Homework 6

Eco 4306 Economic and Business Forecasting
Spring 2018
Due: Thursday, March 29, before the class

Problem 1

Obtain the quarterly data for U.S. real GDP for the period 1947Q1-2017Q4, available under code `GDPC1` on fred.stlouisfed.org and under `FRED/GDPC1` on www.quandl.com.

(a) Plot the real GDP for the period 1947Q1-2017Q4, comment on the shape of the trend. Use the data for 1950Q1-2009Q4 to estimate following model for log transformed real GDP: $\log rGDP_t = \beta_0 + \beta_1 t + \varepsilon_t$

(b) Obtain the actual, fitted, residuals graph, and also the correlogram for residuals. Comment on these two graphs, and why they tell us that residuals in the model in (a) are not white noise.

(c) Modify the model from (a) by adding AR components, to address the issue identified in (b). Verify that the residuals in the modified model are white noise - obtain the actual, fitted, residuals graph, and the correlogram for residuals.

(d) Change the range of your workfile to 1947Q1-2018Q1. To do this first select the workfile, then click on "Proc -> Structure/Resize Current Page" and enter 2018Q1 in the "End date" box.

(e) Create a multistep forecast for $rGDP_t$ for period 2010Q1-2018Q1. Also generate the standard errors for this forecast to construct the lower and upper bounds of the 95% confidence interval. Plot the actual data together with the forecast and its 95% confidence interval. Report the RMSE for this forecast.

(f) Create a sequence of one step ahead forecasts for $rGDP_t$ for period 2010Q1-2018Q1 using fixed forecasting scheme. Also generate the standard errors for this forecast to construct the lower and upper bounds of the 95% confidence interval. Plot the actual data together with the forecast and its 95% confidence interval. Report the RMSE for this forecast.

(g) Comment on the precision of the forecasts in (e) and (f) based on their plots and their RMSEs.

(h) Construct time series for annualized quarter-over-quarter growth rate (percentage change) of the actual real GDP

$$gGDP_t^{QoQ} = 4 \times 100 \times \frac{rGDP_t - rGDP_{t-1}}{rGDP_{t-1}}$$

Then create the quarter-over-quarter growth rate based on the sequence of one step ahead forecasts from part (f). Create a plot showing the two together. What is your forecast for 2018Q1?

(i) Construct time series for year-over-year growth rate (percentage change) of the actual real GDP

$$gGDP_t^{YoY} = 100 \times \frac{rGDP_t - rGDP_{t-4}}{rGDP_{t-4}}$$

Then create the year-over-year growth rate based on the sequence of one step ahead forecasts from (f). Create a plot showing the two together. What is your forecast for 2018Q1?

(j) Compare your forecast for the growth rate in 2018Q1 in (h) with the GDPNow Federal Bank of Atlanta forecast https://www.frbatlanta.org/cqer/research/gdpnow.aspx?panel=1 and also with the minimum, average and maximum forecast for 2018Q1 in the Wall Street Journal Economic Forecasting Survey http://projects.wsj.com/econforecast/#ind=gdp&r=12