



**TRINITY COLLEGE FOR WOMEN
NAMAKKAL
Department of Mathematics**

**BUSINESS STATISTICS
21USTA02 - ODD Semester**

Topic: Analysis of Time Series

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Analysis of Time Series

- ❖ A Time Series is a collection of observations made sequentially in time.
- ❖ Time series analysis is used for non-stationary data—things that are constantly fluctuating over time or are affected by time.
- ❖ Time series analysis helps organizations understand the underlying causes of trends or systemic patterns over time.

Components of Time Series

Short – Term Effect

Long – Term Effect

Seasonal Fluctuations

Cyclical Fluctuations

Secular Trend

Irregular Variations

- Secular trend, which describe the movement along the term
- Seasonal variations, which represent seasonal changes
- Cyclical fluctuations, which correspond to periodical but not seasonal variations;
- Irregular variations, which are other nonrandom sources of variations of series.

Additive Model

$$Y = T+S+C+I$$

Where

T- trend

S- seasonal variation

C- cyclical variation

I- irregular variation

When short-term variation is to be found out as per this model,

$$\text{Short-term variation} = Y - Y_t$$

Multiplicative Model

$$Y = T \times S \times C \times I$$

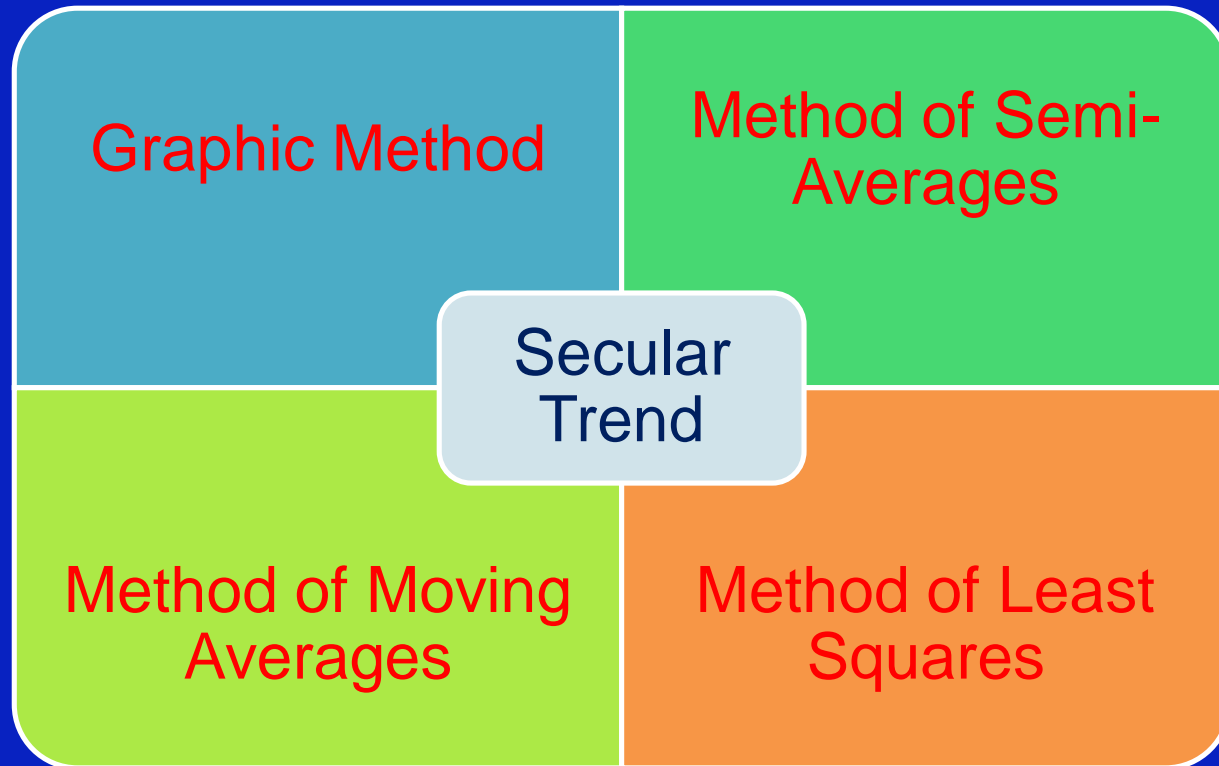
Many time series in Economics and Business are found to be of multiplicative model.

A few other series are found to be of additive model.

The relation between the observed value and the components is called Model.

Secular Trend

There are four methods to estimate the secular trend.



Graphic Method

It is known as free-hand method.

- ❑ The no. of points above the line is equal to the number points below the line, as far as possible.
- ❑ The sum of the vertical distances of the points above the line equals that of the points below the line.
- ❑ The sum of the squares of the vertical distances of all the points from the line is the minimum.

Method of Semi-Averages

When there are even no. of years, the middle most year and the arithmetic mean of the observed values are found out for each half.

When there are odd no. of years, the middle most year and the corresponding observed values are omitted.

THANK YOU

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