Problem Set #3

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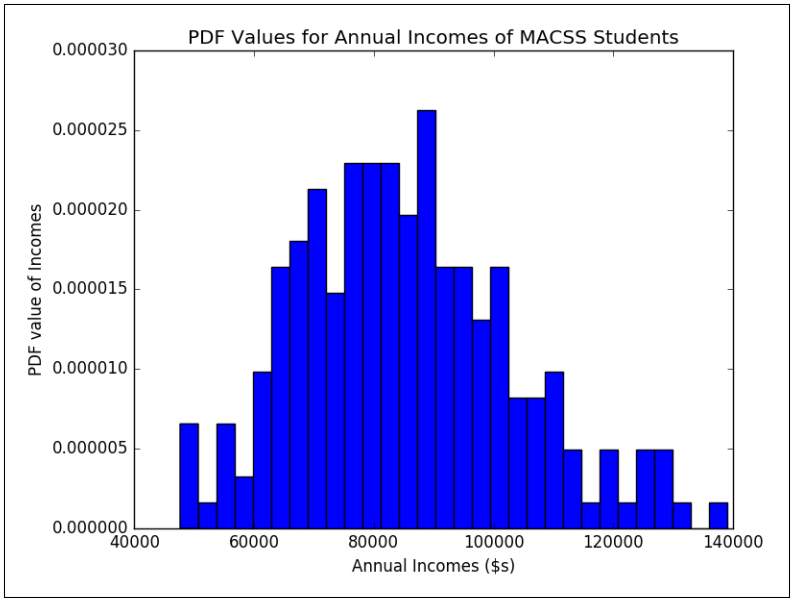
Problem 1

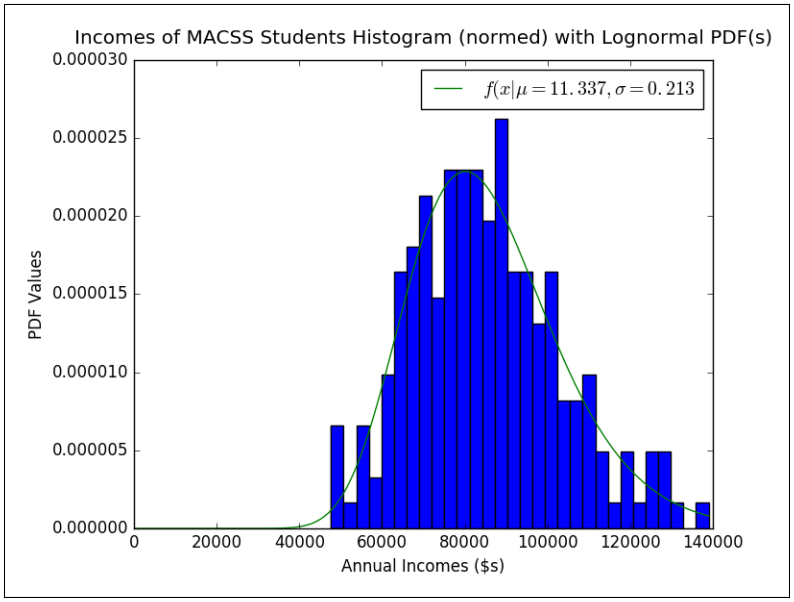
Part (a).

Figure 1: Question 1 part(a)



Part (b).

Figure 2: Question 1 part(b)



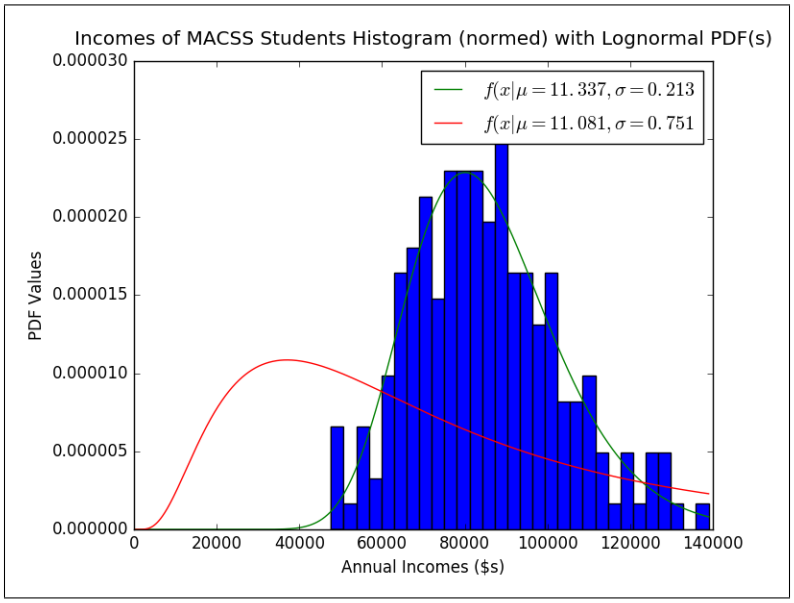
2 moment (mean and standard deviation) GMM estimated the parameters of a lognormal distribution to be $\mu = 11.337 \quad and \quad \sigma = 0.213$ The value of the criterion function for this parameterization of the distribution and given this data is $1.735e{-}13$.

Moments

$mean_{data} = 85276.824 \quad mean_{gmm} = 85276.791 \; sd_{data} = 17992.542 \quad sd_{gmm} = 17992.539$

Part (c).

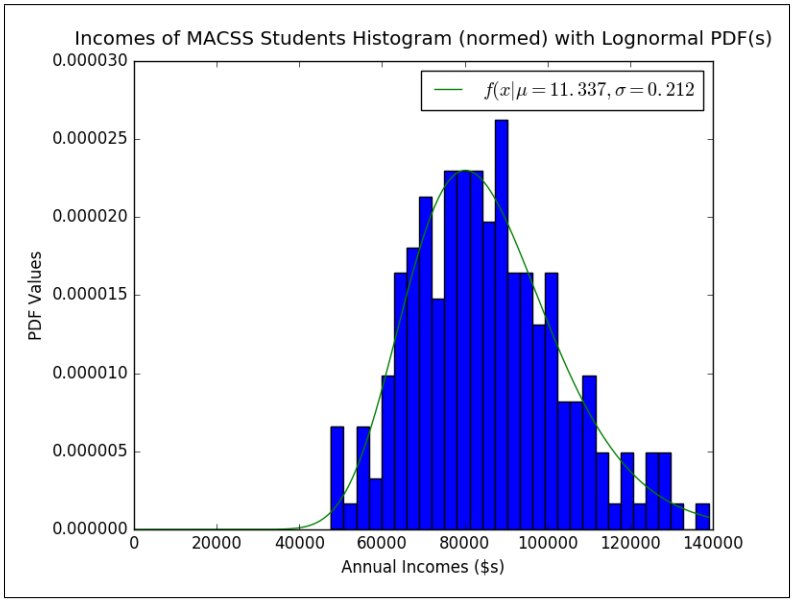
Figure 3: Question 1 part(c)



2 moment (mean and standard deviation) GMM with a 2-step weights matrix estimated the parameters of a lognormal distribution to be $\mu = 11.081 \quad and \quad \sigma = 0.751$ The value of the criterion function for this parameterization of the distribution and given this data is -0.0284.

Moments:

Figure 4: Question 1 part(d)



$mean_{data} = 85276.824 \quad mean_{gmm} = 85276.791 \; sd_{data} = 17992.542 \quad sd_{gmm} = 33028.440$

Part (d). 3 moment (bins) GMM estimated a the parameters of a lognormal distribution to be $\mu = 11.337 \quad and \quad \sigma = 0.212$

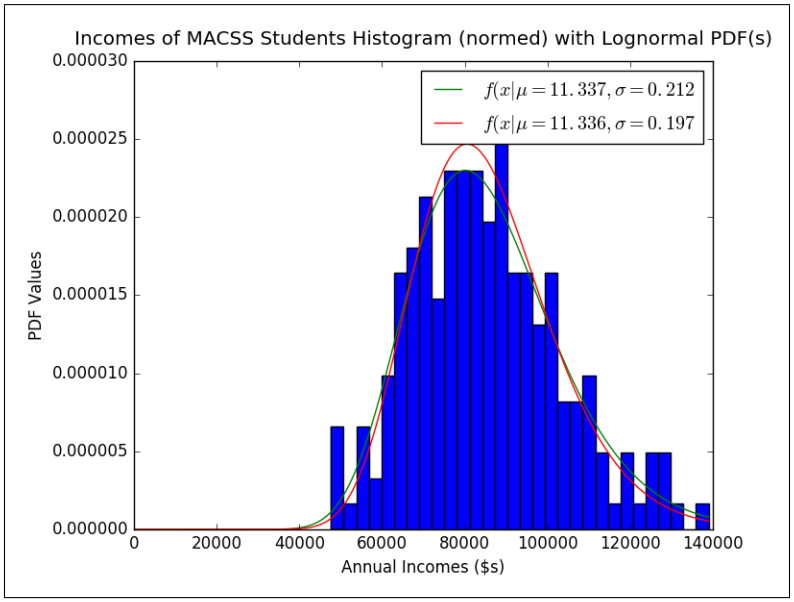
The value of the criterion function for this parameterization of the distribution and given this data is $2.382e-05$

The proportion of incomes in the data between \$0 and \$75,000 = 0.300 The proportion of incomes in the data between \$75,000 and \$100,000 = 0.500 The proportion of incomes in the data between \$100,000 and \$150000 = 0.200

The proportion of incomes in the model between \$0 and \$75,000 = 0.299 The proportion of incomes in the model between \$75,000 and \$100,000 = 0.498 The proportion of incomes in the model between \$100,000 and \$150000 = 0.200

Part (e).

Figure 5: Question 1 part(e)



3 moment (bins) GMM estimated a the parameters of a lognormal distribution to be $\mu = 11.336 \quad and \quad \sigma = 0.197$

The value of the criterion function for this parameterization of the distribution and given this data is $1.125e - 13$

The proportion of incomes in the data between \$0 and \$75,000 = 0.300
The proportion of incomes in the data between \$75,000 and \$100,000 = 0.500
The proportion of incomes in the data between \$100,000 and \$150000 = 0.200

The proportion of incomes in the model between \$0 and \$75,000 = 0.288
The proportion of incomes in the model between \$75,000 and \$100,000 = 0.528
The proportion of incomes in the model between \$100,000 and \$150000 = 0.182

Part (f).
As one can see, utilizing a two-step weights matrix in part (b) results in a really ill-fitting lognormal pdf. Additionally, using a two-step weights matrix in part (e) scarcely changes the lognormal pdf from (d) (which itself is quite similar to that in part (b)).

Even so, the pdf displayed in red in part (e), the one created using a two-step weights matrix with the three bin moments, seems to fit my view of the data better. Looking at the above figure, the red pdf has lower values for higher ends of the distribution than the green pdf does. This seems like a more realistic state of affairs for incomes of students just coming out of the master's program. Sure, there will be those able to achieve that level of income, but it seems more realistic to model that fewer will be able to do so.

Problem 2

Part (a).
$\beta_0^{gmm} = .252 \quad \beta_1^{gmm} = 0.013 \quad \beta_2^{gmm} = 0.401 \quad \beta_3^{gmm} = -0.009992 \quad \sigma_{gmm}^2 = 9.11e-06$ The criterion function value with 2a's GMM estimates = 0.00182