

Turning points - Graphical analysis

The analysis of turning points (actual and predicted) allows the manager to judge which model predicts downturns and upturns with more accuracy.

The graphical analysis consists of plotting the actual change in the variable to predict versus the predicted change. The actual and predicted or forecast changes are defined as follows:

$$\Delta y_t = y_t - y_{t-1}$$

$$\Delta \hat{y}_t = \hat{y}_t - \hat{y}_{t-1}$$

The results of the forecasts exercise include a correct prediction of the direction of change (positive or negative), or a turning-point error. The possible results with the errors in forecasting changes can be categorized as follows:

1. Correct prediction of direction of change.
 - (a) Overestimation of a positive change
 - (b) Underestimation of a positive change
 - (c) Overestimation of a negative change
 - (d) Underestimation of a negative change
2. Turning-point errors.
 - (a) Prediction of an upturn that did not occur (NT)
 - (b) Failure to predict a downturn (TN)
 - (c) Prediction of a downturn that did not occur (NT)
 - (d) Failure to predict an upturn (TN)

These results on turning-point errors can be summarized in a table, as follows.

Turning-point errors

| | Forecast | |
|--------|----------|----|
| | No TP | TP |
| Actual | No TP | TP |
| No TP | NN | NT |
| TP | TN | TT |

The number of correct forecasts is the sum of the main diagonal occurrences (NN+TT). NT represents false signals and TN refers to missed turning points. The proportion of *false signals* is defined as

$$E_{fs} = \frac{NT}{NT + TT}$$

and the proportion of *missed turning points* is

$$E_{mt} = \frac{TN}{TN + TT}$$

where $NT + TT$ is the total number of *TP* predicted and $TN + TT$ is the total number of actual *TP*.