Economics 518B

Homework #5
Unit Roots
Due: Thursday 10/29

For this assignment, read through Nelson and Plosser (1982) in the reading package. I have posted the Nelson and Plosser data set on the class website. For analysis, you will need to convert the data to natural logs (except the bond yield). Also, the sample period is different for each series and is given in Tables 2 and 3 of NP. You will use EViews to replicate Table 5 of NP.

Open EViews and select File/New/Workfile and select annual and sample 1860 to 1970. Import the series and convert them to natural logs (except the bond yield) for their appropriate sample periods (given in Tables 2 and 3). Plot the series on one page and their first differences on the next page. (Use the appropriate samples.)

Now, instead of replicating Table 5 exactly, we will follow the now standard unit root testing procedure (see Campbell and Perron, 1991, in the reading package).

a. ADF unit root tests: for each series, click View/Unit Root Test. Under lagged differences select "6". Do you think you should include no constant, constant, or trend and constant in the regression? (Your answer may not be the same in all cases.) Run the test regression. Check if the *t*-statistic for the last lag is greater than 1.6 in absolute value. If it isn't, re-run the test with one less lagged difference. Print only the output for the final test. [Note: EViews uses the first difference of the series as the dependent variable. Therefore, the coefficient on the lagged level is $\rho - 1$. Thus, the null hypothesis is that $H_0 : \rho - 1 = 0$. This has no effect on the *t*-statistics given in NP, who use levels as the dependent variable. (Why does this have no effect?)] Compare your results to those given in Table 5 of NP. Were the lag orders the same? Were the *t*-statistics the same?

b. PP unit root tests: Proceed as before, but go with the suggested lags provided by EViews. Compare your results with before and with NP's using ADF tests.

c. For the series that you were unable to reject the unit root null with the ADF tests, do ADF unit root tests on their first differences. Again, do you think you should include no constant, constant, or trend and constant in the test regression? (Hint: If a series has drift in levels, but no apparent drift in first differences, you should include a contant, even if it is small. For a series that has no drift in levels, you do not need to include a constant. The basic idea is that a constant in the first differences amounts to drift (deterministic trend component) in levels.)

d. If you are unable to reject the unit root for any of the first differences, do the ADF test for second differences. What do you find?

e. Read up to (but not including) section 3 of Campbell and Perron (1991) and read Cochrane's discussion of their paper, which follows right after it in the reading package. (We'll return to the cointegration portion of the CP article and Miron's discussion later.) What do you think about Campbell and Perron's Monte Carlo experiment about unit roots and forecasting? What do you think about Cochrane's argument that we *know* interest rates do not contain a unit root?