

# Problem Set 3

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DUE DATE : 2021.9.22. time 11:00pm

submit your solution and code files on Blackboard page.

Download the dataset Pset3Data.csv to solve this problem set. The file Pset3Data.csv includes a balanced panel of 3000 individuals, including the personal identifier id, age ranging from 1 to 10, consumption, income, and asset. (Note : Here you have a balanced panel because this is a simple exercise. When working with real data, if you have unbalanced panel, drop the corresponding missing observations in the simulated data, before you compute the simulated moments.)

## Question 1. Estimate the unknown structural parameters using the provided data

In this question, you are asked to estimate the structural parameter  $(\beta, \gamma)$ . Use the following external parameters for this exercise. Use the asset grid generated from log spacing.

Parameter	Description	Value
$N_y$	number of Income Grid	3
normBnd	truncation of normal distribution (truncation at $(-\text{normBnd} \cdot \text{std}, \text{normBnd} \cdot \text{std})$ )	3
$\rho$	AR(1) process coefficient	0.4
$\sigma_\epsilon$	SD of shock	1
$r$	interest rate	0.03
$N_A$	number of asset grids	3
minCons	minimum consumption	$10^{-5}$
$a_0$	initial asset	0

- (a) Explain what moments/auxiliary model you will use to estimate the parameters and explain in words how the moments/auxiliary model help identifying each parameter.
- (b) Report how much time it takes to evaluate one criterion function in your computer. (In R, you can use `proc.time()` to measure execution time).
- (c) Estimate the parameters using the diagonal weighting (that is, using the variance of moment estimates only. do not use covariances).

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- (d) Report the standard error of parameter estimates.
- (e) Visually show the sensitivity measures and discuss how each moment/statistic identifies each parameter.
- (f) Assess the model fit (consumption, asset path over life-cycle) using your estimated parameter in (c).

**[Bonus Question.]** You don't have to solve this question, but you will receive +5 in total score if you successfully complete this question.

Pretend you do not know the income process parameters. Estimate the income process parameter using the provided data. Use the estimated income process parameters to estimate the other structural parameters. Report the standard error computed by doing bootstrap, which takes into account of the sampling error in the income process estimation. Discuss the differences from Question 1.