**GDN course: Homework assignment #2**

**Unit Roots and Breaks**

Take 3 time series with yearly (you need to have at least 40 observations or take a higher than yearly frequency). Try to find time series that when visually inspected exhibit: (T1) no obvious structural break, (T2) a potential structural break, and (T3) a pronounced structural break. Time series expressed in national currency should be converted into real terms and those growing exponentially should be transformed by taking natural logarithms.

1.  Perform the augmented Dickey–Fuller (ADF) test.

ADF tests should be performed in case of each of the time series for the original time series and its first differences. Test the original time series for both trend and level stationarity, while the differenced time series for level stationarity only. It means that for the original time series you run a regression with trend and intercept (model C), a regression with intercept only (model B), and a regression with neither trend nor intercept (model A). For the differenced time series you run a regression with intercept only (model B), and a regression with neither trend nor intercept (model A). Remember to choose the appropriate number of lags in each of the tests.

2.  Perform Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test.

KPSS tests should be performed for each of the time series and for the first differences of each of the time series. With the original time series you should test for both trend and level stationarity. With the differenced time series you should test only for level stationarity. Use procedure from `kwunit2.tsp`.

3.  Select a candidate for a break

For times series T2 and T3 identify visually some break year and find an economic rationale for this break (what happened in the economy chosen by you so hat it could case a break in your time series?).

4.  Perform Perron's test.

Using your candidates for breaks in time series perform Perron's tests for time series T2 and T3. Out of the 3 types of Perron's test, which differ with respect to the number and type of break dummies included (intercept only, trend only, both trend and intercept), choose only one type for each of the time series Try to select such test type that based on visual inspection of the break seems to be the most appropriate.

*What are your conclusions?*