Home Assignment 2

Submission deadline: **2 June 2022** (before 23:59 CEST). Individual solutions to be submitted as an .R code file with comments to wischnewsky@uni-trier.de. Use the following label: <YourLastName>.R.

1. (10 points) **Analyzing the Monetary Transmission Mechanism**

    1. Load the multivariate dataset `data2.xlsx`. Familiarize yourself with the data (industrial production growth, HICP, transaction volumes of the national payment system, and interest rate). Plot the variables.
    2. Replace the HICP with the annual inflation rate.[1] Create a short descriptive statistics table for all four variables.
    3. Can the variables be used for the following analysis or should they be transformed?
    4. Test for multivariate interdependence and interpret the results at the 5% significance level.
    5. Is there an instantaneous relationship between the time series? Do you observe a feedback effect?
    6. Select the four-variable VAR model specification with the best fit and estimate it.
    7. Is there residual autocorrelation when you conduct an appropriate test with 12 lags (with 3 lags)? How do you select the lag length for the test?
    8. Re-estimate the model after you have increased the VAR(p) order by one. Repeat the procedure from the previous question. What has changed?
    9. Derive the impulse response functions (IRFs) for all four variables. Justify the choice of your Cholesky ordering.[2] Use 48 periods and 95 % confidence bands. Interpret the results with regard to significance, persistence, and stationarity.
    10. Based on a forecast error variance decomposition, which variable is most affected by the payment system volumes?

    Useful functions: `stats::Box.test()`, `vars::irf()`, `vars::VAR()`, `urca::ur.df()`, `flextable::flextable()`

[1] Pay attention to the time series starting date.

[2] You may refer to such seminal works like, e.g., Stock, James, H. and Mark W. Watson. (2001): "Vector Autoregressions," *Journal of Economic Perspectives,* 15(4): 101−115.

2. (2 points) **Bonus: IRF Re-Scaling**

Re-scale all impulse response function parameters in the previously created object.[3] The re-scaled IRFs should reflect the reaction to a half-point hike in the key interest rate. Comment on the results.

[3] Object of class `varirf`.