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# 4th method for Multivariate Forecasting methods.

## Single-Equation models

Two types of so-called single-equation models can be considered for multivariate forecasting: regression models and transfer-function models.

The methods are helpful in forecasting only if future values of the explanatory variables are known, if forecasting of explanatory variables is particularly easy, or at least if there is no dynamic feedback from the endogenous to the explanatory variables.

In a time-series setting, errors are often correlated over time, such that ordinary least squares (OLS) may not be appropriate and some kind of generalized least squares (GLS) procedure should be considered. These GLS models assume two equa- tions, with a time-series model for the errors from the ‘means’ equation, for example an ARMA model:

yt =β0xt+ut φ(B)ut = θ(B)εt.

Some authors recommend removing trends and seasonal from all variables or possible differencing before regression modeling, which however may be problematic and may entail a deterioration of predictive accuracy.

Transfer-function models are based on dynamic relationships among mean- and possibly trend-corrected variables yt (output) and xt (input) of the form

δ(B)yt =ω(B)xt +θ(B)εt. (1)

A common suggestion is to start from an ARMA or ARIMA model for the input variable xt and to apply the identified ‘filter’ to both input and output. It is then much easier to determine the remaining polynomial.