SOME DEFINITIONS

Eco 5375

Economics and Business Forecasting

- Target Variable – The variable we are trying to forecast. Example: the number of houses constructed in Dallas County in a given month.
- Leading Indicator Variable – A variable whose movements lead the movements of the target variable and is helpful in forecasting the target variable beyond the forecasting accuracy offered when solely modeling the target variable's trend, cycle, and seasonal factors.
- Lead-time of a leading indicator – the number of periods that movements in the leading indicator variable precede (lead) movements in the target variable. A good leading indicator variable will tend to have a constant lead-time over time. Example: Building permits for housing construction in Dallas County issued each month by the County Clerk. It takes approximately 4 months to build a house so the approximate lead-time would be 4 in forecasting the number of houses constructed in Dallas County in a given month. In this course we will denote the lead-time for a leading indicator by the letter **d** (denoting the delay before the movement in the leading indicator affects the movement in the target variable).
- Forecast Horizon (denoted by **h**) – the number of steps ahead in your data that you want to forecast the target variable. For example, if the frequency of observation of the target variable is quarterly and you would like to forecast the value of the target variable one year from now, then your forecast horizon would be h = 4. Example: Real GDP is observed quarterly. If you wanted to forecast the level of real GDP one year from now, your forecast horizon would be h = 4.
- Forecasting Accuracy Measures – Mathematical formulas that are used to gauge the forecasting accuracies of competing forecasting models in an out-of-sample forecasting experiment. The mathematical formulas include **mean absolute error** (MAE), **percent mean absolute error** (PMAE), **mean square error** (MSE), **root mean square error** (RMSE), and **percent root mean square error** (PRMSE). These mathematical formulas will be defined later in the course. It should be noted, however, that the smaller these measures are for a given forecasting method in an out-of-sample forecasting experiment, the more accurate the forecasting method.
- Out-of-Sample Forecasting Experiment – a forecasting experiment that allows one to determine which of two (or more) competing forecasting methods are superior in forecasting the data of the out-of-sample data set, given a particular forecast horizon and a particular forecasting accuracy measure.
- Validating a Leading Indicator – Consider comparing two competing forecasting methods, one that **does not** use a proposed leading indicator (the so-called **Benchmark Model**) and one **that does. I**f the model that incorporates the leading indicator forecasts more accurately in an out-of-sample forecasting experiment than the competing benchmark model that ignores the leading

indicator, we can conclude that the leading indicator is useful and should be used in forecasting the target variable. Otherwise, one should look for a better model in which to incorporate the leading indicator that will beat the benchmark model in an out-of-sample forecasting experiment. If no other such model can be found, one should conclude that the proposed leading indicator is not useful and one should look for another possible leading indicator to use. In this course the benchmark model is going to be the **Box-Jenkins model** and the model that incorporates the proposed leading indicator is the **Transfer Function model**.

- Point Forecast – the forecast of the yet-to-be realized (future) value of the target variable.
- Interval Forecast – a forecast confidence interval for the yet-to-be realized value of the target variable.
- Model Validation – the process of using statistical techniques to determine whether or not a given model is appropriate for describing the behavior of a given time series.
- In-sample data set – that part of a time series data set used to estimate (fit) the coefficients (parameters) of a proposed forecasting model.
- Out-of-Sample data set – that part of a time series data set used to run an out-of-sample forecasting experiment on two (or more) competing forecasting methods.
- Interesting Forecasting Terrain – Hopefully the chosen out-of-sample data set will contain several turning points so that superior forecasting methods will easily be detected. In other words, in interesting forecasting terrains, poor forecasting methods will do really poorly while superior forecasting methods will do really well and it will be easy to tell the difference.
- Turning Point – when a times series reverses the direction of a previous sustained movement in the time series. For example, instead of sustaining an upward trend, a time series begins a downward trend. Alternatively, instead of sustaining a downward trend, a time series begins an upward trend.