Problem Set #[3]

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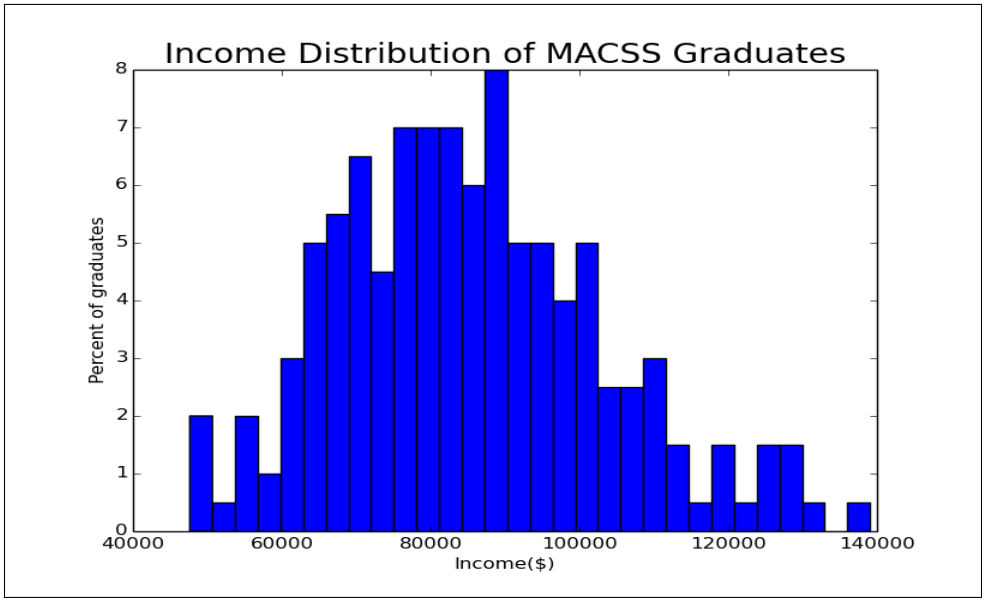
Problem 1 Income data, lognormal distribution and hypothesis testing

Part (1a).

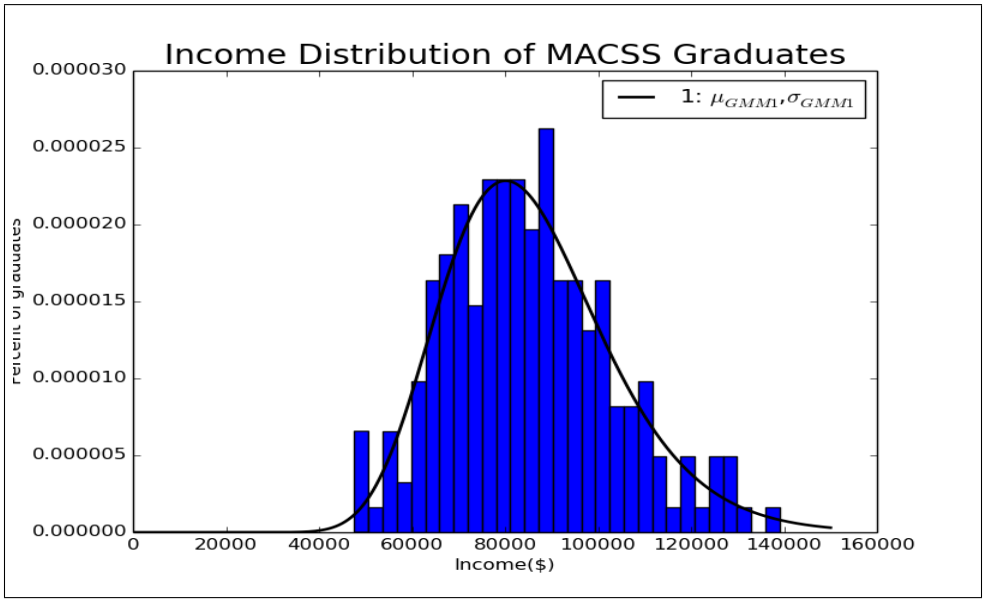
Figure 1: A Histogram of percentages of Income



Part (1b).

The estimators mu_GMM1 is:11.3369
The estimators sig_GMM1 is:0.2130
Mean of points = 85276.824, Standard Deviation of points =17992.54
Mean of model = 85276.795, Standard Deviation of model = 17992.532
The GMM criterion value at mu_GMM1 and sig_GMM1 is: $3.938e^{-13}$

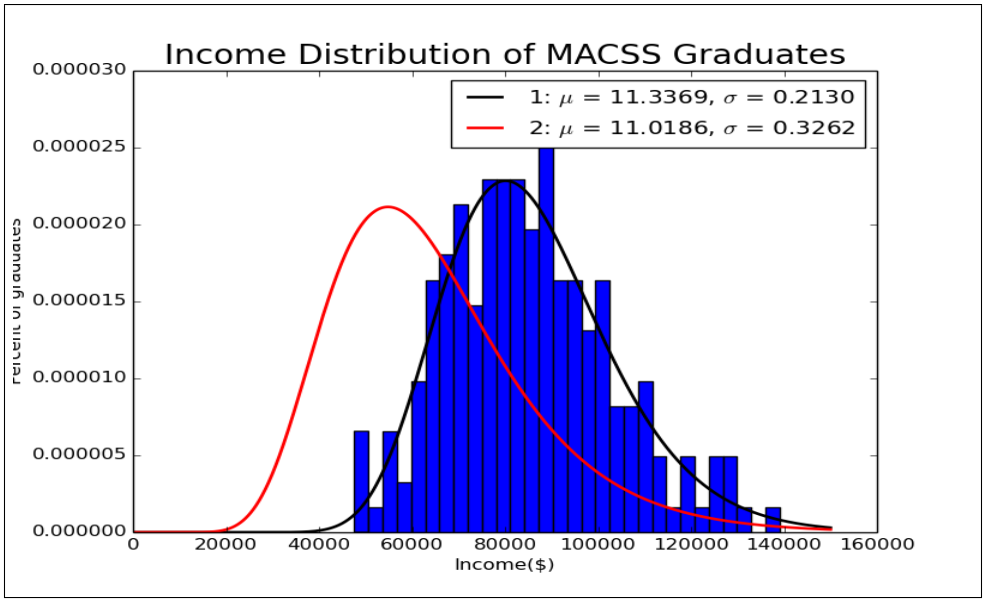
Figure 2: Comparison between 2 plots



Part (1c).

The estimators mu_GMM2 is:11.0186
The estimators sig_GMM2 is:0.3261
Mean of points = 85276.824, Standard Deviation of points =17992.54
Mean of model = 63849.6908, Standard Deviation of model = 20822.568
The GMM criterion value at mu_GMM1 and sig_GMM1 is: 0.0131

Figure 3: Comparison between 3 plots

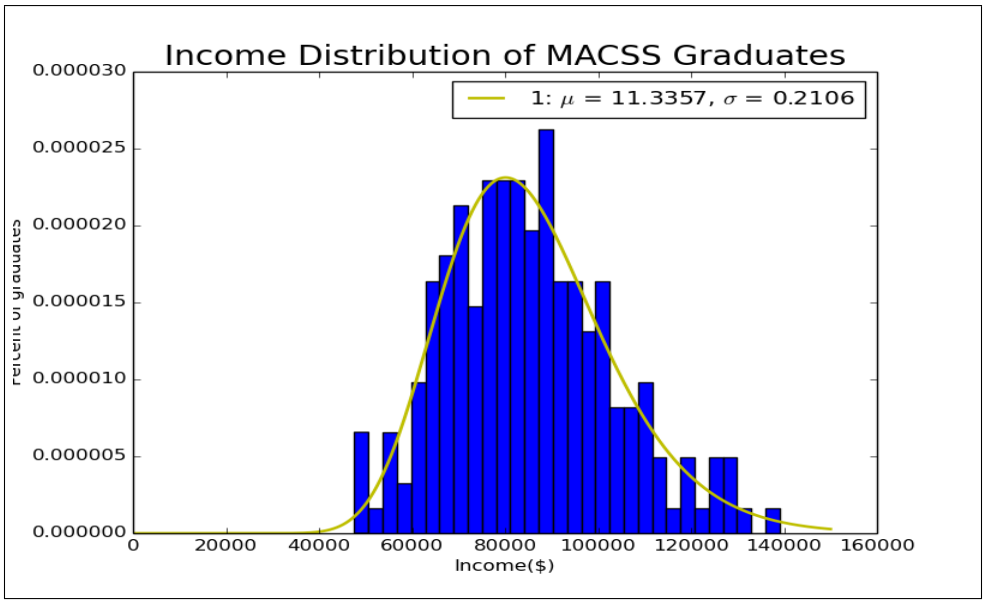


Part (1d).

mu_GMM3 using 3 moments is:11.335

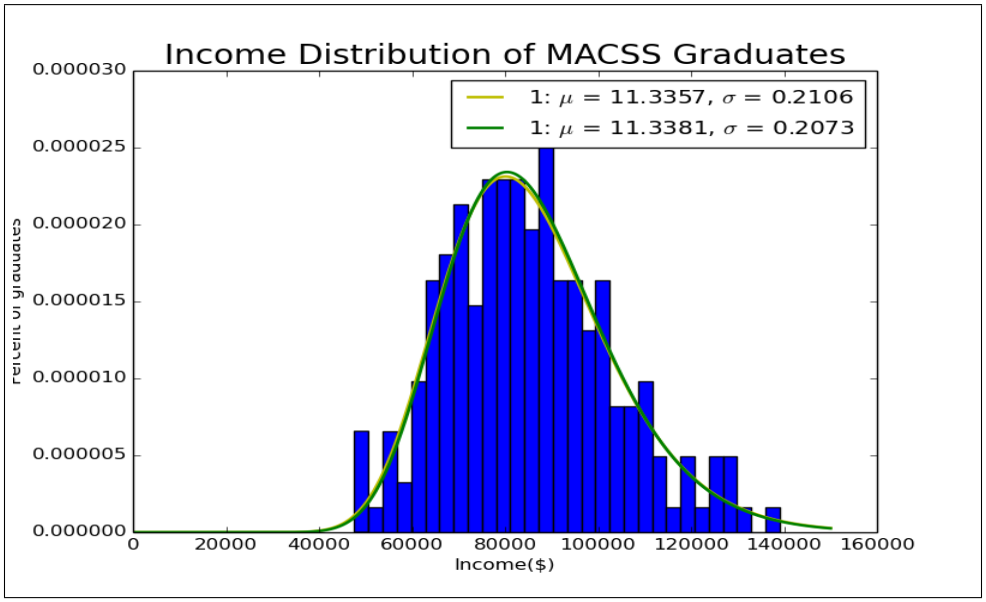
sig_GMM3 using 3 moments is:0.2105
From data:
percent of individuals who earn less than $75,000 is: 0.3
percent of individuals who earn between $75,000 and $100,000 is: 0.5
percent of individuals who higher than $100,000 is: 0.2
From model:
percent of individuals who earn less than $75,000 is:0.3000000036 percent of individuals who earn between $75,000 and $100,000 is:0.5000000059
percent of individuals who higher than $100,000 is: 0.1999999
The GMM criterion value at mu_GMM1 and sig_GMM1 is: $2.534e^{-11}$

Figure 4: Comparison between 2 plots



Part (1e).
mu_GMM4 using 2 step is:11.338
sig_GMM3 using 3 moments is:0.207
From data:
percent of individuals who earn less than $75,000 is: 0.3
percent of individuals who earn between $75,000 and $100,000 is: 0.5
percent of individuals who higher than $100,000 is: 0.2
From model:
percent of individuals who earn less than $75,000 is:0.2930 percent of individuals who earn between $75,000 and $100,000 is:0.5073
percent of individuals who higher than $100,000 is: 0.1995
The GMM criterion value at mu_GMM1 and sig_GMM1 is: 102.511

Figure 5: Comparison between 2 plots



Part (1f).

After plotting out the figures, I think the figures from part 1b, 1d, and 1e fit with the histogram of the income data well. Among these three figure, (Fig 1e),the one from 2-step GMM with three data moments fits the best. This pdf has the highest peak in the middle, and slightly right skewed, which I think fits with the original data.

Problem 2 Linear Regression and MLE

Part (2a).

beta0_GMM=0.2516, beta1_GMM=0.0129, 'beta2_GMM=0.4005, beta3_GMM=-0.0099
The GMM criterion value for linear regression is:0.0018