

# ARE 212 - PROBLEM SET 4

DUE WEDNESDAY APRIL 25<sup>th</sup>

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## Serial Correlation

The goal of this problem set is to explore what happens if we have serially correlated disturbances.

1. Read the data into your fancy computer. Plot the series against time and make sure your data are read in correctly. Also with time series it makes sense to print out your data and compare the first and last row to the ascii file you initially read in, to make sure nothing funny happened when reading in the data. You may also want to check a few sample points in the middle.
2. We would like to estimate the expectations augmented Phillips curve (See Greene p. 251). We are interested in estimating the following equation:

$$\Delta p_t - \Delta p_{t-1} = \beta_1 + \beta_2 u_t + \varepsilon_t \quad (1)$$

- (a) Generate the dependent variable. (Hint: Read your codebook carefully. Should you drop any observations?)
- (b) Estimate the relationship given by equation (1) above and report the parameter estimates, standard errors, t-statistics and the  $R^2$ .
- (c) Plot your residuals against time. Just looking at them do you suspect a correlation problem? Positive? Negative?
- (d) Use the Breusch Godfrey Test to test for first order autocorrelation. Report your test statistic and p-value.
- (e) Use the Box-Pierce Test to test for first order autocorrelation. Report your test statistic and p-value.
- (f) Use the Durbin Watson test to test for first order autocorrelation. Report your test statistic and talk about whether you have a problem or not.
- (g) Use the Prais Winsten procedure to correct for the serial correlation problem. Report your parameter estimates, standard errors, t-statistics and a plot of the new residuals against time.
- (h) Use the Cochrane Orcutt procedure to correct for the serial correlation problem. Report your parameter estimates, standard errors, t-statistics and a plot of the new residuals against time. Did dropping the initial observation change the results a lot?
- (i) Use the Hildreth Lu procedure discussed in the notes to correct for serial correlation. (Do a gridsearch for  $\rho$  over the interval  $[-0.95; 0.95]$  using a 0.01 spacing.)