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# FORECASTING
## PRINCIPLES AND PRACTICE

A comprehensive introduction to the latest forecasting methods
using R. Learn to improve your forecast accuracy using dozens
of real data examples.

3RD EDITION

OTexts

# 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:

- $\varepsilon_t$ are uncorrelated and zero mean
- $\varepsilon_t$ are uncorrelated with each $x_{j,t}$.

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It is **useful** to also have $\varepsilon_t \sim \mathsf{N}(0, \sigma^2)$ 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 $\hat{y}_t$
- 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.)