Sub: Statistics
Topic : Index Number
Lecture Notes 1
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MEANING AND CONCEPT OF INDEXNUMBERS

When we talk that the general level of industrial production has registered an increase of 4 per cent, it is obvious that we are referring to the production of all those items that are produced by the industrial sector. However, production of some of these items may be increasing while that of others may be decreasing or may remain constant. The rate of increase or decrease and the units in which these items are expressed may differ. For instance, cement may be quoted per kg, cloth may be per meters, cars may be per unit etc. In such a situation, when the purpose is to measure the changes in the average level of prices or production of industrial products for comparing over a time or with respect to geographic location, it is not appropriate to apply the technique of measure of central tendency because it is not useful when series are expressed in different units or/and in different items.

It is in these situations, that we need a specialised average, known as index numbers. These are often termed as 'economic barometers'.

An index number may be defined as a special average which helps in comparison of the level of magnitude of a group of related variables under two or more situations.

Index numbers are a series of numbers devised to measure changes over a specified time period (the time period may be daily, weekly, monthly, yearly, or any other regular time interval), or compare with reference to one variable or a group of related variables. Thus, each number in a series of specified index number is:

a) A pure number i.e., it does not have any unit.

b) Calculated according to a pre-determined formula.

c) Generated at regular time intervals, sometimes during the same time interval at different places.

d) The regular generation of numbers form a chronological series.

e) With reference to some specified period and number known as base period and base number, the latter is always 100. For example, if the consumer price index, with base year 1996 is calculated to be 180 for the year 2003, it means that consumer prices have increased by 80 per cent in 2003 as compared to the prices prevalent in 1996.

USES OF INDEX NUMBERS

Though originally the index number was developed for measuring the effect of change in prices, today they have become indispensable for analyzing the data related to business and economic activity. This statistical tool can be used in several ways as follows:

1) Decision makers use index numbers as part of intermediate computations to understand other information better. Nominal income can be transformed into real income. Similarly, nominal sales into real sales & so on …, through an appropriate index number. Consumer price index, also known as cost of living index, is arrived at for a specified group of consumers in respect of prices of specific commodities and services which they usually purchase. This index serves as an indicator of 'real' wages (or income) of the consumers.

For example, an individual earns Rs. 100/- in the year 1970 and his earnings increase to Rs. 300/- in the year 1980. If during this period, consumer price index increases from 100 to 400 then the consumer is not able to purchase the same quantity of different commodities with Rs. 300, which he was able to purchase in the year 1970 with his income of Rs. 100/-. This means the real income has declined. Thus real income can be calculated by dviding the actual income by dividing the consumer price index:

$$\text{Real income in 1980} = \frac{\text{Actual income in 1980}}{\text{Consumer price index of 1980}}$$

$$= \frac{300}{400} = \text{Rs. 75 /– with respect to 1970 as base year.}$$

Therefore, the consumer's real income in the year 1980 is Rs. 75/- as compared to his income of Rs. 100/- in the year 1970. We can also say that because of price increase, even though his income has increased, his purchasing power has decreased.

2) Different types of price indices are used for wage and salary negotiations, for compensating in price rise in the form of DA (Dearness Allowance).

3) Various indices are useful to the Government in framing policies. Some of these include taxation policies, wage and salary policies, economic policies, custom and tariffs policies etc.

4) Index numbers can also be used to compare cost of living across different cities or regions for the purpose of making adjustments in house rent allowance, city compensatory allowance, or some other special allowance.

5) Indices of Industrial Production, Agricultural Production, Business Activity, Exports and Imports are useful for comparison across different places and are also useful in framing industrial policies, import/export policies etc.

6) BSE SENSEX is an index of share prices for shares traded in the Bombay Stock Exchange. This helps the authorities in regulating the stock market. This index is also an indicator of general business activity and is used in framing various government policies. For example, if the share prices of most of the companies comprising any particular industry are continuously falling, the government may think of changes in its policies specific to that industry with a view to helping it.

7) Sometimes, it is useful to correlate index related to one industry to the index of another industry or activity so as to understand and predict changes in the first industry. For example, the cement industry can keep track of the index of construction activity. If the index of construction activity is rising, the cement industry can expect a rise in demand for cement.

CLASSIFICATION OF INDEX NUMBERS

There are three principal types of indices: **price indices, quantity indices, and value indices.**

Price Indices: This type of indices is the most frequently used. Price indices consider prices of a commodity or a group of commodities and compare changes of prices from one period to another period and also compare the difference in price from one place to another. For example, the familiar Consumer Price Index measuring overall price changes of consumer commodities and services is used to define the cost of living.

Quantity Indices: The major focus of consideration and comparison in these indices are the quantities either of a single commodity or a group of commodities. For example, the focus may be to understand the changes in the quantity of paddy production in India over different time periods. For this purpose, a single commodity's quantity index will have to be constructed.
Alternatively, the focus may be to understand the changes in food grain production in India, in this case all commodities which are categorized under food grains will be considered while constructing the quantity index.

Value Indices: Value indices actually measure the combined effects of price and quantity changes. For many situations either a price index or quantity index may not be enough for the purpose of a comparison. For example, an index may be needed to compare cost of living for a specific group of persons in a city or a region. Here comparsion of expenditure of a typical family of the group is more relevant. Since this involves comparing expenditure, it is the value index which will have to be constructed. These indices are useful in production decisions, because it avoids the effects of inflation.

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