

## Problem Set #2

Econ 381, Prof. Evans

Due Monday, Jan. 26

(1:35 pm for Section 001) and (4:30 pm for Section 002)

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**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.

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1. **Chapter 3, “Problems and Applications” (3 points): #3,#6,#9,#10**
  
2. **Hands dirty with data (4 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 two data series into an Excel file.<sup>1</sup> You can then do the subsequent analysis using either Excel or Stata<sup>2</sup>:
    - **Consumer Price Index for All Urban Consumers (CPILFESL), all items less food and energy, year over year percentage change.** Make sure you set the units of account to “percent change from year ago” on the download page.
    - **M1 Money Stock (M1SL), percent change from year ago.** Make sure you set the units of account to “percent change from year ago” on the download page.
  
  - (b) Create a chart that plots both the CPI (% chg. from year ago) and M1 Money Stock (% chg. from year ago) from 1960M1 to 2008M12.
    - Calculate the correlation of the two series over the period 1960M1 to 2008M12.

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<sup>1</sup>Once you find the desired series at the [FRED](#) website, click on the series ID (e.g., CPILFESL) 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”.

<sup>2</sup>Stata is available in both the economics computer lab in 136 FOB and in the SWKT computer lab on the first floor (basement). See Appendix to Problem Set #1 for help out how to use Stata or Excel to manipulate data.

- (c) Now create a 10-year average CPI annual growth rate by putting a formula in each cell starting in 1967M12 that averages the past 120 months of annual growth rates.<sup>3</sup> Create the same 10-year average annual growth rate series for M1 Money Stock but starting in 1969M12. Create a chart that plots both the 10-year average annual CPI growth rate and the 10-year average annual M1 Money Stock growth rate from 1969M12 to 2008M12.
- Calculate the correlation of the two series over the period 1969M12 to 2008M12.
  - How do you explain the difference in the correlations between part (a) and part(b)? (Hint: Has to do with short-term and long-term.)

**3. Chapter 4, “Prof. Evans made-up problem” (3 points):**

- Assume that real output is fixed at  $\bar{Y} = 300$ , consumption is fixed at  $\bar{C} = 200$ , government spending is fixed at  $\bar{G} = 30$ .
- Assume that the Investment function takes the following form  $I(r) = 75 - r$
- Assume that the quantity equation of money holds  $M \cdot V = P \cdot Y$  and the velocity of money is constant  $\bar{V}$ 
  - (a) If the money supply increases by %3, by what percentage rate do prices change? That is, what is the inflation rate?
  - (b) What is the real rate of investment  $r$  in this economy? What is the investment level  $I$ ?
  - (c) What is the nominal interest rate  $i$ ?
  - (d) If government spending  $G$  increases to 35, what happens to the real rate of investment  $r$ , investment  $I$ , and the nominal interest rate  $i$ ?

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<sup>3</sup>In Excel, this is done by using the “=AVERAGE()” function and then copy and pasting it down. See Appendix A.1 for instructions on how to generate a moving average in Stata.

# APPENDIX

## A.1 Moving Average in Stata

Generating a moving average of a time series in Stata takes a few more commands than you might expect. As with the last assignment, paste or import your data into Stata. Then create a variable entitled “rowvar” that simply gives the row number of the data by typing “gen rowvar = \_n”. Then set that series as the time series variable by typing “tsset rowvar”.

Suppose the monthly CPI series is named “cpi”. Now you can create a 10-year moving average of this monthly series (call it “avg10yrcpi”) that includes 119 lagged observations, 1 current observation, and 0 leading observations by typing “tssmooth ma avg10yrcpi = cpi, window(119 1 0)”.