

## Measurement of Seasonal Variations

The objectives for studying seasonal patterns in a time series are

- (i) To isolate the seasonal variations, i.e., to determine the values of the phenomenon if there were no the effect of seasonal swings on the value of the given phenomenon and
- (ii) To eliminate them, i.e., to determine the value of the phenomenon if there were no seasonal ups and downs in the series. This is known as de-seasonalizing the given data and is necessary for the study of cyclic variations.

The determination of seasonal effects is of paramount importance in planning (i) business efficiency or (ii) a production programme. For the study of seasonal variations, the data must be given for parts of year viz., monthly or quarterly, weekly, daily or hourly. Different methods for measuring seasonal variations are

1. Method of simple Averages
2. Ratio to Trend Method
3. Ratio to Moving Average Method
4. Link Relative Method
5. De-seasonalisation of data.

### 1. Method of simple Averages:

This is the simplest method of measuring seasonal variations in a time series and involves the following steps.

- (i) Arrange the data by years and months (or quarterly data are given).
- (ii) Compute the Average  $\bar{x}_i$ , ( $i = 1, 2, \dots, 12$ ) for the  $i^{\text{th}}$

month for all the years.

(iii) Compute the average  $\bar{x}$  of the monthly Averages,

$$\text{i.e., } \bar{x} = \frac{1}{12} \sum \bar{x}_i.$$

(iv) Seasonal indices for different months are obtained by expressing monthly averages as percentage of  $\bar{x}$ . Thus

$$\text{Seasonal Index for } i^{\text{th}} \text{ month} = \frac{\bar{x}_i}{\bar{x}} \times 100; \quad i = 1, 2, \dots, 12.$$

### Remarks

1. If instead of monthly averages, we use monthly totals, for all the years, the result remain the same.
2. Total of seasonal indices is  $12 \times 100 = 1200$  for monthly data and  $4 \times 100 = 400$  for quarterly data.

### Merits and Demerits.

This method is based on the basic assumption that the data do not contain any trend and cyclic components and consists in eliminating irregular components by averaging the monthly values over different years. Since most of the economic time series have trends, these assumptions are not in general true and as such this method, though simple, is not of much practical utility.

Ex Use the method of monthly averages to determine the monthly indices for the following data.

Month	Production in lakhs of tonnes			Total	Monthly Avg.	Seasonal Index.	
	2002	2003	2004				
Oct 10 12 10							
Nov 12 13 11							
Dec 15 14 15							
Jan	12	15	16		14.33	$\frac{14.33}{13.6625} \times 100 = 104.856$	
Feb	11	14	15		13.33		
Mar	10	13	14				
Apr	14	16	16				
May	15	16	15				
Jun	15	15	17				
July	16	17	16				
Aug	13	12	13				
Sep	11	13	10				
Total	492			163.95			1200
Averages	41				$\bar{x} = 13.6625$		100