Problem Set #3

MACSS 30100
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[Note]: The μ and σ in the legend plotted here is the expectation and standard deviation of the log normal pdf. It is NOT the mean and standard deviation of the income distribution!!

Problem 1

(a) The following graph is the histogram for the income of the MACSS cohort:

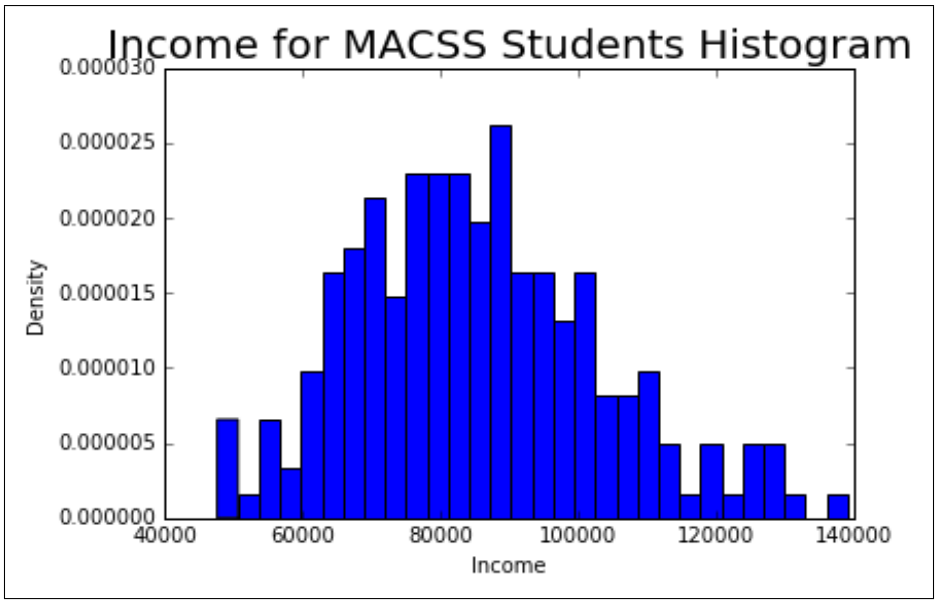

Figure 1: Histogram of Income of MACSS Students

(b)

(c) The GMM estimator of two moment conditions: the log normal parameters are: $\mu = 11.331$, $\sigma = 0.209$.

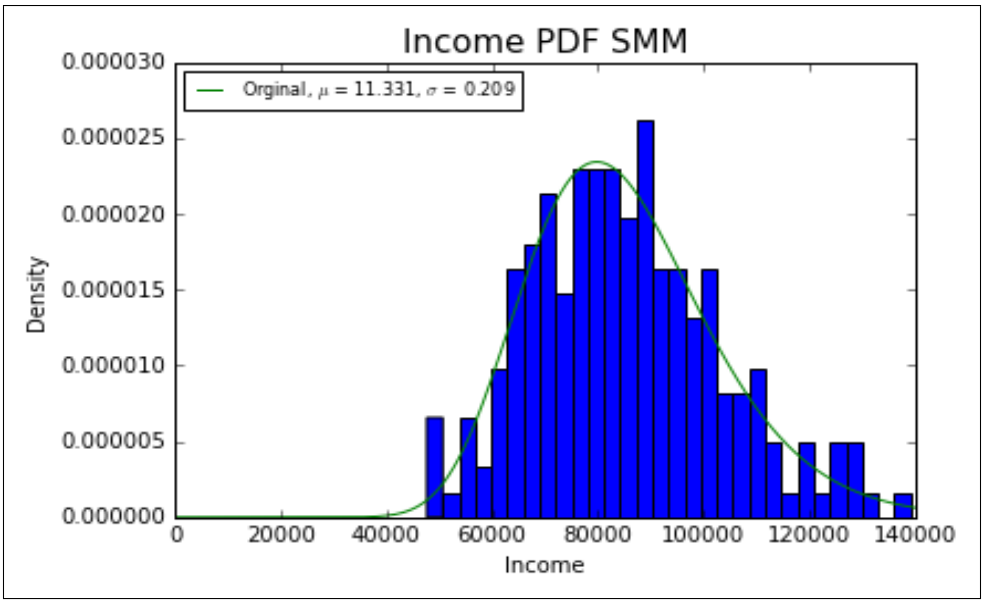

Figure 2: Income PDF of SMM(One Step)

(d) The GMM estimator of two moment conditions using TWO-STEP variance covariance matrix is: the log normal parameters are: $\mu = 11.330$, $\sigma = 0.209$.
The plotted graph is as following:

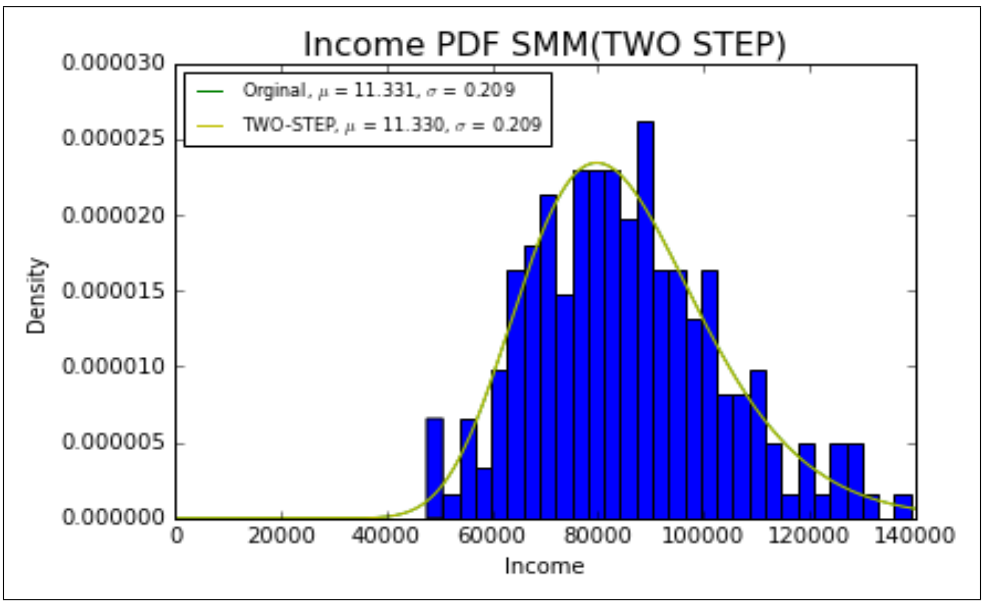

Figure 3: Income PDF of SMM(TWO-STEP)

We take exponential of the estimated expectation and standard deviation. Then we get:
The data moment is: $\mu_{data} = 85276.824$, $\sigma_{data} = 17992.542$.
For ONE Step estimation:

The model moment is $\mu_{model} = 85134.858$, $\sigma_{model} = 17975.070$
The value of the criterion function is $8.11793150e - 13$

For TWO Step estimation:

The model moment is $\mu_{TWO\_STEP} = 85180.563$, $\sigma_{TWO\_STEP} = 17987.327$
The value of the criterion function is $-3.39244544e - 09$

The two estimations are similar with each other. They are all close to the sample mean of the data. But again, the one step estimator seems to perform slightly better than the one step estimator.