

Time Series Patterns

Trend

A trend exists when there is a long-term increase or decrease in the data. It does not have to be linear. Sometimes we will refer to a trend “changing direction” when it might go from an increasing trend to a decreasing trend.

Seasonal

A seasonal pattern exists when a series is influenced by seasonal factors (e.g., the quarter of the year, the month, or day of the week). Seasonality is always of a fixed and known period.

Cyclic

A cyclic pattern exists when data exhibit rises and falls that are *not of fixed period*. The duration of these fluctuations is usually of at least 2 years.

Many people confuse cyclic behaviour with seasonal behaviour, but they are really quite different. If the fluctuations are not of fixed period then they are cyclic; if the period is unchanging and associated with some aspect of the calendar, then the pattern is seasonal. In general, the average length of cycles is longer than the length of a seasonal pattern, and the magnitude of cycles tends to be more variable than the magnitude of seasonal patterns.

The following four examples shows different combinations of the above components.

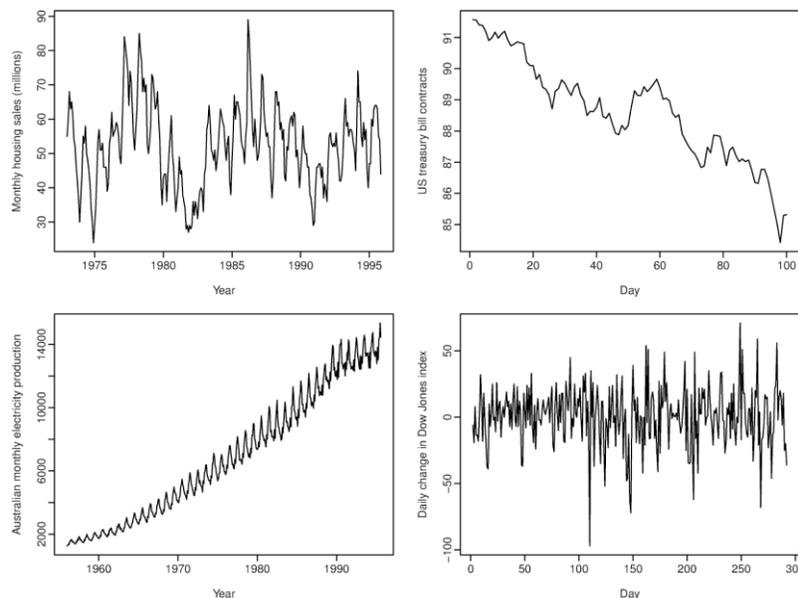


Figure: Four time series exhibiting different types of time series patterns.

The monthly housing sales (top left) show strong seasonality within each year, as well as some strong cyclic behaviour with period about 6–10 years. There is no apparent trend in the data over this period.

The US treasury bill contracts (top right) show results from the Chicago market for 100 consecutive trading days in 1981. Here there is no seasonality, but an obvious downward trend. Possibly, if we had a much longer series, we would see that this downward trend is actually part of a long cycle, but when viewed over only 100 days it appears to be a trend.

The Australian monthly electricity production (bottom left) shows a strong increasing trend, with strong seasonality. There is no evidence of any cyclic behaviour here.

The daily change in the Dow Jones index (bottom right) has no trend, seasonality or cyclic behaviour. There are random fluctuations which do not appear to be very predictable, and no strong patterns that would help with developing a forecasting model.

Source: <http://hydropedia.blogspot.in/search/label/Cyclic>