

Due Tuesday, April 26

This assignment is on the topics of heteroscedasticity and autocorrelation. The necessary data come from two sources: the Excel files `dat303sb.xls` and `macrodata.xls`. The data files are available at <http://uaeller.eller.arizona.edu/~rlo> under econ 522a. Be sure to attach the supporting computer print out to the completed assignment and make clear where your answers are shown.

1. A model of annual labor supply for a random sample of workers in 1990 is given by

$$hours_t = \beta_0 + \beta_1 WAGE_t + \beta_2 NLY_t + \beta_3 FSIZE + u_t, \quad t = 1, \dots, 200$$

where *hours* is annual hours of employment, *WAGE* is the hourly wage rate, *NLY* is annual non-labor income, and *F* is family size.

- a. Estimate the model by *OLS* and obtain the White heteroscedastic consistent variance/covariance matrix standard errors.
 - b. Conduct the following tests for heteroscedasticity at the 5% level of significance:
 - (1) the White test.
 - (2) the Breusch-Pagan test corresponding to $\sigma_{u_t}^2 = h(\alpha_0 + \alpha_1 FSIZE_t)$
 - (3) the Goldfeld-Quandt test for $\sigma_{u_t}^2$ increasing with F_t (use the first and last 70 observations, omitting the middle 60 observations).
 - c. Estimate the model on the assumption that $\sigma_{u_t}^2 = \sigma_u^2 FSIZE_t$.
2. Consider again the following time series model of the demand for imports:

$$\ln(IMPORTS)_t = \beta_0 + \beta_1 \ln(GDP)_t + \beta_2 \ln(PT)_t + \beta_3 \ln(POP)_t + u_t, \quad t = 1, \dots, 35$$

$$u_t = \rho u_{t-1} + \varepsilon_t, \quad |\rho| < 1$$

- a. Test for first-order autocorrelation at the 5% level of significance using
 - (1) the Durbin-Watson test
 - (2) a large sample χ^2 test.
- b. Estimate the model by the Prais-Winsten transformation and by the purely quasi-first difference transformation using estimates of ρ obtained from
 - (1) the Durbin-Watson statistic
 - (2) the regression of the *OLS* residuals on their lagged values