

Problem Set #1

Econ 381, Prof. Evans

Due Monday, Sep. 15, 3 p.m.

NOTE: You are encouraged to work on this problem set in a group of up to four members. When finished, each group should turn in one copy of the problem set to the class inbox in 130 FOB. Each completed problem set should list the names of the group members who worked on the assignment. As noted in the syllabus, no late assignments will be graded.

1. **Hands dirty with data (3 points).** In this problem, you will retrieve and manipulate macroeconomic data and verify some relationships that inform macroeconomic theory.

(a) Go the Federal Reserve Bank of St. Louis' Federal Reserve Economic Data (FRED) website at <http://research.stlouisfed.org/fred2/> and download the following three data series into an Excel file.¹ You can then do the subsequent analysis using either Excel or Stata²:

- **Real Gross Domestic Product, 3 decimal (GDPC96), percent change from year ago, deviation from trend.** Make sure you set the units of account to “percent change from year ago” on the download page. Otherwise, you will simply have to manually calculate the percent change from a year ago from the quarterly levels. You transform this series to deviation of GDP growth from trend in the following way. If you look at the GDP percentage change series, you’ll notice that the average percentage change (growth rate) is above zero. So calculate the average growth rate for the whole series. Then the deviation from trend equals the growth rate minus the average growth rate. This measure shows how the economy is growing relative to its average or “natural” rate.
- **Total Nonfarm Payroll Employment (PAYEMS), year over year percentage change, deviation from trend.** Make sure you set the units of account to “percent change from year ago” on the download page. Follow the same procedure from above in creating the series for deviation from trend in employment growth. Because the GDP series is quarterly and the employment series is monthly, you’ll need to transform the employment series to quarterly. Just

¹Once you find the desired series at the [FRED](#) website, click on the series ID (e.g., GDPC96) which should take you to the series data page. At the top of the page, choose the option, “Download Data”. Then choose the units you want the data in, choose Excel format, and then click “Download Data”.

²Stata is available in both the economics computer lab in 136 FOB and in the SWKT computer lab on the first floor (basement). See the Appendix for instructions on how to do the data analyses below.

set each quarter's employment equal to the average of the first three months employment growth rate. Appendices A.1.1 and A.2.3 give instructions on how to transform a monthly series into a quarterly series.

- **Consumer Price Index for All Urban Consumers (CPILFESL), all items less food and energy, year over year percentage change, deviation from trend.** Make sure you set the units of account to “percent change from year ago” on the download page. Follow the same procedure from above in creating the series for deviation from trend in employment growth. Also, follow the same procedure as with the PAYEMS series to transform CPILFESL from a monthly series to a quarterly series.

(b) Create a chart that plots both Real GDP (% chg. from year ago, deviation from trend) and total nonfarm payroll employment (% chg. from year ago, deviation from trend) from 1948Q1 to 2008Q2.

- Calculate the correlation of the two series over the period 1948Q1 to 2008Q2.³
- How do you explain the two series being related in this way?

(c) Create a chart that plots both Real GDP (% chg. from year ago, deviation from trend) and consumer price index, all urban consumers, less food and energy (% chg. from year ago, deviation from trend) from 1958Q1 to 2008Q2.

- Calculate the correlation of the two series over the period 1958Q1 to 2008Q2.
- How do you explain the two series being related in this way?

2. **Chapter 2, “Problems and Applications” (2 points): #6**

3. **Chapter 2 related employment question (1 point):** Suppose an economy is made up of 100 people who are in the following *mutually exclusive* categories shown in Table 1:

- (a) What is the percent of the workforce *not in the labor force*?
- (b) What is the labor force participation rate?
- (c) What is the unemployment rate?

4. **Chapter 3, “Problems and Applications” (4 points): #3,#6,#9,#10**

³In Excel, you calculate the correlation between two series by using the “=CORREL(series1,series2)” command. In Stata, you use the “correlate var1 var2” command.

Table 1: Employment categories for fake economy

Number	Category
5	under 16 years old
5	disabled
5	have been unemployed for a long time and have decided to stop looking for a job
5	stay-at-home spouses
10	retired
50	currently working
10	have jobs that are currently off for the summer
5	had to leave jobs temporarily because of hurricane Ike
5	unemployed and looking for work

APPENDIX

A.1 Excel Instructions

A.1.1 Transforming series from monthly to quarterly in Excel

The Total Nonfarm Payroll Employment (PAYEMS) series comes at a monthly frequency, but we want to compare it to the GDP series that comes at a quarterly frequency. The solution is to make each quarter the average of the corresponding three months data. However, it is more difficult to do this in Excel in a formula rather than having to manually type the average command in each row.

A solution is to type the following formula into Excel. Assume that the monthly data for June 1947 (1947-06-01) is in cell A117. You can place the formula for second quarter 1947 in cell E117 by inputting the following formula:

$$= \left(INDEX(\$A\$1 : \$K\$971, 3 * ROW(\$B117) - 236, COLUMN(\$B117)) + \dots \right. \\ \left. INDEX(\$A\$1 : \$K\$971, 3 * ROW(\$B117) - 235, COLUMN(\$B117)) + \dots \right. \\ \left. INDEX(\$A\$1 : \$K\$971, 3 * ROW(\$B117) - 234, COLUMN(\$B117)) \right) / 3$$

You can then copy this formula down the column and it will augment of row number of the three cells begin averaged by a multiple of three. The key is that the minus terms in the formula (e.g., "-236", "-235", "-234") must be changed to fit the given series. This new quarterly series can then be matched up to the quarterly GDP series.

A.2 Stata Instructions

A.2.1 Opening Stata in SWKT computer lab

When in the Kimball Tower Student Computing Center (101 SWKT) on the first floor (basement) of the SWKT, you open Stata in the following way. Log onto the computer by entering your NetID and password. Go to the "Start" button in the lower left-hand corner. Click on "All Programs". Then select "Class specific", and click on Stata 10.

The Economics Department computer lab (136 FOB) is slightly easier, although significantly smaller, than the SWKT computer lab. You simply log into one of the computers using your NetID and password, then click on Stata 9 from the "All programs" section of the "Start" menu. There is not any difference that you will notice between Stata 9 in the Econ computer lab and Stata 10 in the SWKT computer lab

A.2.2 Importing data into Stata

One easy way to import data into Stata is to save it as an Excel file and then just cut and paste the data into Stata's data editor. The Stata data editor is accessed by

either clicking on the spreadsheet looking icon or by going to the menu and clicking on “Data” and “data editor”.

Make sure that data series are in numerical format (numbers should be black, text should be red). One easy way to make sure that your Excel numbers get pasted as numbers and not text is to avoid pasting any “#N/A” values from Excel. Otherwise you will have to use a command in Stata like “destring”.

Once the variables have been input into Stata, you can change their names. Suppose the variables that you have imported into Stata are named “var1” and “var2”. You can change the name of “var1” to “newname1” by typing in the command line “rename var1 newname1”.

You can save your data by going to the file menu and selecting “save as”. You will probably want to save to and work from a flash drive.

A.2.3 Transforming series from monthly to quarterly in Stata

Once you have the monthly data series in Stata, you can transform it to a quarterly series in the following way. First, rename the date variable. Suppose your date variable is called “var1” and it is a string variable “str10” (use the “describe” command to confirm this). Rename “var1” to something like “datetext” by typing “rename var1 datetext”.

Now convert “datetext” to a numerical date variable called “datevar” by typing “gen datevar = date(datetext,”YMD”, 2008)”. This creates a numeric variable that Stata recognizes as the date given in the text. Now just format that variable to display as something more readable by typing “format datevar %td”. Next, create a numeric year variable by typing “gen year = year(datevar)”, a numeric quarter variable by typing, “gen quarter = quarter(datevar)”, and a numeric month variable by typing “gen month = month(datevar)”. These variables now tell you which year, month, and quarter each month’s data is in.

Lastly, you just need to calculate the quarterly average and then collapse the data. First, you must sort the data by typing “sort year quarter month”. Suppose your employment growth variable is named “empgrowth”. Create the quarterly average by typing “by year quarter: egen qempgrowth = mean(empgrowth)”. Now you just drop the second and third month observations in each quarter because they are duplicates by typing, “by year quarter: drop if _n ~ = 1”.

Now you have your quarterly employment growth rate series, which is the average of the growth rates of the three months in that quarter. In Stata, there are always many ways to accomplish the same task, and some are more direct than others. I don’t claim that my way is the easiest way. But this is the way that I know how to do it.