Exercise 1

Download the data set from my webpage. It is a dataset from a gamma distribution with 20 points (column Y). In class, we saw that there are 4 different moment conditions that are satisfied:

$$E\begin{bmatrix} y-\dfrac{P}{\lambda} \\ y^2-\dfrac{P(P+1)}{\lambda^2} \\ \ln y - \Psi(P) + \ln\lambda \\ \dfrac{1}{y}-\dfrac{\lambda}{P-1} \end{bmatrix} = 0,$$

where P is the shape and λ is the rate.

a For each possible pair of moments, compute the method of moments estimator and their corresponding standard errors. When using the first and third moment, you should get:

$\hat{P}$	$\hat{\lambda}$
2.41	0.08
(0.61)	(0.03)

b Estimate the paramters using the GMM. Set the weighting matrix equal to the identity matrix.

c Use the previous estimates to compute an estimate of the optimal weighting matrix:

$$\hat{\Phi} = \frac{1}{N}\sum_{1}^{N} \begin{bmatrix} y_i-\dfrac{\hat{P}}{\hat{\lambda}} \\ y_i^2-\dfrac{\hat{P}(\hat{P}+1)}{\hat{\lambda}^2} \\ \ln y_i - \Psi(\hat{P}) + \ln\hat{\lambda} \\ \dfrac{1}{y_i}-\dfrac{\hat{\lambda}}{\hat{P}-1} \end{bmatrix} \begin{bmatrix} y_i-\dfrac{\hat{P}}{\hat{\lambda}} \\ y_i^2-\dfrac{\hat{P}(\hat{P}+1)}{\hat{\lambda}^2} \\ \ln y_i - \Psi(\hat{P}) + \ln\hat{\lambda} \\ \dfrac{1}{y_i}-\dfrac{\hat{\lambda}}{\hat{P}-1} \end{bmatrix}'$$

Does the optimal weighting matrix depend on the parameter values?

d Report parameter estimates using the optimal weighting matrix and the associated standard errors.

Exercise 2

From the life-cycle model that you solved, generate a panel sample of 1000 individuals. Kill individuals as they age.

a For the set of individuals that you know are unconstrained, use the euler equation to write a set of moment conditions.

b Use this set of moment conditions to estimate the discount factor and risk aversion coefficient. See how parameter estimates differ when using the identity matrix and the optimal weighting matrix. Report standard errors.

c From the panel data set, estimate the discount factor and risk aversion coefficient by matching the average wealth of individuals by age. See how parameter estimates differ when using the identity matrix and the optimal weighting matrix. Report standard errors.