TREND PROJECTION

Trend projection method: This method is a version of the linear regression technique. It attempts to draw a straight line through the historical data points in a fashion that comes as close to the points as possible. (Technically, the approach attempts to reduce the vertical deviations of the points from the trend line, and does this by minimizing the squared values of the deviations of the points from the line). Ultimately, the statistical formulas compute a slope for the trend line (b) and the point where the line crosses the y-axis (a). This results in the straight line equation

$Y = a + bX$

Where X represents the values on the horizontal axis (time), and Y represents the values on the vertical axis (demand).

For the demonstration data, computations for b and a reveal the following ***(NOTE: I will not require you to make the statistical calculations for b and a; these would be given to you. However, you do need to know what to do with these values when given to you.)***

$b = 30$

$a = 295$

$Y = 295 + 30X$

This equation can be used to forecast for any year into the future. For example:

Year 7: Forecast = 295 + 30(7) = 505

Year 8: Forecast = 295 + 30(8) = 535

Year 9: Forecast = 295 + 30(9) = 565

Year 10: Forecast = 295 + 30(10) = 595

STABILITY VS. RESPONSIVENESS IN FORECASTING

All demand forecasting methods vary in the degree to which they emphasize recent demand changes when making a forecast. Forecasting methods that react very strongly (or quickly) to demand changes are said to be ***responsive.*** Forecasting methods that do not react quickly to demand changes are said to be ***stable.*** One of the critical issues in selecting the appropriate forecasting method hinges on the question of ***stability*** versus ***responsiveness.*** How much stability or how much responsiveness one should employ is a function of how the historical demand has been fluctuating. If demand has been showing a steady pattern of increase (or decrease), then more responsiveness is desirable, for we would like to react quickly to those demand increases (or decreases) when we make our next forecast. On the other hand, if demand has been fluctuating upward and downward, then more stability is desirable, for we do not want to "over react" to those up and down fluctuations in demand.

For some of the simple forecasting methods we have examined, the following can be noted:

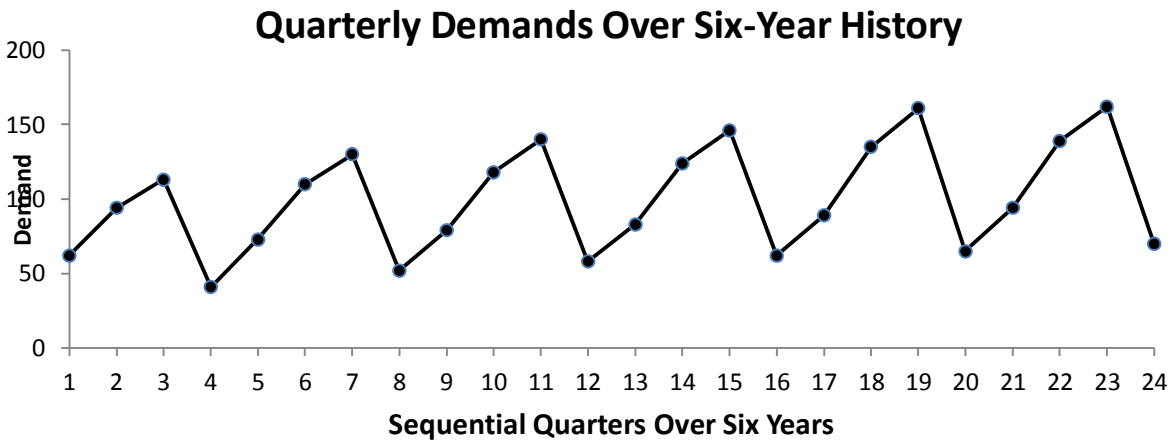
Moving Average Approach: Using more periods in your moving average forecasts will result in more stability in the forecasts. Using fewer periods in your moving average forecasts will result in more responsiveness in the forecasts.

Weighted Moving Average Approach: Using more periods in your weighted moving average forecasts will result in more stability in the forecasts. Using fewer periods in your weighted moving average forecasts will result in more responsiveness in the forecasts. Furthermore, placing lower weights on the more recent demand will result in more stability in the forecasts. Placing higher weights on the more recent demand will result in more responsiveness in the forecasts.

Simple Exponential Smoothing Approach: Using a lower alpha (α) value will result in more stability in the forecasts. Using a higher alpha (α) value will result in more responsiveness in the forecasts.

SEASONALITY ISSUES IN FORECASTING

Up to this point we have seen several ways to make a forecast for an upcoming year. In many instances managers may want more detail that just a yearly forecast. They may like to have a projection for individual time periods within that year (e.g., weeks, months, or quarters). Let's assume that our forecasted demand for an upcoming year is 480, but management would like a forecast for each of the quarters of the year. A simple approach might be to simply divide the total annual forecast of 480 by 4, yielding 120. We could then project that the demand for each quarter of the year will be 120. But of course, such forecasts could be expected to be quite inaccurate, for an examination of our original table of historical data reveals that demand is not uniform across each quarter of the year. There seem to be distinct peaks and valleys (i.e., quarters of higher demand and quarters of lower demand). The graph below of the historical quarterly demand clearly shows those peaks and valleys during the course of each year.



Mechanisms for dealing with seasonality are illustrated over the next several pages.