ECO6353-Consumption & Investment Dynamics

Problem Set 1

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Solutions

1. There are 8 bugs in the provided code on Blackboard. Correct all of them and concisely explain what was causing the bug.

   - 1st bug: The rho parameter is undefined which is needed to define the Y function with rouwen.

   - 2nd bug: The Income Grid Setup (Y) uses an undefined function xxxxxxx. Hence, it needs to be replaced with the actual function, by using rouwen, that generates the income levels based on the provided parameters and the values of P as well.

   - 3rd bug: Initial guess for V0 should not be a vector of NaN.

   - 4th bug: Asset dif should not be equal to zero so we set it to some number.

   - 5th bug: Dif should be equal to the maximum values for the value functions

   - 6th bug: V0 should be equal to V1 and not with V_candidate as it would essentially mean that the value function is the updating, defeating the purpose of the iteration. This is because V0 is used to store the value function from the previous iteration, while V1 stores the updated value function based on the current iteration's calculations. At the end of each iteration, V1 becomes the updated value function, and V0 is used as a reference for convergence checks.

   - 7th bug: In the recovery of the consumption policy function, we need to use Y_n, which is the number of income gridpoints and not Y.

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

   As we can see from the results of the correlation, the values are lower compared to the first simulated results of (c, a'). This is because the borrowing limit is hit as we have set the minimum to zero. Therefore, individuals have the ability to borrow against future income to smooth consumption over time.

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

   As we can see from the results of the correlation, the values are lower compared to the first simulated results of (c,a'). This is because the higher risk aversion value of parameter gamma at 2.6 indicates a reduced consumption volatility. Hence, individuals become more sensitive to changes in consumption.

   In theory, with higher risk aversion (higher gamma), individuals tend to be more cautious about their consumption choices. They are less inclined to consume when faced with income fluctuations. This behavior may lead to a lower responsiveness of consumption to changes in income. Conversely, individuals tend to save more during times of higher income to smooth consumption over time. This behavior leads to a dampened response of consumption to income changes.

4. Solutions for d) and e) are in the code file.