Universidad de San Andrés - Master in Economics
Macroeconometrics (J. García-Cicco)
Problem Set 1

VAR Estimation, Diagnostics and Forecasting

1. Retrieve with R the following time series:

- p^{com}, the commodity price index from the IMF.
- er, the ARS/USD nominal bilateral exchange rate (Com. "A" 3500) from the Central Bank of Argentina.
- p^c, the following consumer price indexes (CPI) from datos.gob.ar
  - p^c_H, the historical CPI from INDEC.
  - p^c_{SL}, the CPI of the Province of San Luis.
  - p^c_{BA}, the CPI of the Autonomous City of Buenos Aires.
  - p^c_{GBA}, the CPI of the Greater Buenos Aires area from INDEC.
  - p^c_{ARG}, the national CPI from INDEC.

2. Construct a single p^c series (contemplating the fact that CPIs from INDEC are not considered reliable from January 2007 to December 2015) and discard the rest. Then, normalize all observations by the average of last twelve observations.

3. Consolidate all three series in a single dataset with time series attributes.

4. Trim the dataset and keep only observations from January 2004 to December 2019. Apply a logarithmic transformation to every variable and plot all three time series. Additionally, compute the first differences and plot these too.

5. Estimate a VAR for the differenced series and find the appropriate lag order using conventional information criteria. Do all criteria agree? Plot the output of the model (fit and residuals).

6. Test the hypothesis that Δer does not Granger-cause Δp^c. In addition, test whether the local variables anticipate p^{com}. Discuss the economic implications.

7. Verify the model assumptions for the estimated VAR. In particular, check for signs of serial correlation, nonnormality or heteroskedasticity in the residuals. Analyze the results.

8. (**Optional**). Investigate whether there is parameter instability.

9. Go back to **6**. Considering the results of the Granger-causality tests, can you further simplify the model?

10. Use the estimated VAR to forecast twelve periods into the future. Plot and comment the results.

Unit Root Tests

1. Apply a unit root test to each series in log-levels to check if the use of first differences in the previous section was appropriate.