**Econ 503 Empirical Assignments**

Note: All graphs/tables should be clearly labeled and organized in a reasonable way. Do not turn in a huge amount of graphs/tables. No assignment requires that. You will be marked down.

**Assignment 1. Basic Macro Data Manipulation and Growth Empirics**

\* Open Gretl

\* Use File>Databases>Gretl native>StL Fed (search for name)

\* Retrieve nominal GDP (gdp, quarterly bil $ 1 decimal from 1947)

\* Regrieve real GDP (realgdpc1, quarterly 1 decimal in 2005$)
\* Retrieve population (pop, monthly, choose averaging to convert to quarterly)

\*Compute Real GDP per capita

(Use Add.New Variable with formula realgdppc = realgdp10/pop)

\* Compute (annualized) percent changes for realgdppc and for real gdp

(note that you can plug in an equation for this using Add>New Variable or you can choose Data>Select All, and then choose Add>log differences of selected variables. This will give you the percent changes (non-annualized) in decimal form; to convert to percentages, multiply by 100).

\* Set the sample to 1952:1 to 2013:2 (use Sample>Set Range)

\*Generate for gdp, real gdp;

(View>Graph>Time Series)

\*Right click and edit graph to add title and title to left axis that explains the units

 \*Copy/Paste output to Word file

\*Repeat the steps above for realgdppc

\*Generate and print summary statistics for percent changes in realgdppc,

(View>Summary Statistics)

\*Copy/Paste output to Word File

\*Add this title: Table 1. Summary Statistics for Real GDP Per Capita, 1952-present

If you have more than one page of output, make sure to staple/clip them together and put your name on the front

Make sure to familiarize yourself with the summary statistics and behavior of the time series

**Assignment 2. Generating Graphics from FRED**

\* Go to St. Louis Fed [data website FRED](http://research.stlouisfed.org/fred2/categories)

\* Find the series on CPI (monthly; search Categories>Prices).

\*Edit graph units to display percent change from year ago

\*Add new series to graph, PCE (monthly)

\*Edit graph units to display percent change from year ago

\*Display graph as pdf and print or copy/paste to Excel file and print with graph below

\*Create new graph for Household and NonProfit Net Worth (quarterly, Flow of Funds category)

\*Add new series to graph, Net Worth (quarterly)

\*Edit graph to display change from year ago for Net Worth

\*Edit graph so new change in net worth values display on right side of graph

\*Display graph as pdf and print or copy/paste to Excel file and print with graph above

If 2 pages printed, staple or clip pages together with your name on front.

Make sure you know:

1. Units used on the axes (billions, millions, percent)

2. Similarity/difference of CPI and PCE

3. Size and growth of household/NP net worth

**Assignment 3. Simple Regressions for Real GDP Per Capita and Economic Freedom**

\*Open GRETL
\*Go to File>Databases>On Server and open Barro-Lee 138 country data set

\*Retrieve 1990 real gdp per capita (realgdpsh590), index of political rights (prightsb), and index of civil liberties (civlibb) for the 138 countries in the data set

(File>Databases>Database server>Barro-Lee and search/add individual variables)

\*Generate scattorplot graph (View>Graph>X-Y Scatter) of

realgdp per capita (Y) and political rights (X)

realgdp per capita (Y) and civil liberties (X)

\*Run these regression using the regression utility in GRETL (Model>OLS) and note the R2 of each model next to its graph

\*Copy/paste both graphics to Word file

Put your name on the front

Make sure you know/consider:

1. The meaning of the regression lines

2. Are there any possible subtle patterns observable in the scatterplots

3. What other variables in the Barro-Lee data might expand to improve these models?

**Assignment 4. Some Short Run Empirical Measures and Methods**

\*Open Gretl and using the gretl database for FRED download real gdp 2005$ (gdpc1)

\*Compute percent changes in real gdp (in decimals) by using the Add>differences of logs

\*Create a new variable that annualizes these percent changes (multiply by 4)

\*Compute a variable trend and cycle for percent changes in GDP using the Hodrick-Prescott filter (Variable:Filter) and save these series

\*Plot and PRINT each the trend and cycle series on separate graphs

Q: How much and when does the HP-trend variable differ from a constant 3 percent growth rate?

\*Clear the data set
\*Download the unemployment rate (unrate), industrial production (indpro), fed funds rate (fedfund) and oil prices (oilprice). Use Data>Select All and Add>differences to compute differences in each variable

\*Set the sample for 1950:1 to 2013:6

\*Create a “impulse response function” based on a “vector autoregression” for several macroeconomic variables

Use Model>Time Series>VAR and put all of these variables into the “Endogenous” box and create a VAR. Then Use Graphs and create a Combined Impulse Response graphic.

\*Print the impulse response graphic

Q: Which variable(s) has the biggest impact on the other variable(s)

\*Go to FRED. Access unemployment rate (unrate). Click on the graph to access the graph editing. Add real gdp (gdpc1) to the graphic and change its units to percent change from a year ago and select redraw graph. Add total credit market liabilities (tcmdo). It will automatically graph as percent changes from a year ago.

\*Print the graph (If you do not have a color printer, select different line styles for each line).

Q: How many recessions since 1950 (appear as shaded areas on graph)? Length of recessions?

(Also see <http://wwwdev.nber.org/cycles/cyclesmain.html>)

Q: Which of the lines match the recessions the closest?
Q: How would the size of some recessions change if defined by unemployment behavior or changes in liabilities?

Save this file for later use.

**Assignment 5. Money-Inflation, Inflation-Unemployment Relationships**

Make sure to save this file for later use.

\*Open Gretl and download monthly unemployment rate, consumer price index, and capacity utilization

\*Compute inflation (percent changes in CPI or differences of logs)

Set sample range to 1948.1 to 1969.4

\*Generate and Print a scatter plot of Inflation Rate and Unemployment Rate.

On the plot, draw a line depicting the relationship

\*Set sample range to 1970 to 2009

\*Generate and PRINT a scatter plot of Inflation Rate and Unemployment Rate.

Compare the plots for these two time periods. What do they indicate about the relationship between unemployment and inflation?

\*Regress Inflation as dependent variable on capacity utilization including contemporaneous and lagged 1 and 2 months to the regression

\*Print these results.
Does “slack” in the economy as measured by capacity utilization help predict inflation?

**Assignment 6. Taylor Rule Empirics**Make sure to save this file for later use

\*Open Gretl and download these interest rates (fed funds, industrial production, and cpi)

\*Compute inflation rates from cpi using log differences

\*Compute inflation on percent basis (x100) and annualized (x12)

\*Set the sample range for 1983:1 to 2000:12

\*Estimate simple Taylor Rule equation using

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\*Re-estimate the same regression for 2001:1 to 2007:12

\*Re-estimate the regression for 2008:1-2013:6

\*Print the regressions
Compare the coefficients across the three time periods

What might explain these differences?

**Assignment 7. Interest Rates and Debt**

Read James Hamilton’s [Econbrowser blog entry](http://www.econbrowser.com/archives/2013/03/why_im_more_wor.html) on “Why I’m More Worried than Paul Krugman about the U.S. Debt Burden”

\*Write out his basic regression results for explaining the relationship between cross-country interest rates and debt

\*What countries/time periods are included in the data?

\*What are his variables and how are they measured?

\*In his regression, how does he take into account non-linear relationships between his debt and trade balance and interest rates?

\*How does he take account of unique, country-specific characteristics?

\*What might be some ways to extend, slightly alter, … Hamilton’s study?

**Assignment 8. Yield Curve (Interest Rate Spreads) and GDP Forecasts**

\*Open Gretl and download these interest rates: 10 year Treasury (gs10), 1 year Treasury (gs1), Download industrial production (INDPRO) Download Kansas City Fed financial stress index (KCFSI)
\*Compute difference in the 10-year and 1 year Treasury. Compute differences in industrial production.
\*Download real gdp (gdpc1; convert to monthly using default). Compute percent changes in it.

\*Include a Recession variable (0,1)

\*Regress percent changes in industrial production on lags of difference in Treasury Rates (1-12)

\*Regress recession on lags of difference in Treasury rates (1-12)

\*Regression changes in industrial production on lags of KCFSI (1-12)

\*Regression recession on lags of KCFSI (1-12)

In terms of overall R2, how does each variable differ in explaining changes in industrial production versus recessions?

In terms of overall R2, how do treasury spreads perform versus the KCFSI?

**Assignment x. Interest Rates & VARs**

\*Under Model, select Vector Autoregression

\*Select fed funds (REFF), 3-month Treasury (RTB3M), 1-month commercial paper rate (RCPR1M), and Baa corporate bond rate (RBAA) as endogenous variables

\*Select lags and choose 3

\*Print results

 \*Under Graphs, select impulse responses (combined)

\*Print the graphics

\*Under Analysis, select impulse responses (these correspond to the graphs

\*Print these results

\*On a cover sheet to these results, express which of the lagged values in the basic VAR output tends to influence the other in order of size of effects

\*What are the impulse response functions indicating?

Unused Assignments

 Generating Forecasts/Manipulating the Fair Macro Model

Solving the Fair Model

\* Go to Fair Model link <http://fairmodel.econ.yale.edu/main3.htm>

\* Select link for “Solve version dated Oct 31 2005 through Aug 24 2009

\*Enter a dataset name and password of your choosing and select “Enter”

\*In Dataset box enter BASE082; in Password box enter BASE

\*Select link for “Solve Model and Display Results”; Select Proceed button

\*Estimate the model with the default values;

\*Put UR in “List of Variables for Output” window and select “Display Output” button

\*Copy and Paste results into Excel spreadsheet

\*Go back and repeat last step, except replace UR with GDPR and select “Percentage change” button under “Variable Values”

\*Go back to page listing the 9 options; select either “Drop or Add” and equation” or “Modify equations” and make a selection as to what to drop or modify (choose something where you can explain your reasoning/interest in making this change)

\*Go back to and repeat the steps from “Solve the model and examine the results”

\*On your Excel spreadsheet, enter the Actual values for these time frames (you can obtain these from the “Forecast Record” link on the Fair Model main page

\*Print your Excel sheet(s); on it, explain whether your change improve the base model results or not? Was the difference large or small? Also, briefly express your reasoning for making this change

**Manipulating Prescott Model**

\*Create a new data set (Tools) with 70 observations, time-series, starting date of 1970

\*From the website, save the file e503 dsge sim.inp and Open it into Gretl as a Script file.

(If the file opens in a browser window, copy the file contents, go to File>Script>New Script>Gretl and paste the contents onto the new Script file page)

\*Run the file for the default parameter settings

\*In the data file, generate and PRINT descriptive statistics for ypercap (income/output) and labor hours; on this page, report the final year value of y along with the parameter settings for labor tax rate (tauh);

\*Change the setting for labor tax rate to 0.15, 0.2, 0.3, and 0.35 and rerun the simulation; for each setting, PRINT the same information as above

\*Change the setting for capital share (theta) which equals the productivity of capital; reset it to 0.45, run the simulation, and print the results;

\*On an attached sheet, 1) how much does changing labor tax rate change income/output? 2) how much does a higher MRP of capital change income/output? 3) List the equations that feed into the output/income per capita equation (don’t include the equations for cohorts/working pop; those equal the population (NPop) in this example.