Problem Set #[3]

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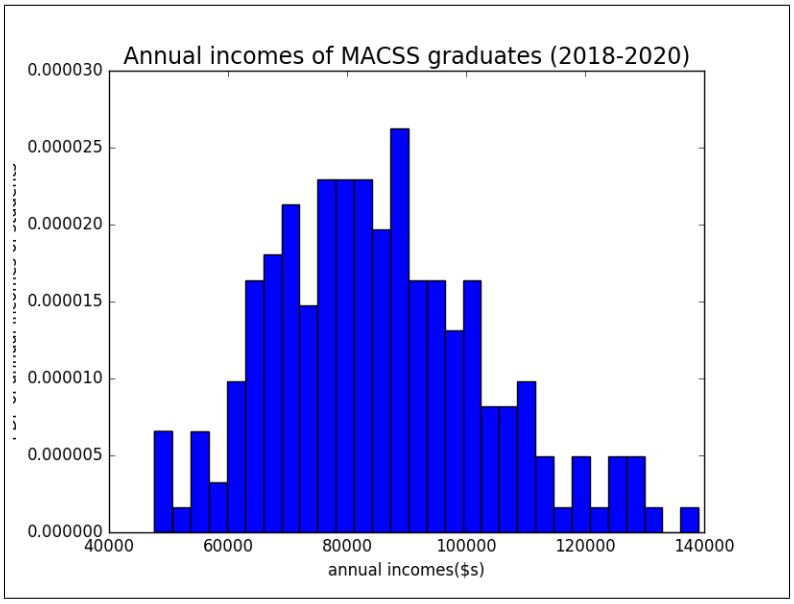
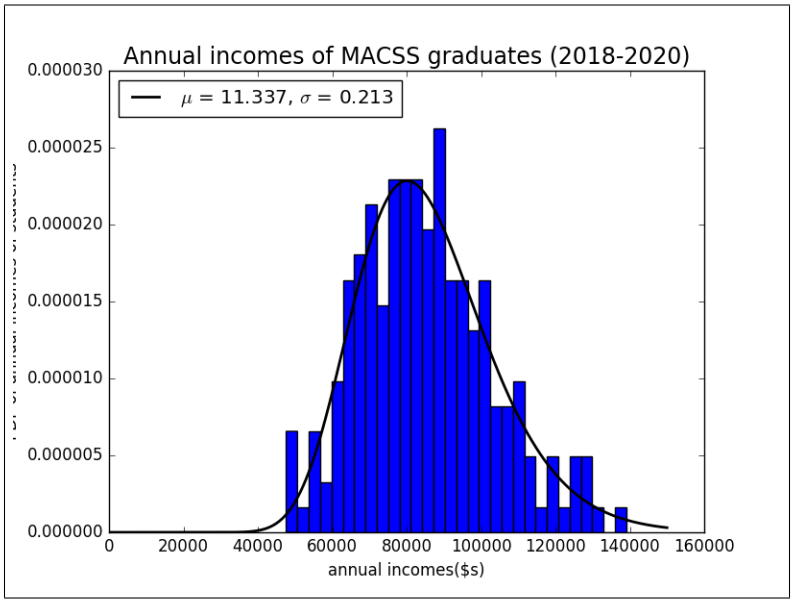
Problem 1

Part (a).Plot a histogram

The histogram of annual incomes of students who graduated in 2018, 2019, and 2020 from the University of Chicago MACSS program is as below:

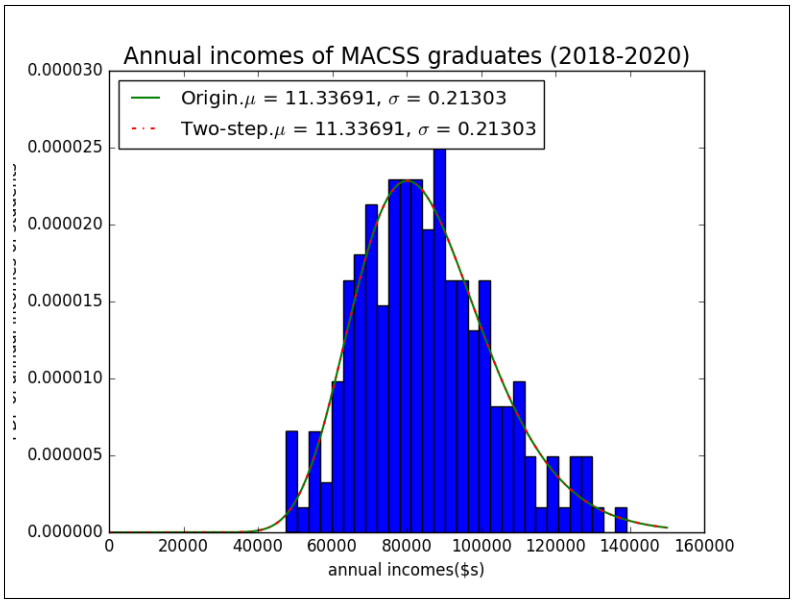


Part (b).GMM



The lognormal parameters for GMM estimation is: $\mu = 11.337$,$\sigma = 0.213$.
$The data moments are: \mu = 85276.824$, $\sigma^2 = 323731572.230$.
$Model moments at the estimated parameter values are: \mu = 85277.012$, $\sigma^2 = 323731406.898$.
The value of GMM criterion function at the estimated parameter values is: $7.822822686613493e-13$.

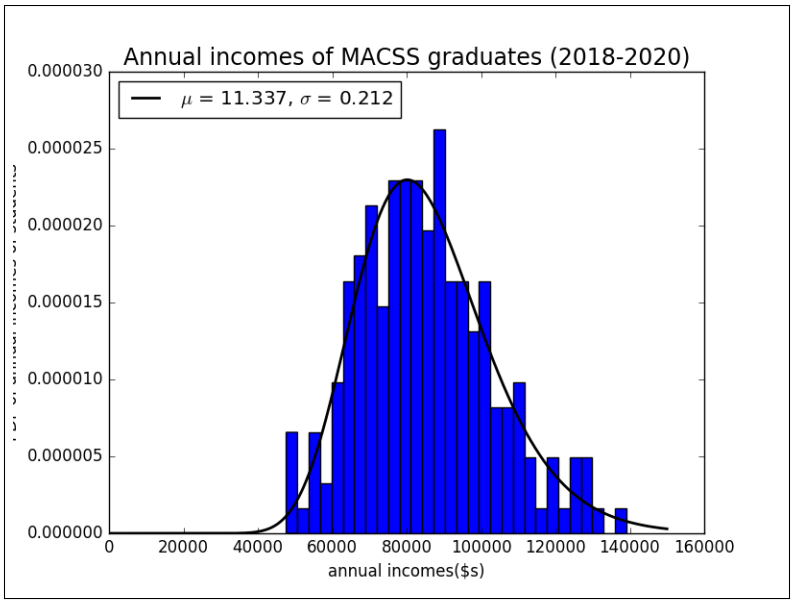
Part (c).Two-step GMM



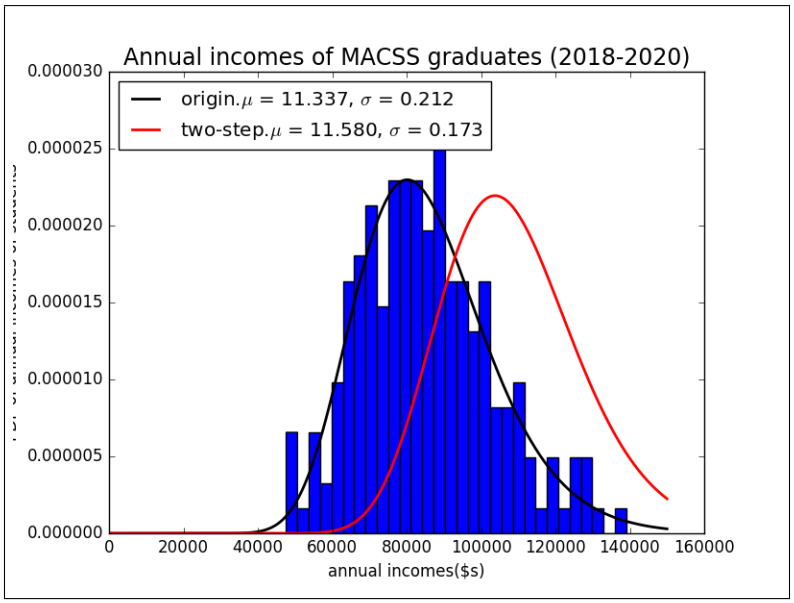
The lognormal parameters for GMM estimation is: $\mu = 11.483$,$\sigma = 0.248$.
$The data moments are: \mu = 85276.824$, $\sigma^2 = 323731572.230$.
$Model moments at the estimated parameter values are: \mu = 85276.847$, $\sigma^2 = 323731440.020$.
The value of GMM criterion function at the estimated parameter values is: $1.1265942112996877e-06$.

Part (d).GMM

The lognormal parameters for GMM estimation is: $\mu = 11.337$,$\sigma = 0.212$.
Three data moment:
the proportion of individuals who earn less than \$75,000 is: 0.3,
the proportion of individuals who earn more than \$75,000 but less than \$100,000 is: 0.5
the proportion of individuals who earn more than \$100,000 is: 0.2.
Three Model moments:
the proportion of individuals who earn less than \$75,000 is: 0.299,
the proportion of individuals who earn more than \$75,000 but less than \$100,000 is: 0.498,
the proportion of individuals who earn more than \$100,000 is: 0.200.
The value of GMM criterion function at the estimated parameter values is: 0.23818173308994178.



Part (e).Two step GMM



The lognormal parameters for GMM estimation is: $\mu = 11.157$,$\sigma = 0.214$.
Three data moment:
the proportion of individuals who earn less than \$75,000 is: 0.3,
the proportion of individuals who earn more than \$75,000 but less than \$100,000 is: 0.5
the proportion of individuals who earn more than \$100,000 is: 0.2.
Three Model moments:
the proportion of individuals who earn less than \$75,000 is: 0.020,
the proportion of individuals who earn more than \$75,000 but less than \$100,000 is: 0.329,

the proportion of individuals who earn more than $100,000 is: 0.626.
The value of GMM criterion function at the estimated parameter values is: $1.3436737333893944e-08$.

Part (f).Two step GMM

From the five figures above, we could know the figure in b,c,d fit my histogram. Among these three, the two-step GMM with three data moment figure is the d is the most fitted

Problem 2

Part (a).

The estimators are:
$\beta_0^{ggm} = 0.2516 \quad \beta_1^{ggm} = 0.0129 \quad \beta_2^{ggm} = 0.4005 \quad \beta_3^{ggm} = -0.0100$
The value of GMM criterion function is: 0.00182128980707.