

Homework 10. Due Wednesday November 13.

1. Simulate two random walks

$$y_t = y_{t-1} + e_t ,$$

and

$$x_t = x_{t-1} + u_t ,$$

where u and e are independent standard normals. Run the regression

$$y_t = \mu + \gamma x_t + w_t .$$

Do a number of simulations for $T = 50, 100$ and 500 and report the average values of $\hat{\gamma}$ and the associated t-statistics. (Spurious regression.)

2. Simulate the random walk (if you want, you can do this at the same time as question 2) and use the same y_t s.)

$$y_t = y_{t-1} + e_t ,$$

and

$$x_t = 0.5y_t + u_t ,$$

where u and e are independent standard normals. Run the regression

$$y_t = \mu + \gamma x_t + w_t .$$

Do a number of simulations for $T = 50, 100$ and 500 and report the average value of $T(\hat{\gamma} - 0.5)$ and the associated t-statistic. (Cointegrated regression.) Can you see the super-consistency? Run a unit root test (t-test) on the residuals and find the critical value at the 5 percent level for testing for cointegration. (Look up the critical value for the CADF test and compare.)