Washington University
Department of Economics

Fall 2009
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Economics 518B

Homework #6
Detrending Output
Due: Tuesday 11/24

For this assignment, read through Cogley and Nason (1995) and Morley, Nelson, and Zivot (2003) in the reading package.

1. Open EViews. Create new workfile with quarterly data from 1959:1 to 2000:3. Import the series "gnpq ggeq gcnq gcsq" into the workfile. The four series are in the hw6.txt file available on the class website. The file contains data from DRI. It is easiest to take the data for the adjusted sample and put it into another text file (using Excel) before importing into EViews. The four series are real GNP, real Government Expenditure, real Consumption expenditure on non-durables, and real Consumption expenditure on services, respectively. We're going to create two series: log real consumption of non-durables and services and log private real GNP. We choose these series in particular because they seem to be cointegrated with vector [1 –1] (i.e., their ratio appears to be covariance stationary). Calculate log real consumption of nondurables and services as follows: type "genr lcnds=log(gcnq+gcsq)". Then calculate log private real GNP as follows: type "genr lpgnp=log(gnpq-ggeq)". (NOTE: in EViews, the log function calculates natural logs. Also, note that, given chain-weighted data, adding and subtracting components is not technically correct, although the resulting series are quite similar to more correctly treated series.) Plot these series together. What would you say about common movements in the two series? What would you say about the relative smoothness of the two series?

2. Regress output on consumption: type "ls lpgnp c lcnds". Print output. What do you notice about the coefficient on consumption? Plot residuals. Click freeze. Now obtain business cycle dates from the NBER website. Use the AddShade button to shade in the dates corresponding to NBER recessions (peak to trough). Click Name and accept GRAPH01 as a title. What would you say about your residuals as a measure of the business cycle? Note that this measure is similar to what the BN decomposition would produce given a forecasting model of output using consumption and assuming consumption is weakly exogenous in terms of the long-run relationship. Why might consumption provide a good forecast of future income? Finally, type "genr ccycle=resid". Then view ccyle as a graph. Click Freeze. Click template. Select Copy options, text, and shading. Type "GRAPH01". Double click on the graph to bring up graphing options. Click the "add a zero line" option. Click Name. Name the graph "Cycle1".

3. Now, we're going to calculate the HP filter trend and cycle. Select Series Statistics/Hodrick Prescott Filter from the Quick menu. Type "lpgnp" for the series. Click Okay. Accept the smoothing parameter 1600. Click Okay. Print. Type "genr hpcycle1600=lpgnp-hptrend01". View hpcycle1600. Click freeze. Click template. Select Copy options, text, and shading. Type "Cycle1". Click Name. Name graph "Cycle2". Redo all of these steps, but set smoothing parameter to 6 and naming the series hpcycle6 and the graph "Cycle3" instead.

4. Now, we'll calculate the BN decomposition. Note the formula for the BN cycle is $-\begin{bmatrix}1 & 0 & \cdots & 0\end{bmatrix}F(I-F)^{-1}\beta_{t|t}$. Download the GAUSS program "hw6.prg" and the data file "lpgnp.txt". The program is set up to calculate the BN cycle for an AR(12) model.

   a. Estimate an AR(12) model for the first differences of private GNP in EViews. Type "genr dlpgnp=d(lpgnp)" to get first differences. Then type "ls dlpgnp c dlpgnp(-1 to –12)" to get estimates. Copy your estimates for the phi's into the GAUSS file. Have a look at the GAUSS file and then run it. It will create a data output file called "bncycle12.dta". In EViews select File/Import/Read LotusTextExcel. Find the data file and select open. Type name for series "bncycle12". Set # of headers equal to 1. Change sample to "1959:2 2000:3". This is because your model uses first differences. Then select okay. View the series. Click Freeze. Click Template. Type "Cycle1". Click Name. Name graph "Cycle4".
   b. Redo part a. for an AR(2) model. You will have to modify the GAUSS program somewhat. Name the series "bncycle2" and the graph "Cycle5".

5. Now, we'll calculate the UC-cycle assuming an AR(2) cycle and zero correlation between permanent and transitory shocks. Download the GAUSS program "hw6.opt". Run the program. It will create a data output file called "uccycle.dta". In EViews select File/Import/Read LotusTextExcel. Find the data file and select open. Type name for series "uccycle". Set # of headers equal to 1. Change sample to "1959:2 2000:3". Then select okay. View the series. Click Freeze. Click Template. Type "Cycle1". Click Name. Name graph "Cycle6".

6. Select all the cycle graphs together (hold down ctrl and select each graph). View all of them together. Make sure each graph has the same units on the y-axis. Double click on a graph that doesn't and select the Use Manual Scaling feature. Type in –0.1 and 0.1 for min and mix, respectively. Print. Comment on the various graphs. Why are they different? Why are they similar? How well do they match the NBER dated recessions?

7. After reading Cogley and Nason (1994) discuss the spurious cycle phenomenon and problems with using the HP filter. After reading Morley, Nelson, Zivot (2003), compare your results for the BN decomposition and the UC model. Why are they different?