Problem Set #4

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Problem 1

Part (a)

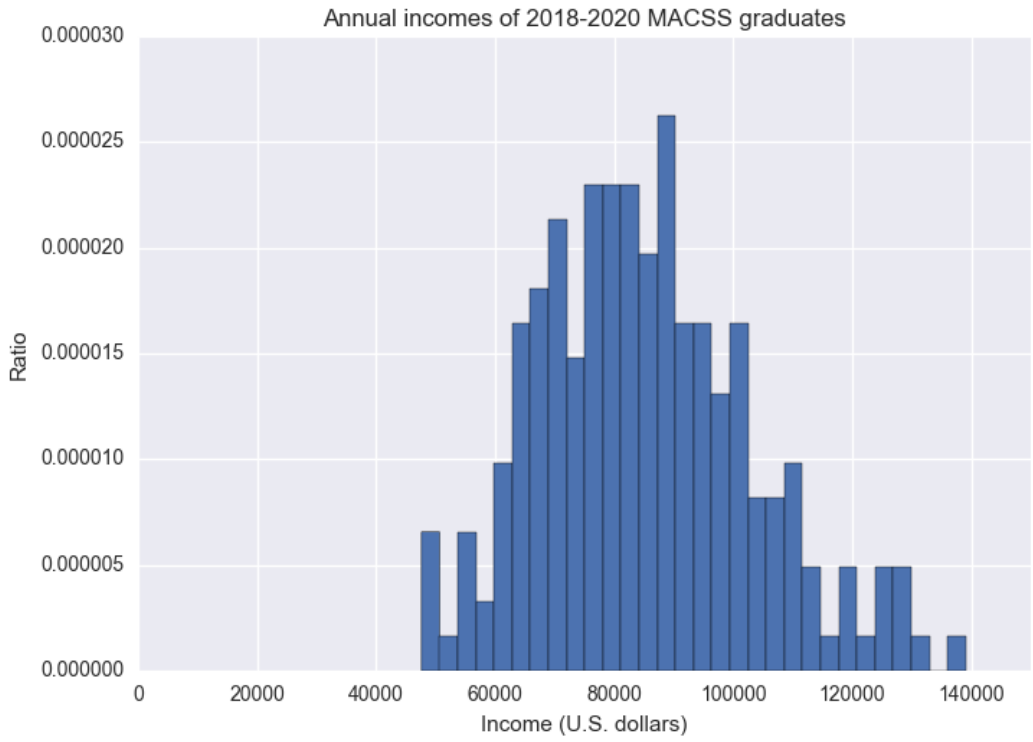

Figure 1: 1a

Part (b)

Test PDF values:

$$\begin{bmatrix} 0.0019079 & 0.00123533 \\ 0.00217547 & 0.0019646 \end{bmatrix}$$

Part (c).

With estimated parameter values $\mu = 11.330637236$ and $\sigma = 0.209229370701$, the value of the SMM criterion function is 5.55966141266e-15.

Data moments and model moments compared:
Average, standard deviation of income data = (85276.8236063, 17992.542128)
Mean, standard deviation of model (one-step estimation) = (85276.8280721, 17992.543083)

The data and model moments are very nearly the same.

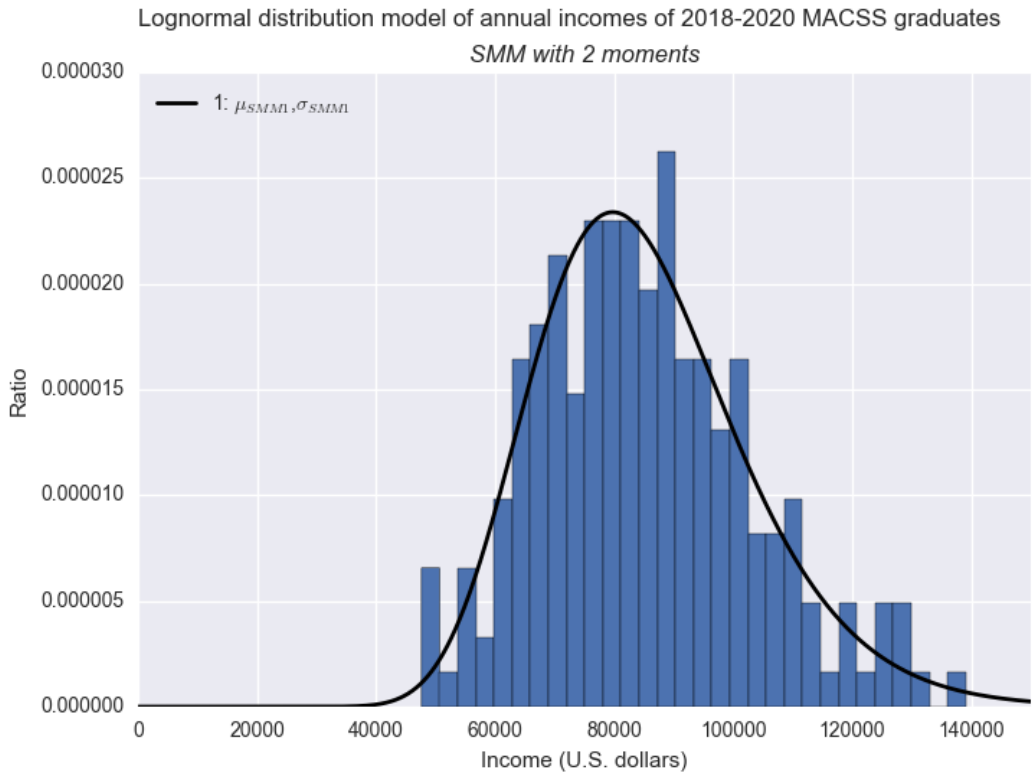

Figure 2: 1c

Part (d).

With the estimated parameter values $\mu = 11.3306372141$ and $\sigma = 0.209229359136$, the value of the SMM criterion function is 0.000176839034035.

Data moments and model moments compared:
Average, standard deviation of income data = (85276.8236063, 17992.542128)
Mean, standard deviation of model (one-step estimation) = (85276.8280721, 17992.543083)
Mean, standard deviation of model (two-step estimation) = (85276.8259939, 17992.5416292)

Although the one-step estimation provides a good fit for the two moments chosen, the two-step estimation produces model moments even closer to the data moments.

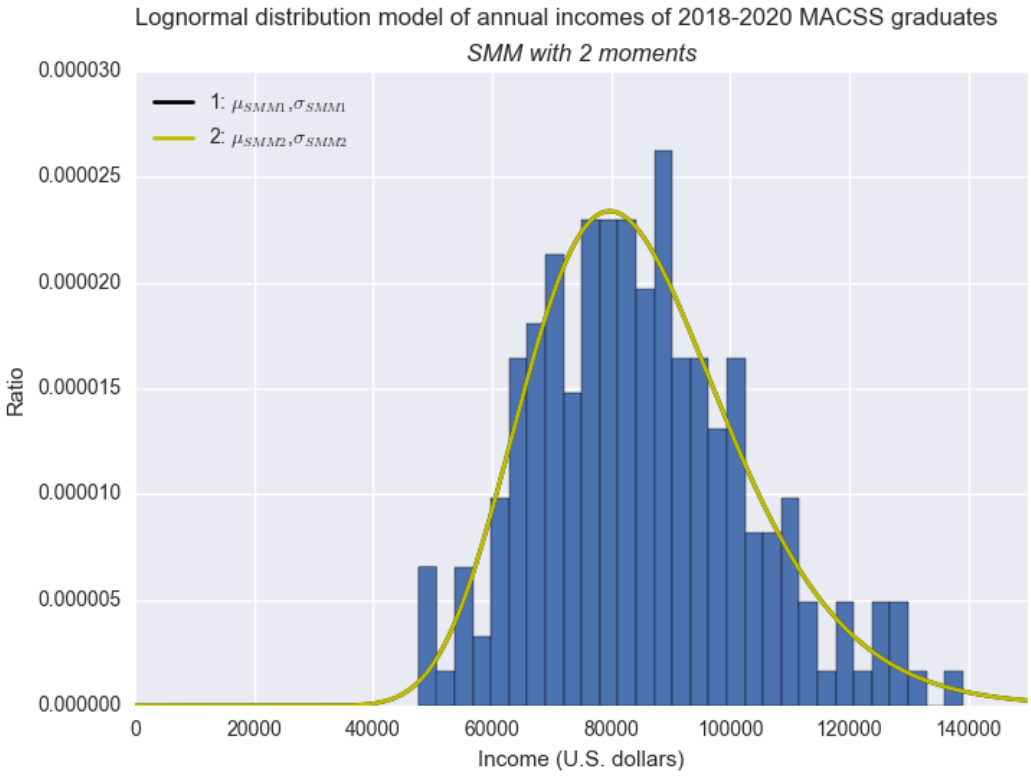
Lognormal distribution model of annual incomes of 2018-2020 MACSS graduates
SMM with 2 moments
1: μ_{SMM1},σ_{SMM1}
2: μ_{SMM2},σ_{SMM2}
Ratio
0.000030
0.000025
0.000020
0.000015
0.000010
0.000005
0.000000
0
20000
40000
60000
80000
100000
120000
140000
Income (U.S. dollars)

Figure 3: 1d