Exercises

*Topics marked with an * are advanced and may be omitted for more introductory courses.*

3.1 The growth rate in the U.S. gross domestic product *(GDP)* for 1963–2015 is provided in *GDP_change_2.xlsx*.

a. Use three- and seven-term moving averages to generate one-step-ahead forecasts for 2001 to the end of the series. Graph the results, and comment on the differences between the two moving averages.

b. Compare the performance of the two procedures by calculating the *RMSE* and *MAE*. Why is the *MAPE* inappropriate in this case?

3.2 The annual percentage change in the consumer price index *(CPI)* for 1963–2015 is provided in *CPI_change_2.xlsx*.

a. Use three- and seven-term moving averages to generate one-step-ahead forecasts for 2001 to the end of the series.

b. Compare the performance of the two procedures by calculating the *RMSE* and *MAE*.

c. Calculate the *RelMAE* and *MASE* for the one-step-ahead forecasts. Why is the *MAPE* inappropriate in this case?

3.3 Use the data in *GDP_change_2.xlsx* to generate forecasts for *GDP* growth by simple exponential smoothing (SES).

a. With the observed value for 1963 as the starting value, compute the one-step-ahead SES forecasts for 2001–2015, using each of $\alpha = 0.2$, 0.5, and 0.8 in turn.

b. Compare the forecasting performance for the given values of α by calculating the *RMSE* and *MAE* over the period 2001–2015.

c. How does this method compare with the moving-average procedures used in Exercise 3.1? (Be careful to make comparisons over the same time periods.)