Econometrics I
Problem Set 6
Jan. 4, 2002
Due: Jan. 11, 2002

1. The file ps6q1.dat contains 9 observations of 2 variables. The two variables are average compensation Y and average productivity X.

   (a) Regress Y on X. Is the coefficient of X significant?
   From the proceeding regression obtain the residuals $\hat{u}_i$. (hint: use the command *predict*)

   (b) Following the Park test, regress $\ln \hat{u}_i^2$ on $\ln X_i$ to test for hoteroscedasticity.

   (c) Following the Glejser approach, regress $|\hat{u}_i|$ on X_i and then regress $|\hat{u}_i|$ on $\sqrt{X_i}$, and comment on your results.

   (d) Find the rank correlation between $|\hat{u}_i|$ and X_i and comment on the nature of heteroscedasticity.

2. The file ps6q2.dat contains 2 variables from Tabel 11.5— R&D expenses Y and sales X respectively.

   (a) Run an OLS regression of Y on X.

   (b) According to the Breusch-Pagan-Godfrey test, is the error variance of the regression homoscedastic?

   (c) According to the White's general heteroscedasticity test, is the error variance of the regression homoscedastic?

   (d) Regress Y on X and use White's heteroscedasticity-consistent variances. Is the standard error of the coefficient of X greater or smaller than the standard error in (a)? (hint: use *robust* option in regress)

3. Assume the first-order autoregressive scheme $u_t = \rho u_{t-1} + \epsilon_t$ where ϵ_t satisfies the assumption of the classical linear regression model.

   (a) Show that $\text{Var}(u_t) = \sigma^2/(1-\rho^2)$, where $\sigma^2 = \text{Var}(\epsilon_t)$.

   (b) What is the covariance between u_t and u_{t-1}? Between u_t and u_{t-2}? generalize your results.

   (c) Write the covariance matrix of the u's.

4. Given a sample of 50 observations and 4 explanatory variables, what is the result of Durbin-Watson test of autocorrelation for the following d statistics? (a) $d = 1.05$ (b) $d = 1.40$ (c) $d = 2.50$ (d) $d = 3.97$.