

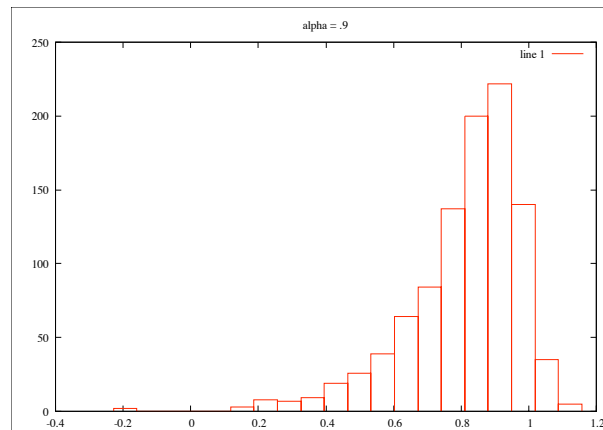
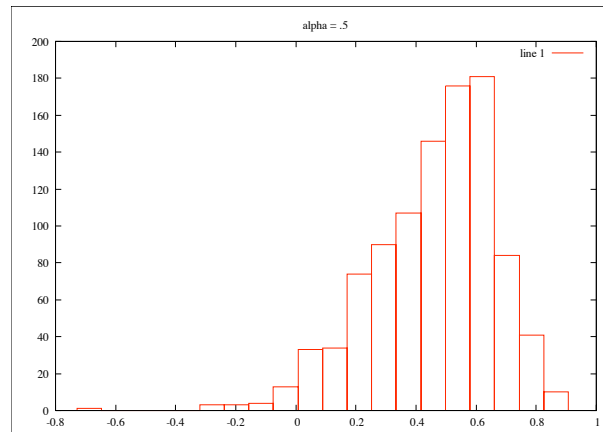
Economics 522A, Homework 9 Solutions

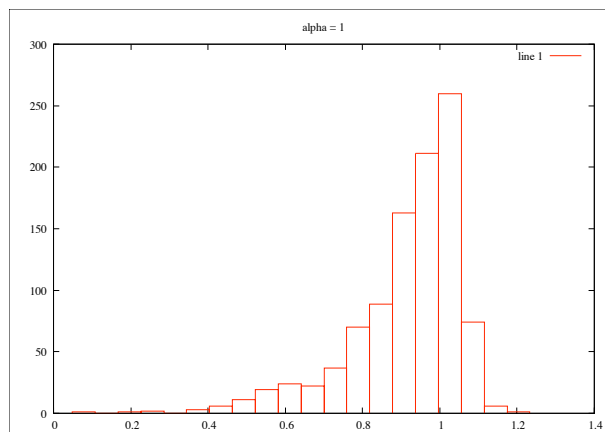
1. The M-function `hw9.m` takes as input T , α , and the number of simulation draws, and then draws from the distribution of $\hat{\alpha}$. For $\alpha = 0.5, 0.9, 1$, we get sample averages for $\hat{\alpha}$ of:

0.45255 0.82097 0.92029

We see that all of the estimates are downward biased, with more bias when α is .9 or 1.

Here are the histograms of the distributions of $\hat{\alpha}$.





We see that all of the distributions are slightly asymmetric, and when $\alpha = .9$ or $\alpha = 1$, the asymmetry is quite pronounced.

2. Let $\hat{\beta}_1 = (X_1'X_1)^{-1}X_1'y$. Then

$$\begin{aligned}
 E[\hat{\beta}_1|X] &= E[(X_1'X_1)^{-1}X_1'y|X_1, X_2] \\
 &= (X_1'X_1)^{-1}X_1'[X_1\beta_1 + X_2\beta_2] \\
 &= \beta_1 + M_1X_2\beta_2,
 \end{aligned}$$

where $M_1 = (X_1'X_1)^{-1}X_1$. So M_1X_2 is the matrix of least squares coefficients in regressions of the columns of X_2 on the matrix X_1 . Intuitively, it provides estimates of the coefficients of the best linear predictor of X_2 given X_1 .

Comparing this to LN19: there we conditioned only on X_1 , so M_1X_2 was replaced by the conditional mean of X_2 given X_1 . Here, we are conditioning on both X_1 and X_2 , so we replace the conditional mean with a sample version.