Practice Problem Set – Linear Regression

The file entitled MONEYDEM.XLS contains quarterly values of seasonally adjusted U.S.3-month (TB3mo) and 1-year (TB1yr) treasury bill rates. Each series is measured over the period 1959:Q3 to 2001:Q1.

(a) Plot the time series of each series separately. Does each series appear to have a constant mean and variance over time?

(b) Plot each time series on the same figure. What can you say about the relationship between the two series?

(c) Use Ordinary Least Squares (OLS) to estimate the relationship between long-term and short-term interest rates as

$$TB1yr_t = \alpha + \beta TB3mo_t + \varepsilon_t$$

(d) What does the estimate of β tell you about the relationship between long-run and short-run interest rates?

(e) Test the null that $\beta = 1$.

(f) Plot the residuals from the regression in part (c) versus TB3mo. Do you observe any pattern?

(g) Use the White Test to test for the presence of heteroskedasticity.

(h) Estimate the model again, but calculate the robust (White) standard errors.

(i) What happens to the coefficients of the model in part (h) relative to part (c)? What happens to the standard errors of the model in part (h) relative to part (c)? Why?

(j) Create a dummy variable that is equal to 1 when TB3mo is in excess of 10.00 and zero otherwise. Include this variable in the regression model as

$$TB1yr_t = \alpha + \beta TB3mo_t + \delta D_t + \varepsilon_t$$

and run OLS.

(k) Test the null that the dummy variable is relevant in part (j).

(l) What happens to the fit of the model in part (j) relative to part (c)?