Ch. 9. SERIAL CORRELATION

- OLS assumption: errors are not correlated.
- Incorrect estimation of standard errors and t-stats not reliable.
- Bias in estimates.
- Economic growth.
- Most of the time, economic growth.
- Positive correlation more likely in economics (negative difficult to explain).
- Pure serial correlation.

\[ Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \]
\[ \varepsilon_t = \rho \varepsilon_{t-1} + u_t \]

- Illustrations of serial correlations.
- \( \rho \) = correlation of \( \varepsilon_t \) and \( \varepsilon_{t-1} \)
- \(-1 \leq \rho \leq 1\)

- Correlation more likely in economics (negative difficult to explain).

To test for positive correlation:
- \( \text{H}_0: \rho \leq 0 \)
- \( \text{H}_a: \rho > 0 \)

Critical D.W. has \( d_{\text{lower}} < d_{\text{upper}} \)

- Reject if computed D.W. < \( d_{\text{lower}} \)

Example: p. 318

- K = 3, N = 25, 5%. \( d_{\text{lower}} = 1.12 \), 1.66
- Computed D.W. = 1.78: No Serial Correlation

- What if test indicates serial correlation? Is functional form correct?
  - Add "ARC(1)" to the estimated equation in Eviews.
  - Extra independent variable: \( \varepsilon_{t-1} \)

\[ (Y_t - \hat{\beta} Y_{t-1}) = (\beta_0 - \hat{\beta}_0) + \hat{\beta}_1 (X_t - \hat{\beta} X_{t-1}) + (\varepsilon_t - \hat{\rho} \varepsilon_{t-1}) + u_t \]

2. Estimate initial regression w/ Corrected standard errors in Eviews: Newey-West.