

**Concordia University
Department of Economics**

Econ 324
Economic Data Analysis

Ivan Tchinkov
Winter 2017

Problem Set # 1

(due Tuesday, Feb. 28 in class)

FIRST NAME: _____ LAST NAME: _____

STUDENT NUMBER: _____

I. True/False/Uncertain - Briefly explain. No credit without an explanation (6 marks each).

1. More variation in the residuals improves the precision of estimation.
False. Since the variation in the residuals is in the numerator of the formula for the standard error, the higher it is, the higher the standard error, the less precise the estimation.
2. The Almon Distributed Lag Model improves estimation by overcoming the degrees of freedom and serial correlation problems of the Distributed Lag Model.
False/Uncertain. It can overcome the degrees of freedom and multicollinearity, not serial correlation, problems, but if the restriction is incorrect, it would not necessarily improve estimation.
3. The Lagrange Multiplier test for serial correlation is superior to the Durbin Watson d-test.
True/Uncertain. It does overcome most of the problems of the DW d-test like its inconclusiveness, being useful only for AR(1) serial correlation and with no lagged dependent variable as a regressor, and being a small sample test.
4. The long run multiplier can be found by using non-stationary data.
True/Uncertain. The long run multiplier can be found by either using ADL (p,q) model in its rewritten version with stationary data or from a simple regression with unit root, cointegrated variables.
5. The Error Correction Model requires unit root, non-stationary variables that are not cointegrated.
False. They need to be cointegrated.

II. Problems - Use Stata for all your computations. You have to show your work. No credit without an explanation.

1. Find data on four time-series variables of your choice. Use any data source you like (including the sources posted on Moodle), but explain in detail how you got the data, so that your work can be replicated. Use Stata to do the following:

- (a) Report time line graphs for the four variables and discuss your findings. (5 marks)
Full marks for Stata graphs of 4 time series variables and reasonable interpretation, i.e. if trending - unit root/trend stationary, if not - stationary.
- (b) Report time line graphs for the first difference in the four variables and discuss your findings. (5 marks)
Full marks for Stata graphs of 4 time series variables in first differences and reasonable interpretation, i.e. if first differences of unit root are not trending, then levels were I(1).
- (c) Construct the auto-correlation function of each variable and explain your findings. (5 marks)
Full marks for 4 autocorrelation functions in Stata and reasonable interpretation, i.e. unit root functions with high autocorrelation coefficients, stationary variables with low/random ones.
- (d) Construct a scatter plot of each pair of variables and discuss your findings. (5 marks)
Full marks for 6 Stata scatter plots and reasonable interpretation, i.e. why the pairs might or might not be correlated.
2. Use the file “324 exercise.xls” posted on Moodle. For this exercise use the monthly data **starting** from January 1950 onward (Use $p=q=4$).
- (a) Test the real stock price and real dividends for unit root non-stationarity. What do you conclude? (10 marks)
For price - fail to reject the null of a unit root, based on AR(4), no time trend specification, since t-stat -1.195 is not more negative than critical value with no time trend -2.89, so price is unit root, non-stationary.
For dividends - fail to reject the null of a unit root, based on AR(5), with time trend specification, since t stat -2.928 is not more negative than critical value with time trend -3.45, so dividend is unit root, non-stationary.
- (b) Test those two variables for cointegration. Would there be any spurious regression problem with those variables? (10 marks)
Applying the Engle-Granger test on the residuals - fail to reject the null of a unit root, based on AR(5), no time trend specification, since t-stat -2.127 is not more negative than critical value with no time trend -2.89, so residuals are unit root, non-stationary, thus price and dividends are NOT cointegrated and there will be spurious regression problems.
- (c) Regress the change in real stock market price on a constant and a time variable. Is time a good predictor of the stock market? (10 marks)
No, since the p-value on the time variable is .952, so one cannot reject the null that the coefficient on time is zero, i.e. time does not affect the change in real stock market price.
- (d) Depending on your result in (b), find and interpret the long run multiplier of real dividends on the real stock market price. (10 marks)
Since they are unit root, but NOT cointegrated, then we need to first difference them and find the multiplier based on the rewritten ADL(p,q) model with first differences, assuming they are stationary. Based on ADL (1,0) final specification, we get $\hat{\rho} = -.78$ and $\hat{\theta} = 6.86$, so the multiplier is $-\frac{\hat{\theta}}{\hat{\rho}} = 8.8$ or a very high long-run multiplier of the change in dividends on the change in real stock price.
- (e) Can an Error Correction Model be used here? If, yes, what is the speed of adjustment? (10 marks)
No, since they are NOT cointegrated.