

Homework Assignment #5

Show all work. For those questions that require you to write R code, hand in the programs that you wrote. This assignment is due on 4/22. All programs are available from the course web site.

1. The file `mc_asy.r` contains some Monte Carlo code that will enable you to explore the performance and properties of the OLS estimator as the sample size increases. Read the code carefully and make sure you understand its different parts. Change the line that starts with `Nvec` to generate six samples of different sizes, ranging from 10 to 1000. Report and interpret the results using the plots produced by the program. (10 points)
2. The file `mc_asydist.r` contains some Monte Carlo code similar to that in `mc_asy.r`. A key difference is that the data generating process assumes that the errors are uniformly distributed on the interval $[-4, 4]$. We want to explore the distribution of the OLS estimator as the sample size increases assuming non-normal errors. Again, read the code carefully and make sure you understand its different parts.
 - (a) Change the line that starts with `Nvec`, run the code, produce the plots, and discuss the results. What do they tell you about the how the distribution of the estimates of the slope coefficient changes as the sample size increases? (10 points)
 - (b) Change the code to choose a different non-normal distribution for the errors. Some candidates are `rbinom` (for a binomial distribution), `rgeom` (for a geometric distribution), and `rexp` (for an exponential distribution). To see how to use these distribution commands, type `help(dist)` where “`dist`” refers to the distribution (e.g., `rbinom`). Re-run the code and discuss your results. (20 points)
3. The file `het.mc.r` contains Monte Carlo code for generating heteroskedastic data and estimating OLS and GLS. Fill in the appropriate code for the lines containing “????”.
 - (a) What does this exercise tell you about bias in the OLS and GLS estimators? (15 points)
 - (b) What does it tell you about the efficiency of these estimators? (15 points)
 - (c) Write code to compute White robust standard errors. How do the robust standard errors compare with the standard errors from the other estimators? (30 points)