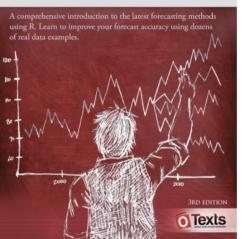
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# FORECASTING PRINCIPLES AND PRACTICE



# 7. Time series regression models

7.3 Evaluating the regression model OTexts.org/fpp3/

## Multiple regression and forecasting

For forecasting purposes, we require the following assumptions:

- $\mathbf{\varepsilon}_t$  are uncorrelated and zero mean
- $\varepsilon_t$  are uncorrelated with each  $x_{i,t}$ .

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It is **useful** to also have  $\varepsilon_t \sim N(0, \sigma^2)$  when producing prediction intervals or doing statistical tests.

#### **Residual plots**

Useful for spotting outliers and whether the linear model was appropriate.

- Scatterplot of residuals  $\varepsilon_t$  against each predictor  $x_{j,t}$ .
- Scatterplot residuals against the fitted values ŷ<sub>t</sub>
- Expect to see scatterplots resembling a horizontal band with no values too far from the band and no patterns such as curvature or increasing spread.

#### **Residual patterns**

- If a plot of the residuals vs any predictor in the model shows a pattern, then the relationship is nonlinear.
- If a plot of the residuals vs any predictor **not** in the model shows a pattern, then the predictor should be added to the model.
- If a plot of the residuals vs fitted values shows a pattern, then there is heteroscedasticity in the errors. (Could try a transformation.)