Homework 8

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1 Discussion and Results

As I explained before, in this project I am looking into stochastic economic behavior of principal and identical agents in a one-good, pure exchange economy. Each agent hold shares of assets. An asset(land) empowers the agent to claim the output(rent) generated by it. The output of an asset is affected by investment decision of agents and the principle. For example, localities with better public infrastructure (principal investments) and well furnished houses (agents investments) leads to higher rents generation. However, agents will only cooperate with the principal if they are at least as well off as they are without the principal involvement. That is, the principal(government) formulates a contract consisting of tax rate, private and public investment decision sequences such that an agent utility level (v^*) is unchanged with principal involvement but maximizes the welfare of principals(w).

So what I did here is I formulated a contract that agents utility level (v^*) is unchanged with principal involvement but maximizes the welfare of principals(w).

Here are the results after running the code:

Without Government Contract

Given $y_0 = 100$, Infinite Period Horizon Model based on Euler Equation yields $v^* = 39.55$

With Government Contract

Given $y_0 = 100$, Infinite Period Horizon Model based on Euler Equation yields $v* = 39.87$ and $w = 28.399$.

2 figures

Figure 1 is the result of the policy iterations for an agent with just private investment (K) (no government contract). Vertical axis is agents private investment (K) and horizontal axis is rent. An increase in private investment leads to increase in rent.
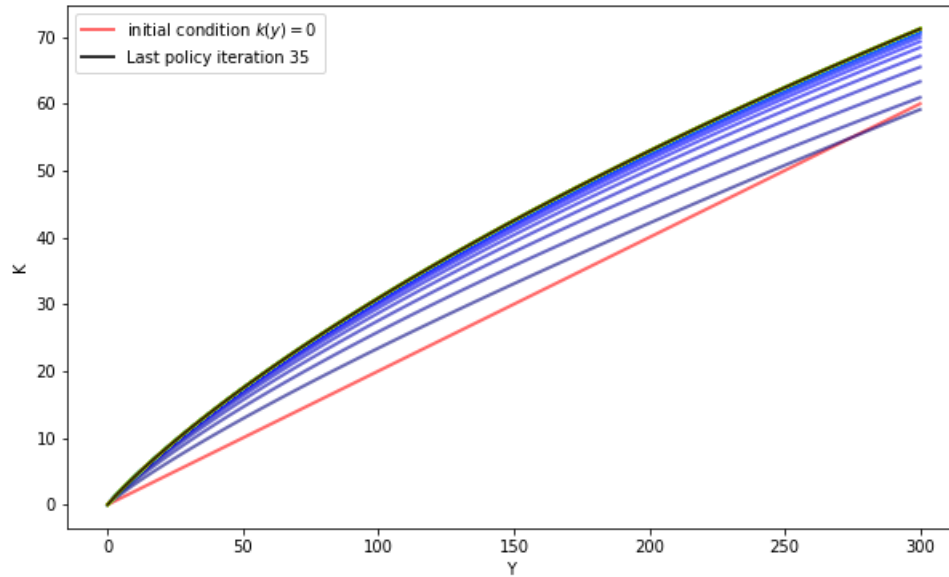
Figure 1: Policy Iteration

Figure 2 is the results of the policy iterations for an agent with private investment(K)(no government contract) which is shown as the left figure and with public investment(X) (with government contract) which is shown as the right figure. An increase in private investment and public investment leads to increase in rent.
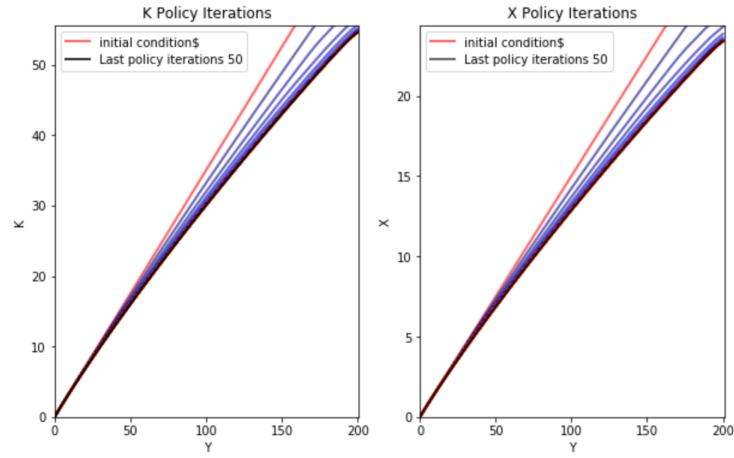
Figure 2: K Policy Iteration and X Policy Iteration

Figure 3 is agents value function as a function of rent (Y). This plot shows that total utility of each agent increases with rent. Agent with Government contract is better off than agent without government contract.
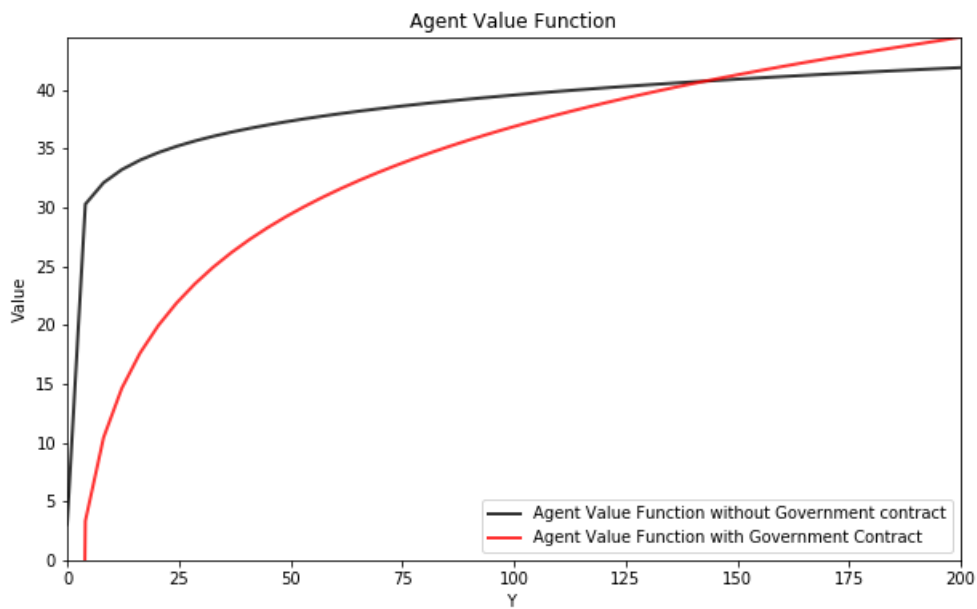
Figure 3: Agent Value Function

Figure 4 is principals (government) value function as a function of rent (Y). This plot shows that total utility of the principal increases with rent.

Figure 4: Principal Value Function