

Index

- Adaptive exponential smoothing, 208
Adjusted R^2 , 58–86
Aggregation and disaggregation of forecasts, 369
Akaike information criterion (AIC), 59
All possible regressions, 107
Analysis of variance, 85
AR(1) process, 240
AR(2) process, 242
ARCH models, 355
ARIMA model building, 265
ARIMA models, 231, 235, 236, 238–240, 242, 245, 253, 256, 282, 343
ARIMA models and exponential smoothing, 217
ARMA processes, 253
Asymptotic efficiency, 59
Atypical events in time series, 10
Autocorrelation, 5, 133
Autocorrelation function, 30
Autocovariance function, 29
Autoregressive (AR) processes, 239, 246
Average (mean) forecast error (ME), 49
- Backshift operator, 37, 234
Backward elimination, 107
Box–Jenkins models, *see* ARIMA models
Box–Pierce statistic, 56, 57, 267
- Causal forecasting models, 4
Cochrane–Orcutt method, 140
Combining forecasts, 365
Confidence intervals on regression coefficients, 93
Confidence intervals on the mean response, 94
Consistency, 59
- Control charts, 14, 60, 62, 63
Cross correlation function, 307
Cross-section data, 74
Cross-validation, *see* Data splitting
Cumulative error tracking signal, 65
Cusum control charts, 62
Cyclic patterns, 7
- Data splitting, 13, 57, 103, 370
Decomposition of a time series, 43
Delphi method, 4
Deterministic trend, 38
Diagnostic checking of ARIMA models, 266
Differencing, 36, 39, 256
Discounted least squares, 119, 125, 129
Double exponential smoothing, 129. *See also*
 Second-order exponential smoothing
Durbin–Watson test, 134
- EWMA control charts, 62, 63, 64
Exponential smoothing, 171, 176, 183, 193, 208, 210, 217
Extra sum of squares method, 89
- First-order autoregressive process, 134
First-order (simple) exponential smoothing, 176
Forecast, 1, 18
Forecast error, 4, 19, 49
Forecast errors versus residuals, 19
Forecast horizon, 5
Forecast interval, 5
Forecast versus fitted values, 18

Introduction to Time Series Analysis and Forecasting

By Douglas C. Montgomery, Cheryl L. Jennings, and Murat Kulahci

Copyright © 2008 John Wiley & Sons, Inc.

- Forecasting, 1, 3, 4, 12, 49, 150, 193, 322, 359, 365, 369
- Forecasting model evaluation, 49
- Forecasting percentiles, 359
- Forward selection, 107
- Fundamental frequency, 42

- Gain, 301
- GARCH models, 355
- Gaussian white noise, 54
- General autoregressive processes, 256
- Generalized least squares, 111, 112
- Goodness-of-fit test, 57

- Hanning filter, 23
- Harmonic frequency, 42
- Histograms, 19
- Holt's method, 191

- Impulse response function, 300
- Infinite moving average process, 234
- Influence in regression, 105
- Intervention analysis, 330
- Inverse autocorrelation function, 255
- Invertibility of ARMA(p, q) processes, 254
- Invertibility of MA processes, 251

- Lead time, 5
- Least squares normal equations, 76
- Leverage, 105
- Likelihood function, 60, 146
- Linear filter, 23
- Linear trend, 7, 38
- Ljung–Box statistic, 57, 267

- MA(1) process, 236
- MA(2) process, 238
- Maximum likelihood estimation, 145
- Mean absolute deviation (MAD), 49
- Mean absolute percent forecast error (MAPE), 51
- Mean of a time series, 27
- Mean percent forecast error (MPE), 51
- Mean squared error (MSE), 50
- Method of least squares, 75, 111
- Model identification, 265
- Model parsimony, 60
- Model validation, 13
- Monitoring forecast performance, 14, 49
- Moving average, 22, 175
- Moving average (MA) processes, 235, 251
- Moving horizon forecasts, 5
- Moving medians, 24

- Multiple linear regression model, 74
- Multivariate time series, 343

- Neural networks, 372
- Nonstationary time series, 8, 36, 256
- Normal distribution, 53, 54
- Normal probability plot, 53

- Outliers, 338
- Out-of-sample forecast error, 57
- Overfitting, 57, 86

- Parameter estimation in ARIMA models, 266
- Partial autocorrelation function, 248, 249
- Partial correlation, 248
- Partial F -test, 90
- Patterns in time series data, 5
- Point estimate, 4
- Positive correlation, 28
- Power family transformations, 34
- Prediction interval in regression, 96
- Prediction interval, 4, 96, 150, 154, 157, 158, 195, 198, 212, 217
- Predictor variables, 73
- PRESS, 103
- Prewhitening, 309

- Qualitative forecasting, 3
- Quantitative forecasting, 4

- R^2 , 58, 86
- Regression coefficients, 73
- Regression models, 36, 41, 73, 133
- Regressor variables, 73
- Relative forecast error, 50
- Residual autocorrelations, 56
- Residual plots, 98, 134
- Residuals, 19, 78, 98, 100, 104
- Response variable, 73
- R -student, 104

- Sample autocorrelation function, 30
- Sample cross correlation function, 308
- Scatter plots, 21
- Schwartz information criterion (SIC), 59
- Seasonal adjustments, 36, 43
- Seasonal ARIMA models, 282
- Seasonal differencing, 39
- Seasonal exponential smoothing, 210
- Seasonal patterns, 7
- Second-order exponential smoothing, 183
- Simple linear regression model, 73
- Smoothed data, 22

INDEX

445

- Smoothed error tracking signal, 65
Smoothing models, 4, 171, 176, 183, 193, 208, 210, 217
Standard error of a regression coefficient, 88
Standardized residuals, 100
State space models, 350
Stationarity of ARMA(p, q) processes, 253
Stationary time series, 25, 231–233
Statistical packages for forecasting, 15
Statistical tests in regression, 84
Statistical tests on individual regression coefficients, 87
Stepwise regression, 107
Studentized residuals, 100

Temporal aggregation of time series, 370
Testing significance of regression, 84
Time series, 2, 18, 75
Time series models, 4
Time series plot, 2, 19

Tracking signals, 65
Transfer function–noise models, 299, 322
Transfer function, 300
Transformations, 34, 99
Trend adjustments, 36, 43, 81
 t -tests, 87

Unbiased forecast, 50
Uncorrelated data, 28

Variance of a time series, 28
Vector AR models, 346
Vector ARIMA models, 343, 344

Weighted least squares, 111, 114
White noise, 54
Winters' method, 210, 214

Yule–Walker equations, 244

