Problem Set #8

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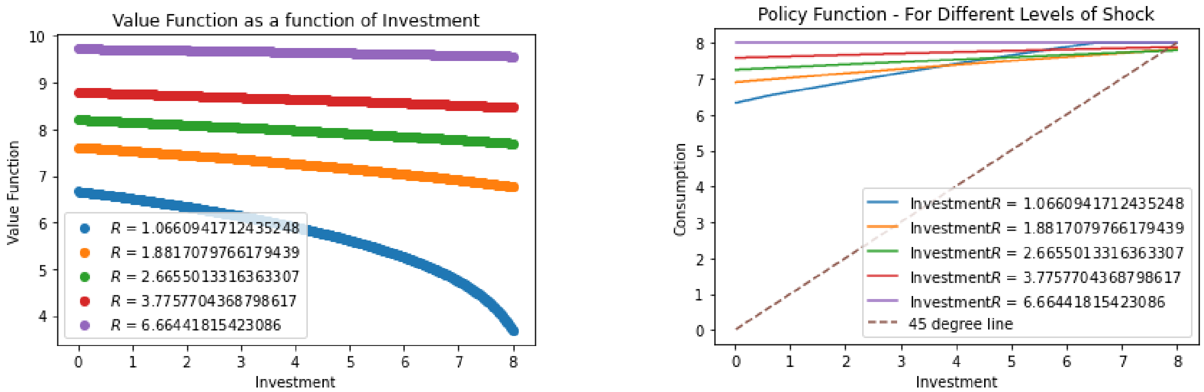
Following the environment set up in the problem set 7, I use the attached execute and function python files to calculate the value function and policy function. The investment behavior of the individuals in the stock market are shown in Figure 1. A shock in the rate of return of the stock affects the investment behavior of the individuals.

Figure 1a presents the value function iteration results for five levels of rate of return (R). The utility obtained by the individual drops by a reduction in the rate of return shown respectively by purple, red, green, yellow and blue lines. For example, if a shock results in an increase in the rate of return from 1.07 % to 6.66 %, at the investment level of 4 thousand dollars, the utility increases from 6 units to roughly 9.7 units. Moreover, for the larger rate of returns, the changes in the amount of investment does not affect the gained utility by the individuals. However, for the lower rates of return, larger investments reduce the amount of individual's obtained utility. That is, the individuals prefer to consume rather than invest.

Figure 1b shows the policy function iteration results at 5 different levels of rate of return. Consistently with the value function, at lower rate of return, the slope of changes in the consumption-investment relationship is larger for the lower rates of return. The individuals increase their consumption with larger amounts when the rate of return is smaller. For example, when the rate of return of stock is 1.07 % and 2.67 %, individuals invest 4.5 thousand dollars. But at the increase in the consumption at 1.07 % is larger than that of 2.67 % rate of return. Particularly, at the investment level of 6 thousand dollars and rate of return of 1.07 %, the consumption increases to 8 thousand dollars. While the consumption for the same amount of investment at 2.67 % rate of return is roughly the same as previous amount.

All in all, a higher rate of return provides the individuals with higher utility levels. Although the individuals obtain returns from the investments, at smaller rates of return, they prefer to consume more.



(a) Value function iteration

(b) Policy function iteration

Figure 1: Investment decision of individuals

Notes: This figure shows the dynamic investment behavior of the individuals.