

ECO 6353: Consumption & Investment

PS1 Writeup

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(a) Bugs and their error explanation

The enumeration below denotes the number of the bug in the order in which it occurs in the Matlab code file - Buggy_VFI_for_Distribution.m.

1. Missing value of rho in the income grid setup. It led to Y not having a defined input and the first part of the computation process throwing an error.
2. (Line 18) Removing xxxxxxxx in the argument to get the AR(1) income process with a normally distributed income shock. I inserted the 'Rouwenhorst' method to calculate the discretized AR(1) income process and the transition matrix P.
3. (Line 60) Preallocation of guess function V0 needs to be changed by removing NaN from the replication of the 3-dimensional matrix for utility.
4. (Line 69) Setting dif=0.00002. Increase dif by a small amount to allow for difference b/w consecutive iterations of V0.
5. (Line 80) Add another max between the difference of $V0 - V1$ to allow for the loop to iterate for the given number of periods.
6. (Line 85) $V0 = V_candidate$ would still give us an answer but it won't be correct. We want our initial guess to converge to the true value of the value function, which in this case is V1. It satisfies the value function $V_candidate$ as well since V1 is the max value of $V_candidate$ (inferred from the code snippet). Therefore, I set $V0 = V1$.
7. (Line 88) Replace Y with Y_n to allow replication of matrices by a scalar quantity instead of a row vector.

(b) Explain how the simulated results (c, a') would qualitatively change if the borrowing constraint was set to 0

When the borrowing constraint is set to 0, simulated consumption and asset choices change significantly. For simulated consumption, the results begin near zero which implies that agents consume zero in the starting period since they cannot borrow to consume. Further, they consume their earned income with their natural debt limit being 0, preventing them from incurring any debt in that state.

For simulated asset choices, when there is no borrowing, asset choices are positive in the starting period, compared to when there is a natural debt limit. It implies that consumers don't use their assets to pay back the debt incurred or balance consumption in case of high borrowing limits. They save their assets for uncertainty in the future.

(c) Explain how the simulated results (c, a') would qualitatively change if the risk aversion parameter was doubled

When the risk aversion parameter is doubled, i.e., $\sigma = 0.08$, consumers trigger more precautionary savings to prepare for uncertainty in the future. Therefore, simulated consumption is slightly lower in the starting period, compared to when $\sigma = 0.04$. This is true since consumers want to consume less and save more in the form of risk-free assets.

For simulated asset choices, we see a slightly higher initial point estimate and an increase at a higher rate when $\sigma = 0.08$. It implies that consumers are investing more in risk-free assets when the risk aversion parameter is doubled, therefore, coherent with the results for simulated consumption.

Part (d) and (e) are at the end of the `Code_wo_bugs.m` file uploaded in this repository.