Time Series Analysis: Assignment

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Analyzing macroeconomic data with VAR model

Perform the following steps. The goal is to construct a VAR model to fit some macroeconomic data.

1. Get two sequences of data (at least 30 data points) for GDP per capita and consumption per capita (for any country; you can get quarterly data for 30 years as well).[1]
2. Construct the growth rates of the two series. Perform ADF test to check for stationarity for both variables. If they are not stationary, try taking another difference for both variables.
3. Plot empirical ACF and PACF for the growth rates.
4. Estimate ARMA(p, q) processes separately for each of the two series. Following Box-Jenkins methodology (as we did in the class). Try $0 \leq p,\ q \leq 4$. Compute and store AIC and BIC. Which model is chosen for consumption and which one is chosen for gdp?
5. Fit VAR(p) for $p = 0, \ldots, 4$. Compute and store AIC and BIC. Which model would you pick based on the information criteria?
6. Does consumption *Granger cause* gdp or the other way round?

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[1]Try World Bank Database (link: https://data.worldbank.org/) for yearly data or OECD Database (link: https://www.oecd.org/en/data.html) for quarterly data.