UNSW ECON2209 Assessment
Problem Set 2: Solutions

2021

At the start of an R session for this course, remember to type `library(fpp3)` *in the R Studio Console. This will then load (most of) the R packages you will need, including some data sets.*

Details:

- Total value: 10 marks.
- Submission is due on **Friday of Week 5 (19 March), 5pm**.
- A submission link is on the Moodle site under Assessments.
- Submit your documents in PDF format.
- Your submitted answers should include the R code that you used and any figures produced. Note that in the bottom right quadrant of RStudio, under the Plots tab there is an export button. This can be used to export figures for inserting into your answer document; e.g. select "Copy to Clipboard" and paste into a Word document. (Other methods are also possible.)
- Problems are not of equal value.

Problem 1 [4 marks]:

Forecast the Chinese GDP from the `global_economy` data set using an ETS model. Experiment with the various options in the `ETS()` function to see how much the forecasts change with damped trend, or with a Box-Cox transformation. Try to develop an intuition of what each is doing to the forecasts. Discuss your results.

[Hint: use `h=20` when forecasting, so you can clearly see the differences between the various options when plotting the forecasts.]

Problem 2 [6 marks]:

Use the quarterly number of arrivals to Australia from New Zealand, 1981 Q1 – 2012 Q3, from data set `aus_arrivals`.

a. Make a time plot of your data and describe the main features of the series.

b. Create a training set that withholds the last two years of available data. Forecast the test set using an appropriate model for Holt-Winters' multiplicative method.

c. Why is multiplicative seasonality necessary here?

d. Forecast the two-year test set using each of the following methods:
   i) an ETS model;
   ii) an additive ETS model applied to a log transformed series;
   iii) a seasonal naïve method;

iv) an STL decomposition applied to the log transformed data followed by an ETS model applied to the seasonally adjusted (transformed) data.

e. Which method gives the best forecasts? Check and comment on the residuals.