

Problem Set 6 – “Bayesian OLS”

In this problem set, use the Metropolis-Hastings algorithm to estimate the posterior distribution of the coefficients on returns to schooling.

In the repository you find data compiled by David Card that contains a sample with individual wage data. We are interested in finding the returns to schooling, ie the effect of an additional year in school on log wages. For the purpose of this problem set we ignore the endogeneity problems in such a regression! (But we could do everything using an IV strategy, it would only require us to use a different likelihood function.)

1. Run an OLS regression of log wages on education, experience, and dummy variables for SMSA status, race (“black”), and region (“South”). Find estimates for the coefficients $\hat{\beta}$ and their standard errors, as well as an estimate of the standard deviation of the residuals $\hat{\sigma}_\varepsilon$.
2. Now find the posterior distribution of the parameter vector $(\beta, \sigma_\varepsilon)$ by using the Metropolis-Hastings algorithm.
 - (a) Use a flat prior for all parameters.
 - (b) You come across a study by someone else on an unrelated dataset that finds a value $\hat{\beta}_{educ} = 0.06$ with a confidence interval of $[0.035, 0.085]$. You think about using $\hat{\beta}_{educ}$ as the mean for a normal prior distribution for β_{educ} . For the standard deviation of your prior you decide to use 2 times the standard error of $\hat{\beta}_{educ}$ in the previous study. Use a flat prior on all other parameters.
3. In a few sentences compare how the estimates from 1. relate to the posterior distributions in 2.a) and 2.b).