<div style="text-align: center; border: 1px solid black;">

# Lesson – 11

# Index Number

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## Summary

Index number in statistics is an instrument to measure change in a variable or variables over a given period of time. It provides the basis to determine changes in the magnitude of a group of related variables. Index number facilitates the comparative study over different time period. Index numbers are expressed in terms of percentages. Index numbers occupy an important place due to its efficacy in measuring the extent of economic changes across a stipulated period. In this chapter We will about various methods to calculate index numbers and its application in economics.

## Meaning of Index Numbers

- An index number is a statistical measure, designed to measure changes in a variable, or a group of related variables.
- Index number is a single ratio (or a percentage) which measures the combined change of several variables between two different times, places or situations.
- Index Number expresses the relative change in price, quantity, or value compared to a base period.
- Index Numbers expresses the relative change in price, quantity, or value compared to a base period.

The period with which the comparison is to be made, is known as the base period.

## Characteristics of Index Numners

- Index numbers are a special type of average that provides a measurement of relative changes over the period of time.
- Index numbers are expressed in terms of percentages to show the extent of relative change.
- Index numbers measure relative changes. They measure the relative change in the value of a variable or a group of related variables.

- Index numbers can also measure changes which are not directly measurable. For Example the cost of living.

## Uses of Index Numbers

- Index numbers are economic barometers. Index numbers measure the level of business and economic activities.
- Index numbers helps in formulating suitable economic policies and planning etc.
- Index numbers are used in studying trends and tendencies.
- Index numbers are useful in forecasting future economic activity.
- Index numbers measure the purchasing power of money. The cost of living index numbers determine whether the real wages are rising or falling or remain constant.

## Construction of an Index Number

Un - weighted Index Number

Weighted Index Number

## Un – weighted Index Number

- **Simple Aggregate Method**

$$P_{01} = \frac{\sum P_1}{\sum P_{0.}} \times 100$$

$\sum P_1$ = Sum of current year`s prices of commodity
$\sum P_{0.}$ = Sum of base year`s prices of commodity

- **Simple Average of Price Relative Method**

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

$\frac{P_1}{P_0} \times 100$ = Price Relative of commodity

$N$ = No. of commodities

Number of commodities

## Weighted Index Number

- **Weighted Aggregative Price Indices**
- Lasyeyre`s price index and Paasche's price index are the two most important methods of calculating weighted price indices.
- **Laspeyre's Price index number –**

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

$P_{1 =}$ Current year price

$P_0 =$ Base year price

$Q_0 =$ Base year quantity

- Lasyeyre`s price index number is the weighted aggregative price index number which uses base year's quantity as the weights.
- **Paasche's price index number –**
- It is the weighted aggregative price index number *which* uses current year's quantity as the weights.

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

$P_1 =$ Current year price

$P_0 =$ Base year price

$Q_1 =$ Current year quantity

## Weighted Price Relative Method

- According to this method this method price index is constructed on the basis of price relatives and not on the basis of absolute prices. The price index is obtained by taking the average of all weighted price relatives.

$$P_{01} = \frac{\sum W \left(\frac{P_1}{P_0} \times 100\right)}{\sum W}$$

Where, $P_{01} =$ Weighted Arithmetic Mean

## Some other Important Index Numbers

### Consumer Price Index

- A consumer price index (CPI) measures changes in the price level of a basket of consumer goods and services purchased by households. CPI measures changes in the price level for the specified consumers in the particular region.
- CPI can be calculated for industrial workers, urban labours, Agricultural workers etc.

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

Where, $P = \frac{P_1}{P_0} \times 100$
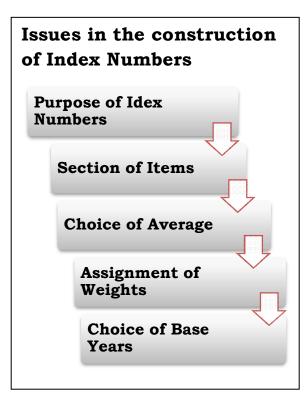
$\sum W = Weights$

### Wholesale Price Index Number

- The Wholesale Price Index or WPI is the price of a representative basket of wholesale goods. The wholesale price index number indicates the change in the general price level.

## Industrial production index

- The industrial production index indicates the change in the level of industrial production in the given period comprising many industries. It is a weighted average of quantity relatives.

*Industrial Production Index*

$$= \frac{\sum Q_1 \times W}{\sum W}$$

## Issues in the construction of Index Numbers

**Purpose of Idex Numbers**

**Section of Items**

**Choice of Average**

**Assignment of Weights**

**Choice of Base Years**