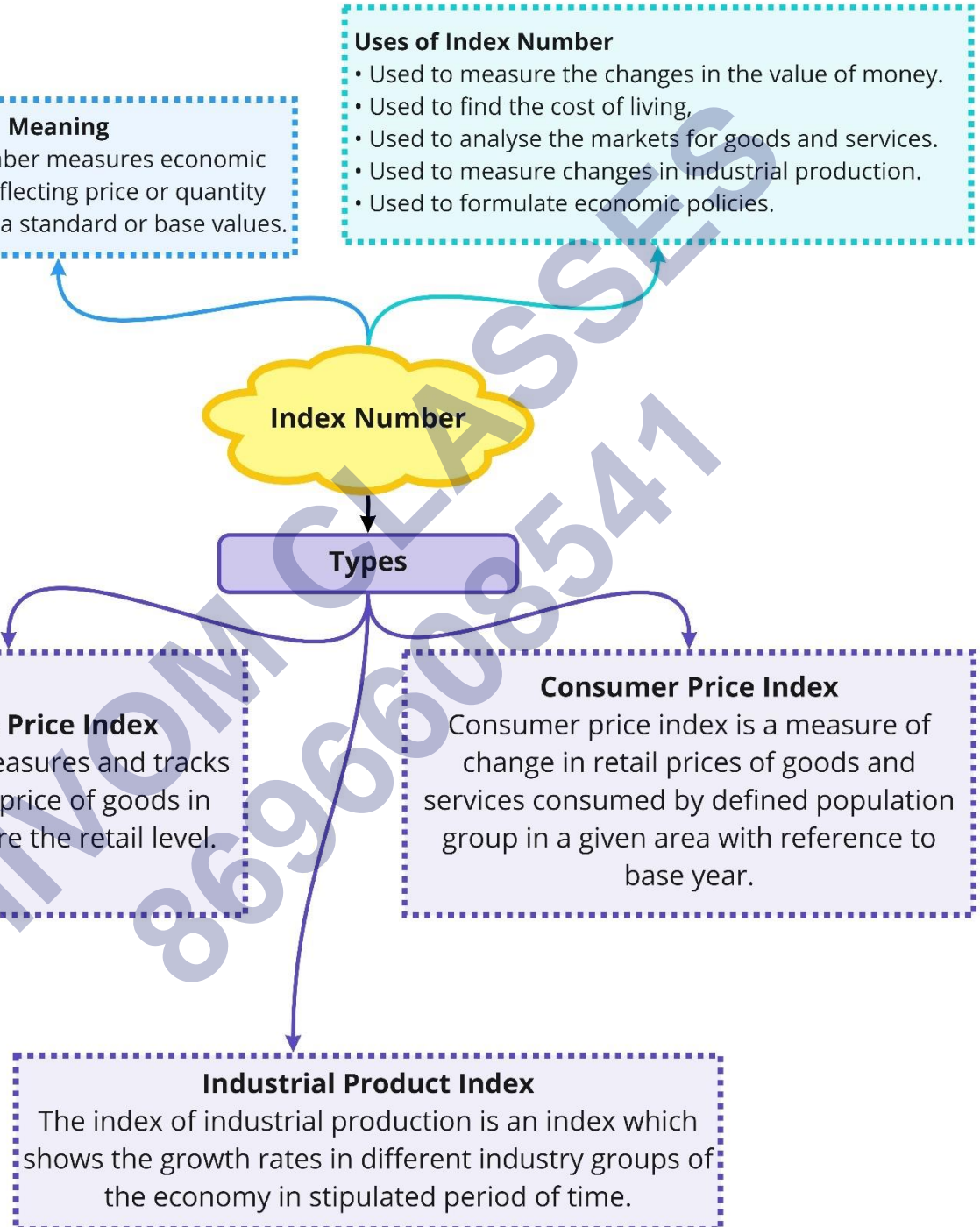
$$\text{Inflation Rate} = \frac{I_1 - I_0}{I_0} \times 100$$

$$\text{Where } I_1 = \text{Index of current period}$$
$$I_0 = \text{Index of base period.}$$

(4)

Class : 11th Economics (Statistics)
Chapter-8 : Index Number

Meaning
An index number measures economic data figure reflecting price or quantity compared with a standard or base values.

Uses of Index Number
• Used to measure the changes in the value of money.
• Used to find the cost of living,
• Used to analyse the markets for goods and services.
• Used to measure changes in industrial production.
• Used to formulate economic policies.

Index Number

Types

Wholesale Price Index
An index that measures and tracks the changes in price of goods in the stages before the retail level.

Consumer Price Index
Consumer price index is a measure of change in retail prices of goods and services consumed by defined population group in a given area with reference to base year.

Industrial Product Index
The index of industrial production is an index which shows the growth rates in different industry groups of the economy in stipulated period of time.

(5)

Important Questions

Multiple Choice questions-

1. Whose formula is considered ideal for the construction of index number?
    (a) Paasche's formula
    (b) Laspeyer's formula
    (c) Fisher's formula
    (d) None of these

2. Fisher's Ideal index is the:
    (a) Mean of Laspeyre's and Paasche's indexes
    (b) Median of Laspeyre's and Paasche's indexes
    (c) Geometric mean of Laspeyre's and Paasche's indexes
    (d) None of the above

3. Price Relatives = Current Year Price / ? × 100
    (a) Reference year price
    (b) Periodic year price
    (c) Base year price
    (d) Both (a) and (c)

4. In notation $_P01$, 1 stand for:
    (a) current year
    (b) reference year
    (c) both (a) and (b)
    (d) none of these

5. $_p01 = \Sigma_p 1q0 / \Sigma_{pq} 0 \times 100$ is the formula of:
    (a) Laspeyre's Method
    (b) Paasche's Method
    (c) Fisher's Method
    (d) none of these

6. Fisher's method of calculating index numbers is based on:
    (a) arithmetic mean
    (b) harmonic mean
    (c) geometric mean
    (d) none of these

7. Fisher's index number is considered ideal because:
    (a) it is based on variable weights
    (b) it satisfies Time Reversal Test

(6)

(c) it satisfies Factor Reversal Test
(d) all of these

8. Consumer Price Index is also known as:
    (a) Industrial Production Index
    (b) Cost of Living Index
    (c) Wholesale Price Index
    (d) none of these

9. The Paasche's index number is based on:
    (a) Base year quantities
    (b) Current year quantities
    (c) Average of current and base years
    (d) None of the above

10. Index number for the base period is always taken as:
    (a) 100
    (b) 50
    (c) 1
    (d) 200

11. Indices calculated by the chain base method are free from:
    (a) Seasonal variations
    (b) Errors
    (c) Percentages
    (d) Ratios

12. Index numbers helps in _____
    (a) studying the trends
    (b) deflating values
    (c) policy formation
    (d) All of these

13. A monthly price index that uses the price changes in consumer goods and services for measuring the changes in consumer prices over time is known as the
    (a) CPI
    (b) Laspeyres Index
    (c) Paasche Index
    (d) IIP

14. The aggregate index formula using base period quantities is known as:
    (a) Laspeyre's index
    (b) Fisher's Ideal index
    (c) Bowley's index
    (d) Paasche's index

15. Cost of living index is known as
    (a) cost price index
    (b) consumer price index
    (c) both
    (d) none

Very Short Questions:

1. Define index number.

2. What is a simple index number?

3. Define the weighted index number.

4. Explain price relative.

5. Define consumer price index number.

6. What is the wholesale price index?

7. State the two types of price index numbers.

8. What should be the base year like?

9. Name the consumer groups for which consumer price index number is computed.

10. Name one principal limitation of index numbers.

Short & Long Questions:

1. Concept and definition of index numbers?

2. Features or characteristics of index numbers?

3. Difficulties or problems in the construction of index numbers?

4. Advantages or uses of index numbers?

5. limitations of index numbers?

6. Simple and weighted index numbers?

7. Methods of constructing index numbers?

8. Importance of the Consumer Price Index or Cost of Living Index?

9. Difficulties in the Construction of Consumer Price Index?

(8)

11. Wholesale Price Index (WPI)

Assertion Reason Question:

1. Read the following statements given below and choose the correct alternative.

   (a) Both assertion and reason are true. The reason is the correct explanation of the assertion

   (b) Both assertion and reason are not true. The reason is not the correct explanation of the assertion

   (c) Assertion is true but the reason is not

   (d) Reason is true but the assertion is not

Assertion- wholesale price index measures the relative changes in the price of commodities traded in the wholesale markets.

Reason- wholesale price index is used for forecasting demand and supply.

2. Read the following statements given below and choose the correct alternative.

   (a) Both assertion and reason are true. The reason is the correct explanation of the assertion

   (b) Both assertion and reason are not true. The reason is not the correct explanation of the assertion

   (c) Assertion is true but the reason is not

   (d) Reason is true but the assertion is not

Assertion- Inflation refers to the situation of rising the general price level in our country over a fairly long period of time.

Reason- Inflation is measured in terms of a consumer price index.

ANSWER KEY

Multiple Choice Answers-

1. C

2. C

3. D

4. A

5. A

(9)

6. C

7. D

8. B

9. B

10. A

11. A

12. D

13. A

14. A

15. B

Very Short Answers:

1. An index number is a mathematical measure outlined to explain changes in a group of related variables or just variable considering the time, characteristics, and geographical location.

2. Simple index numbers are the index numbers in which all items of the series are accorded equal weightage or importance.

3. These are the index number in which different item of the series are accorded different weightage, depending upon their relative.

4. A price relative is the percentage ration of the value of a variable in the current year to its value in the base year.

5. It is the index number which measures the average change in the prices. The specific class of consumer pays this price for goods and services consumed by then in the current year in comparison with a base year.

6. The wholesale price index calculates the relative difference in the prices of goods traded in the wholesale markets.

7. The two types of price index numbers are.

   - Consumer Price Index

- Wholesale Price Index

8. The base year should be a year without wide fluctuations, neither very long nor concise period of study and for which reliable data are available.

9. The consumer groups for which consumer price index number is computed are.

- Industrial Workers

- Urban-Non Manual Employees

- Agricultural Labourers

10. One principal limitation of index numbers is that it owes a difference in unit of currency and the composition of production across the world. It is difficult to construct an index number that facilitates international comparison.

Short & Long Answers:

1. The concept of index number can be best understood through an illustration. Let us consider a situation of rising prices during the year 2018. In this context, we are faced with three basic questions. First, compared to which year have the prices risen during 2018? Second, how do we handle the situation when the prices of some goods rise more than the others? Thirdly, can prices of different goods be expressed in terms of any standard unit or different units are to be used to express prices of different goods and services, such that the price of milk is to be expressed in terms of rupees per liter, of cloth in terms of rupees per meter and of sweets in terms of rupees per kilogram. The study of Index Numbers answers all these questions: First, rise in prices during 2018 would be studied only with reference to some previous years like 2001 or 2004. Otherwise, the mere statement that prices during 2018 have tended to rise would make no sense. 2018 will be treated as the current year and 2001 or 2004 as the base year. Prices during the base year are taken as 100. Prices during the current year are related to the base year price. So that, we find out percentage change in price level over the years. Level of price is called the index of price. Since price of the base year is assumed to be 100, we can say that index of price of the base year is always 100. If base year is 2004 and the price index is 100, and if in the year 2018 prices are doubled, we shall conclude that the index of price in the year 2018 has shot up to 200 compared to 100 in the base year. As regards the second question (how do we handle the situation when prices of some goods change more than the others) the study of index numbers suggests to take average change. Thus, if the price of Potatoes has rises from 100 to 200 and the price of Onions has risen from 100 to 300, we shall consider average change only, viz. 200+300/2 = 250

Thus, it is the average index of prices for the various goods and services which is constructed for different years, and compared with the base year.

Third, as regards the problem of expressing the prices of various goods and services in some homogeneous units, the theory of Index Numbers suggests to consider only percentage change in prices of various goods and services. Once a change in price is expressed as a percentage change, the unit of the commodity (like litre of a milk, or meter of a cloth) loses its relevance.

Thus, what does the study of Index Numbers do? It helps us to find out percentage change in the values of different variables (may be prices of different goods or production of different commodities) over time with reference to some base year which happens to be the year of comparison. When various goods are studied simultaneously, the percentage change is taken as the average for all the goods.

Definition

In the words of Spiegel, "An Index Number is a statistical measure designed to show changes in a variable or group of related variables with respect to time, geographic location or other characteristics".

According to Croxton and Cowden, "Index Numbers are devices for measuring difference in the magnitude of a group of related variables".

2. Following are the three specific features or characteristics of index numbers:

(1) Relative Changes: Index numbers measure relative or percentage changes in the variable(s) over time. Index number of prices, for example, is not simply a statement of prices at different dates, it presents estimates of percentage changes in the prices over years with reference to some selected base year. If index of prices stands at 200 in 2018 compared to 100 in 2004-05 (the base year), it suggests that compared to the base year, prices have risen by 100 per cent.

(2) Quantitative Expression: Index numbers offer a precise measurement of the quantitative change in the concerned variable(s) over time. The index of prices, for example, will tell us that between the years 2017 and 2018, prices have risen by 7 percent, or that industrial production has declined by 3 per cent or that national income has risen just by 3.5 per cent during this period. The index numbers are not the qualitative statements like prices are rising or falling.

(3) Averages: Index numbers show changes in terms of averages. For example, when it is said that between the years 2017 and 2018, prices have risen by 7 per cent, it does not mean that prices of all goods and services have uniformly risen by 7 per cent; it only means that on an average there has been a 7 per cent rise in the prices of various goods and services. Even when prices of certain goods might have risen by more than 7 per cent and of certain others by less than 7 per cent.

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3. DIFFICULTIES OR PROBLEMS IN THE CONSTRUCTION OF INDEX NUMBERS

(1) Purpose of Index Number: There are various types of index numbers, constructed with different objectives. Before constructing an index number, one must define the objective. The construction of index number is significantly influenced by the objective or purpose of the study. Thus, for example, if the objective is to study the impact of change in the value of money on the consumers one should construct consumers' price index number. If we are to study the impact of change in the purchasing power of money on the producers, we shall construct index number on the basis of wholesale prices. Haberler has rightly pointed out that, "Different index numbers are constructed to fulfil different objective and before setting to construct a particular index number, one must clearly define one's object of study because, it is on the objective of the study, that the nature and format of the index number depends."

(2) Selection of Base Year: Selection of Base Year is another problem in the construction of index number. Base year is the reference year. It is the year with which prices of the current year are compared. As far as possible, Base Year should be a normal year.
That is, it should be the one without much ups and downs. Otherwise, the index values would fail to capture the real change in the variable. The year 2004-05 is treated as base year in India, at present.

(3) Selection of Goods and Services: Having defined the objective, the problem is of the selection of goods or Services to be included in the index number. To construct the Consumers' Price Index, for example, all commodities are not included. It is neither possible nor desirable to include all the goods and services produced in the country. We have to choose those goods and services which represent most of

Purpose of Constructing Index Number of

(i) Prices, and
(ii) Quantities

(i) Purpose of constructing index number of prices is to know the relative change or percentage change in the price level (made up of simple or weighted average of the prices of different goods and services) over time.

A rising general price level over time is a pointer towards inflation, while a falling general price level is a pointer towards deflation. Both inflation as well as deflation have notable consequences for an overall economic activity in the economy.

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(ii) Purpose of constructing index number of quantity is to know relative change or percentage change in the quantum or volume of output of different goods and services over time. This reflects the level of economic activity in the economy and its different sectors. A rising index of quantity suggest a rising level of economic activity and vice versa.

others in the market. In other words, commodities selected should be such as are widely consumed, for example, rice, milk, ghee, cloth, etc. Larger the number of goods and services more representative is the index number.

(4) Selection of the Prices of the Goods and Services: Having selected the goods and services, the problem arises of prices to be selected. Broadly, in the construction of Price Index, the problem is whether to adopt retail prices or wholesale prices, controlled or open market prices. The choice would depend upon the objective or purpose of the study.

(5) Finding the Average Prices: In the construction of index number, base year value is assumed to be 100 and other values of different years are related to 100. Thus, if cloth price is Rs. 5 per meter in the base year and is found to be Rs. 10 per meter in the current year, the index of prices of cloth would be 10/5 × 100 = 200 for the current year.

Likewise, price relatives for other commodities are worked out and average for these price relatives is determined and compared with the base year value of 100. It may be noted here that average of base year remains 100, but the average of the year under investigation may be more or less than 100. In case the average of the year under investigation is more than the average of the base year, it means that general price level has gone up. If it is less than the base year, it means that general price level has gone down. Generally, base year is indicated as 'O' and current year as T\ Price index is written as P01 and it is read as price index of year 1 in relation year 0.

(6) Selection of Weights: While constructing index number, weights are accorded to different commodities according to their relative significance. There are several methods of according weight, e.g., Fisher's method, Paasche's method, Laspeyre's method. While constructing weighted index number, one must justify his choice of weighting technique in accordance with the nature and objective of his study.

(7) Choice of Average: In finding out average values, different kinds of average may be used, geometric average, arithmetic average, etc. The choice of average significantly influences the results. Different kinds of averages may give different index number of a given change in price.

(8) Selection of Formula: Index numbers can be constructed with the help of many formulae, such as, Laspeyre's method, Paasche's method, Dorbish and Rowley's method, Fisher's method. One has to decide about the method to be used while constructing the index number.

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4. ADVANTAGES OR USES OF INDEX NUMBERS

Some of the main advantages or uses of index numbers are as under.

(1) Measurement of Change in the Price Level or the Value of Money: Most important use of index numbers is that index numbers measure the value of money during different periods of time. We can use index numbers to know the impact of the change in the value of money on different sections of the society. Accordingly, devices or means can be worked out to correct inflationary or deflationary gaps in the system.

(2) Knowledge of the Change in Standard of Living: Index numbers help to ascertain the living standards of people. Money incomes may increase but if index numbers show a decrease in the value of money, living standards may even decline. Thus, index numbers indicate change in real income.

(3) Adjustments in Salaries and Allowances: Cost of living index is a useful guide to the Government and Private Enterprises to make necessary adjustments in salaries and allowances of the workers. Increase in the cost of living index suggests increase in salaries and allowances.

(4) Useful to Business Community: Price index numbers serve as a useful guide to the business community in their planning and decisions. Trend of the prices significantly influence their production decisions.

(5) Information Regarding Production: Index numbers of production shows whether the level of agricultural and industrial production in the economy is increasing or decreasing. Accordingly, agricultural and industrial development policies are formulated.

(6) Information Regarding Foreign Trade: Index of exports and imports provides useful information regarding foreign trade. Accordingly, export-import policies are formulated.

(7) Useful to Politicians: Politicians come to know of the real economic condition in the country on the basis of index numbers. They offer constructive criticism of government's economic policies and give suggestions for economic reforms in the country.

5. LIMITATIONS OF INDEX NUMBERS

In the construction of index numbers, there are some practical difficulties and theoretical limitations. The same are as under:

(1) Not Completely True: Index numbers are not fully true. For example, one can only make an estimate of change in the value of money with the help of index numbers. The index numbers simply indicate arithmetical tendency of the temporal changes in the variable.

(2) International Comparison not Possible: Different countries have different basis of index numbers. These do not help international comparisons.

(3) Difference of Time: With the passage of time, it is difficult to make comparisons of index numbers. With the changing times, man's habits, tastes, etc., also undergo a change. Consequently, index numbers constructed on the basis of old consumption

pattern cannot be compared with the index numbers constructed on the basis of new consumption pattern.

(4) Limited Use: Index numbers are prepared with certain specific objective. If they are used for another purpose they may lead to wrong conclusions. For example, index numbers prepared to know about the economic condition of the teachers cannot be used to know about the economic condition of the labourers.

(5) Lack of Retail Price Index Numbers: Most of the index numbers are prepared on the basis of wholesale prices. But in real life, retail prices are most relevant, but it is difficult to collect retail prices. Index numbers based on wholesale prices may be misleading. t With regard to the limitations of index numbers, Coulbourn has rightly said, "In this changing world it is difficult to escape from the theoretical defects and in future, as far as we can see, it will not he possible, from theoretical point of view, to make use of the best method, of constructing the index number."

6. **SIMPLE AND WEIGHTED INDEX NUMBERS**

'Simple' and 'weighted' are the two broad categories of index numbers. Here is a brief description of these concepts.

Simple Index Numbers

These are the index numbers in which all items of the series are accorded equal weightage or importance. In case of a simple index of prices, for example, all goods and services are to be accorded equal weightage, no matter whether sale/purchase of certain goods is more than that of the others. It will be a simple average of the prices of different goods and services.
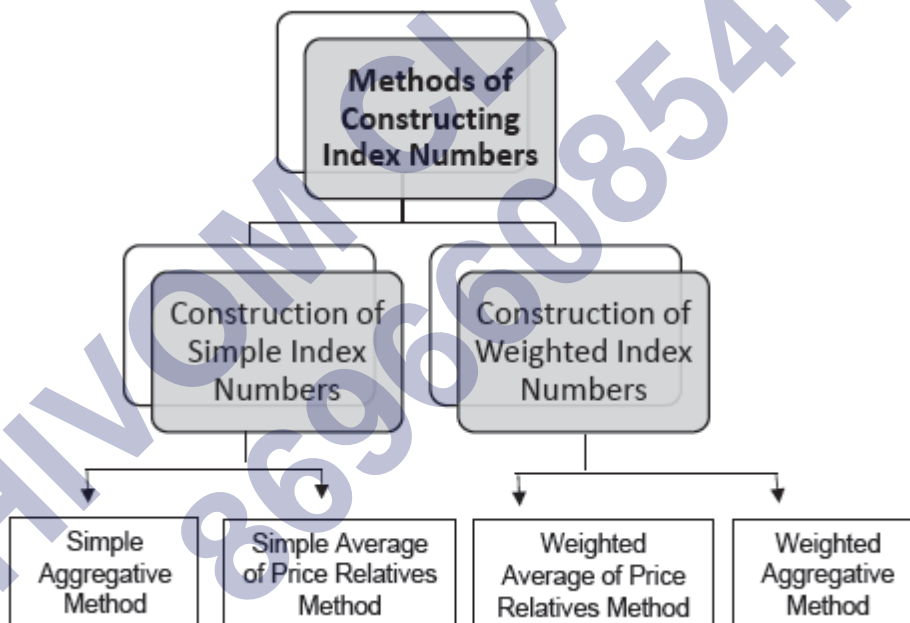
Weighted index Numbers

These are the index numbers in which different items of the series are accorded different weightage, depending upon their relative importance. It is not a simple

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average of prices of different goods and services, as in case of a simple price index. Instead, it is to be a weighted average of the prices of different goods. Thus, if the expenditure on rice is twice the expenditure on cloth, then in the construction of price index, price of rice may be accorded '2' as the weight compared to the weightage of T' to the price of cloth. Though difficult to construct, weighted index numbers certainly offer a much more realistic view of the change over time compared to the simple index numbers.

The basic difference between Simple Index and Weighted Index In the simple index, all items of the series are treated as of equal importance. In the weighted index, weights are accorded to different items depending on their relative importance.

7. METHODS OF CONSTRUCTING INDEX NUMBERS

The following chart shows the various methods of constructing index numbers (Simple as well as weighted):

Let us attempt a brief description of the various methods.

Base Year and its Characteristics
Base year is the year of comparison, also called reference year. It should bear the following characteristics:
(i) It should be a normal year, not showing wide fluctuations in the parameters related to the index number.
(ii) It should be a year for which reliable statistical data are available, so that comparison of the performance of the other years with the base year becomes meaningful-
(iii) It should not be a year too far from the period of study. Otherwise, relative change

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over time would not make much sense,

(iv) It should be neither very long nor very short period. Generally, it is not more than a year and not less than a month.

CONSTRUCTION OF SIMPLE INDEX NUMBERS
There are two methods of constructing simple index numbers:

(1) Simple Aggregative Method
In this method, aggregate of the prices of commodities in the current year are divided by the aggregate of their prices in the base year and multiplied by 100 to get index value for
the current year. It is expressed by the following formula:

FORMULA

$P01 = \Sigma P1/\Sigma P0 \times 100$
ΣPo
Here, P01 = Price index of the current year.
ΣPL = Sum of the prices of the commodities in the current year.
$\Sigma P0$ = Sum of the prices of the commodities in the base year.
Current Year: Current year is the year for which average change is to be measured or index number is to be calculated.
Base Year: Base year is the year of reference from which we want to measure extent of change in the current year. The index number of base year is generally assumed to be 100.

Illustration.
Given the following data and assuming 2004 as the base year, find out index value of the prices of different commodities for the year 2018.

Commodity	A	B	C	D	E
Price in 2004 (Rs.)	50	40	10	5	2
Price in 2018 (Rs.)	80	60	20	10	6

Solution:
Construction of a Simple Index Number— Simple Aggregative Method

Commodity	2004 Price (Rs.) (P_0)	2018 Price (Rs.) (P_1)
A	50	80
B	40	60
C	10	20
D	5	10
E	2	6
Total	$\Sigma P_0 = 107$	$\Sigma P_1 = 176$

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

$= 176/107 \times 100$

$= 164.49$

Price Index = 164.49.

(2) Simple Average of Price Relatives Method

According to this method, we first find out price relatives for each commodity and then take simple average of all the price relatives.

What is Price Relative?

A price relative is the percentage ratio of the value of a variable in the current year to its value in the base year. In other words, a price relatives is a percentage ratio between

price of a commodity in the current year and that in the base year.

Price Relatives, P01 = Current Year Price (P1) **/** Base Year Price (P0) × 100

We can find out price index number of the current year by using the following formula.

FORMULA

$P01 = \Sigma(P1/P0 \times 100)/N$

An Important Caution

Prices for different commodities are expressed with reference to different units of measurement. Price of steel, for example, is expressed as rupee per kg, while the price of milk is expressed as rupee per liter, and the price of doth is expressed as rupee per meter. Simple aggregate method of index numbers cannot be used for commodities with different units of measurement. It can be used only for those commodities which have a common unit of measurement. (Here,

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$P1/P0 \times 100 \times 100$ = Price relatives; N = Number of goods; P, = Current year's value; P0 = Base year's value.)

Illustration.

Given the following data and using the Price Relatives Method, construct an index number for the year 2018 in relation to 2004 prices.

Commodity	Wheat	Ghee	Milk	Rice	Sugar
2004 Price (Rs.)	100 (per qt.)	8 (per kg)	2 (per l)	200 (per qt.)	1 (per kg)
2018 Price (Rs.)	200	40	16	800	6

Notation of 0 and 1

Often the notation of 0 stands for the base year, and 1 stands for the current year.

Solution:

Construction of a Simple Index Number— Simple Average of Price Relative Method

Commodity	Base Year 2004 Price (P_0)	2018 Price (P_1)	Price Relatives of 2018 in relation to 2004 $\left(\frac{P_1}{P_0} \times 100\right)$
Wheat	100 (per qt)	200 (per qt)	$\frac{200}{100} \times 100 = 200$
Ghee	8 (per kg)	40 (per kg)	$\frac{40}{8} \times 100 = 500$
Milk	2 (per l)	16 (per l)	$\frac{16}{2} \times 100 = 800$
Rice	200 (per qt)	800 (per qt)	$\frac{800}{200} \times 100 = 400$
Sugar	1 (per kg)	6 (per kg)	$\frac{6}{1} \times 100 = 600$
N = 5			$\Sigma\left(\frac{P_1}{P_0} \times 100\right) = 2,500$

P01 = Σ(P1/P0 × 100)/N = 2,500/5 = 500
Price Index = 500.

CONSTRUCTION OF WEIGHTED INDEX NUMBERS

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There are two methods of constructing weighted index numbers, as discussed below:
(1) Weighted Average of Price Relatives Method

Not all Commodities are Ever Included

Not all commodities are ever included in the construction of an Index Number. Only a sample of commodities is taken which represents characteristics of the entire group of commodities under study.

According to this method, weighted sum of the price relatives is divided by the sum total of the weights. In this method, goods are given weight according to their quantity. Thus,

FORMULA
$P01 = \Sigma RW/\Sigma W$

(Here, P01 = Index number for the current year in relation to the base year; W = Weight;
R = Price relative.)

8. **Importance of the Consumer Price Index or Cost of Living Index**

(1) Formulation of Price Policy: The consumer price indices are used by government to frame policies on prices. On the basis of these indices government decides whether the prices are to be controlled, dual price policy should be adopted or public distribution system is to be introduced, etc. Also, government policies like rent control and taxation, general economic and fiscal policies etc. are framed on the basis of the consumer price index numbers to a large extent.

(2) Wage Adjustment: Cost of living index numbers are used as basis for the wage adjustments. The rates of dearness allowances are decided by the government on the basis of these indices. These indices are also used for wage contracts and wage agreements of the workers.

(3) Measurement of Real Value: These index numbers are used to measure the real value
of the rupee or its purchasing power and real income (or revenue), etc.

(4) Analysis of Markets: The consumer price indices are also used for the analysis of the market of specific commodities for their demand and supply.

(5) National Income Deflator: These indices are also used as deflators of national income. Accordingly, real change in national income is estimated.

9. **Difficulties in the Construction of Consumer Price Index**
There are many difficulties in the construction of consumer price index. These are as follows:

(21)

(1) Difference in the Standards of Living: Consumption pattern of different classes of consumers are different and therefore, have different living standards. Thus, there cannot be one consumer price index number for different classes of society.

(2) Difference in Prices: The price indices are constructed on the basis of retail prices. But the retail prices vary from place to place and even at the same place from shop to shop. As such it is very difficult to find a representative price for the calculation of consumer price index.

(3) Difference in the Proportion of Expenditure: All the members of any particular group do not spend on various items of consumption in same ratio and even one person does not spend on various commodities in the same ratio at two different periods of time. A consumer's purchase ratio depends upon his/her taste, habits, etc. Accordingly, it is difficult to construct a cost of living index that truly reflects a change in the cost of living over time.

10. WHOLESALE PRICE INDEX (WPI)

The Wholesale Price Index (WPI) measures the relative changes in the prices of commodities traded in the wholesale markets. In India, the wholesale price index numbers are constructed on weekly basis. The year 2011-12 is being used as the base year.

Commodity Group and Weightage of Wholesale Price Index
In India, all the commodities have been classified in the following three groups:

Commodity Group	Name of Commodities	Weightage
(i) Primary Articles	These include 98 commodities like Rice, Fruits, Pulses, Vegetables and Non-food articles like Cotton, Jute, Metals.	22.02
(ii) Fuel, Power, Light and Lubricants	These include 19 items like Coal, Petroleum Products, Electricity, LPG.	14.23
(iii) Manufacturing	It includes 318 items like Textiles, Sugar, Paper, Machinery, Chemicals, Fertilizers, Leather, etc.	63.75

The basic difference of purpose behind the Consumer Price Index Number and the Wholesale Price Index Number

In case of consumer price index number, the basic purpose is to know cost of living of a specified group of consumers in the society. In case of wholesale index number, the basic purpose is to assess the situations of overall demand and supply in the economy.

(22)

Rising prices indicate a situation of excess demand, while falling prices suggest a situation of deficient demand. Wholesale price index focuses on the rate of inflation in the economy.

Producer Price Index As in many countries, in India also, efforts are afoot to shift from WPI (Wholesale Price Index) to Producer Price Index. Producer-Price refers to the basic price

including taxes, trade margins and transport cost. Producer Price Index is expected to offer better insights into the analysis of price trends in the country.

Uses of Wholesale Price Index

(1) Forecasting Demand and Supply: The wholesale price indices are often used to forecast demand and supply situation in the economy. An increase in wholesale price index is an indication of excess demand. It is a situation in which demand is greater than supply. On the other hand, a decrease in wholesale price index implies deficient demand. It is a situation in which demand is less than supply.

(2) Estimation of Monetary Value and Real Value: The wholesale price index can be used to estimate the monetary value and real value of aggregates like national income and expenditure. Monetary value is the value estimated at current year prices. Real value is the value estimated at base year prices or at constant prices. The monetary aggregate can be

converted into real aggregate by applying the following formula:
Real Aggregate of the Current Year = Monetary Aggregate of the Current Year
Price Index of Base Year/Price Index of Current Year

(3) Indicator of Rate of Inflation: The wholesale price index is also applied to calculate the rate of inflation in a country. It refers to the rate at which prices tend to increase over time.

Assertion Reason Answer:

1. (b) Both assertion and reason are not true. The reason is not the correct explanation of the assertion.

2. (b) Both assertion and reason are not true. The reason is not the correct explanation of the assertion.