ECON4003 Economic and Business Forecasting
S2, 2024-25
Assignment 3

Due: **Thur (in class), May 8, 2025**

There are four monthly time series contained in the Assignment 3 Dataset file. Pick **one** of these and perform the analysis below. The sample size **should cover period from Jan 2003 to the latest available**. The analysis should include:

1) A plot of your raw data (i.e. before any adjustment) and a discussion of what time series decomposition components are potentially existent.
2) An examination of the trend and/or seasonal factor modeling to see if these terms have to be incorporated into your model.
3) An examination of the autocorrelation and partial autocorrelation functions (use maximum displacement/lag of 24) and discussion of the Q-test results.
4) An estimation of the information criteria for **each** ARMA model order **from (0,0) to (5,5).**
5) An estimation of the model that you feel most appropriate given the results that you found from the 3) and 4).
6) The 1-step ahead forecast, 2-step ahead forecast and 3-step ahead forecast given the estimation results from part 5). See part (f) below for the needed procedures.
7) The construction of a forecasting framework to compare the forecasting accuracy of
   i. Your chosen ARMA model (with trend and seasonal components when applicable)
   ii. An arbitrary ARMA(1,1)
   (Hints: you need to compare MSE or other model selection criteria of the two models i. and ii.)

Marking scheme: This assignment is about data analysis with EViews (or other software), and the following marks are allocated to the respective questions. With the selected series, each question should be addressed in terms of snapshots from Eviews (or other software) or tables in the submitted solution by students. Appropriate explanation may also be provided if necessary.

(a) (10 marks) Plots of data and general discussions.
(b) (15 marks) Checking procedures for trend and seasonal components, e.g. how do you decide what specifications to be used for those components.
(c) (15 marks) ACF and PACF tables or figures should be provided and Q-test results discussed.
(d) (15 marks) AIC and SIC comparison tables should be given from (0, 0) to (5, 5). Further explanation for model selection should be provided. E.g. other than the AIC and SIC, what other features of your chosen model from 5) above show that it is an appropriate choice.
(e) (10 marks) Discuss if the suggestion from observing part (c) is consistent with those indicated in part (d).

(f) (20 marks) Re-estimate your model by leaving out the last three observations of your sample data for checking forecasting accuracy. Conduct the 1-step, 2-step and 3-step ahead forecasts by either manual calculation or EViews, Gretl or any other software you used. If done manually, use the recursive forecasting discussed in class.

(g) (15 marks) Using the MSE introduced in Assignment 1 to compare the forecasting accuracy of your chosen model and that of a benchmark ARMA(1,1) model. Compute both the in-sample MSE and the out-of-sample MSE [for out-of-sample forecast, note that from (f) there will be just one 1-step ahead, one 2-step ahead and one 3-step ahead forecasts].

EViews Help on ARMA modeling:
https://www.eviews.com/help/content/timeser-Estimating_ARIMA_and_ARFIMA_Models_in_EViews.html

Refer to the attached ppt files on other matters about EVIEWS and Gretl