ASSIGNMENT 6

Questions 1 (50 points): In this question, you will estimate a VAR model using three key U.S. macroeconomic indicators: the inflation rate, the unemployment rate, and the federal funds rate. For instructional purposes, treat all variables as stationary. The dataset is provided in "*Assignment 6.xlsx*", sheet "*macro model*." The variables are named `inflation, unrate`, and `ffs`. Complete the following tasks:

i. Import the data, and limit the sample to the period of 1985-2019. Plot the three variables in a single graph.
ii. Estimate the VAR model to learn about the dynamic interrelationships among the three variables. Note: use `varsoc` to select the optimal lag lengths.
iii. Perform the impulse response function (IRF) analysis and make a brief comments (4-6 lines) on it.
iv. Perform the Granger causality test basing on your VAR estimation and interpret results.

Question 2 (50 points): In this exercise, we will examine whether the prices of two major coffee varieties – robusta and arabica – share a long-run equilibrium relationship, and learn how to interpret cointegration results. Vietnam is the world's largest producer of robusta, which is typically priced lower than arabica and widely used in instant-coffee production.

We use weekly futures price data from 2008 to 2025, provided in sheet "*coffee weekly*." Arabica prices (A) are quoted in USD cents per pound, while robusta prices (R) are quoted in USD per ton..

i. Import data as the daily interval and use the following code to get the time interval as weekly: `tsset your_time_var, delta(7)`
Convert both price series to a common unit (USD/kg). Plot the two price series on the same chart using two different y-axes.
ii. Use the full sample and perform the ADF tests to determine whether these variables are integrated of order 1. *Hint:* Use `varsoc d.your_var, maxlag(12)` to select an appropriate lag length for the ADF tests.
iii. Assuming both variables are I(1), conduct a Johansen cointegration test for the two coffee price series. Do you find evidence of a cointegrating relationship? If so, estimate a Vector Error Correction Model (VECM) and briefly comment on the long-run and short-run results.
iv. Restrict the sample to the period 2008–2022 using: `keep if tin(, 25dec2022)`
Re-run the Johansen test and interpret the results. Based on your interpretation, suggest the appropriate modelling approach for these two variables and perform it.

Question 3* (40 points bonus): This question asks you to read an applied research study that uses the time-series models we have learned in the course. The article we will discuss for this question is *"Assessing the price and output effects of monetary policy in Vietnam: evidence from a VAR analysis"* (2019), written by Thi Mai Lan Nguyen, Elissaios Papyrakis, and Peter A.G. Van Bergeijk. Answer each of the following questions briefly (3–4 sentences per question):

i. What is the main research question of the paper? What are the three key variables studied? Which variables are endogenous and which are exogenous?

ii. What are the stationarity properties of the variables? How did the authors handle seasonal adjustment of the data?

iii. Which model is used in the study – VAR or SVAR? What method is employed to identify the non–white-noise residual matrix u_t?

iv. Is this methodology purely atheoretical, or does it rely on theoretical a priori assumptions?

v. Summarize the effect of a monetary policy shock on inflation and national output based on the impulse response functions.