EC306 Econometrics II: Time Series
2022 Vacation Assignment

Data: The data file contains quarterly U.S. observations on

- Real Household Income Consumption Expenditure ('Consumption')
- Real private non-financial investment ('Investment PNFI')
- The 3 month Treasury Bill interest Rate ('T3M')
- The 10yr government bond rate ('Ten yr')
- Moody's seasoned BAA bond rate ('BAA')

The first observation is Q1 1959, the last is Q4 2019

1. Considering the time-series properties of the variables concerned, design a VAR to study the effect of credit spreads on investment. Consider a system including consumption, investment and a credit spread. Estimate your model on a sample 1965q1-2006 q4. Comment on the Granger causality patterns you find. (20 marks)
2. (a) Keeping the same sample and model, present and describe the IRFs which represent the effect of a shock to credit spreads on investment. (10 marks)

   (b) Is there any reason to include additional information on interest rates in the model when examining the effect of credit spreads on investment? How would you introduce such information to your model and does it change your conclusions in this exercise? How would you explain this? (20 marks)
3. (a) Estimate a VAR(4) in (appropriate transformations of) consumption, investment, the short rate and the credit spread, on the sample 1965q1-2000q4, assuming all can be treated as trend stationary. Forecast the consumption equation 1 step ahead, out of sample, 2001q1-2006q4. Build an ARMA model for consumption in this sample, under the same stationarity assumption. Repeat the forecast exercise. Which is preferable. Why do you think you find this result? (20 marks)

   (b) Compare the dynamic forecast of the ARMA model you build in part a) with outcomes, beginning the dynamic forecasts in 2001, 2006, 2012. How might you deal with this? Can you present an ARMA model with better dynamic forecasts, conditional on *estimating* your model up to 2000? (20 marks)
4. Do you find any evidence of arch effects for investment growth rate? If so what do you find? (10 marks)

Generic guidance and notes for non economists:

- The term spread is the difference between a long-maturity interest rate and a short-maturity interest rate.

- You should inspect data by plotting it; it is expected that you make basic transformations to ensure you work with variables suitable for linear models
- Graphs can be included in an answer e.g. if inspection of the graph helps you decide how to make modelling decisions. Unless otherwise stated in the question, graphical analysis alone is not sufficient.
- When you report results of a statistical test, state the test regression, the parameter(s) of interest, the null hypothesis, the test statistic, the value of the test statistic you find, the critical value and the decision you make. Bullet points are fine for such discussion
- Try to summarize the important parts of the regression output in a table, rather than screen-grabbing whole chunks from the raw `stata` output; this makes you think about the output and demonstrates understanding of what is important.
- It's up to you to get the data into `stata` and figure out the commands, but you won't need any that we have not covered in class