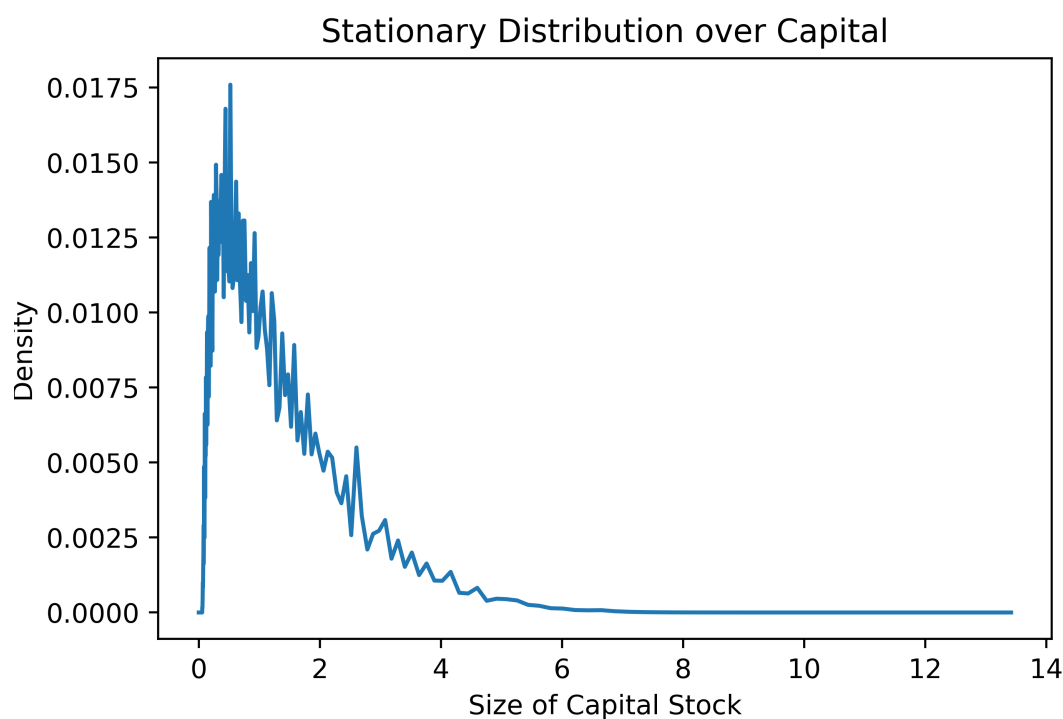# Problem Set #8: Dynamic Programming

This problem set requires solving a stationary general equilibrium of the economy with dynamic firms and households with stochastic productivity shocks and quadratic adjustment costs.

Results

Solving the general equilibrium problem gives the equilibrium wage: **1.061992347**.

Stationary Distribution over Capital

We can see from the stationary distribution that the density for holding capital stock initially goes high rapidly for low levels of capital stock, until it reaches its maximum between 0-1. For capital stock greater than 1, it becomes less profitable for many firms to hold that much capital hence there are fewer firms holding high capital stock.

Stationary Distribution in 3D
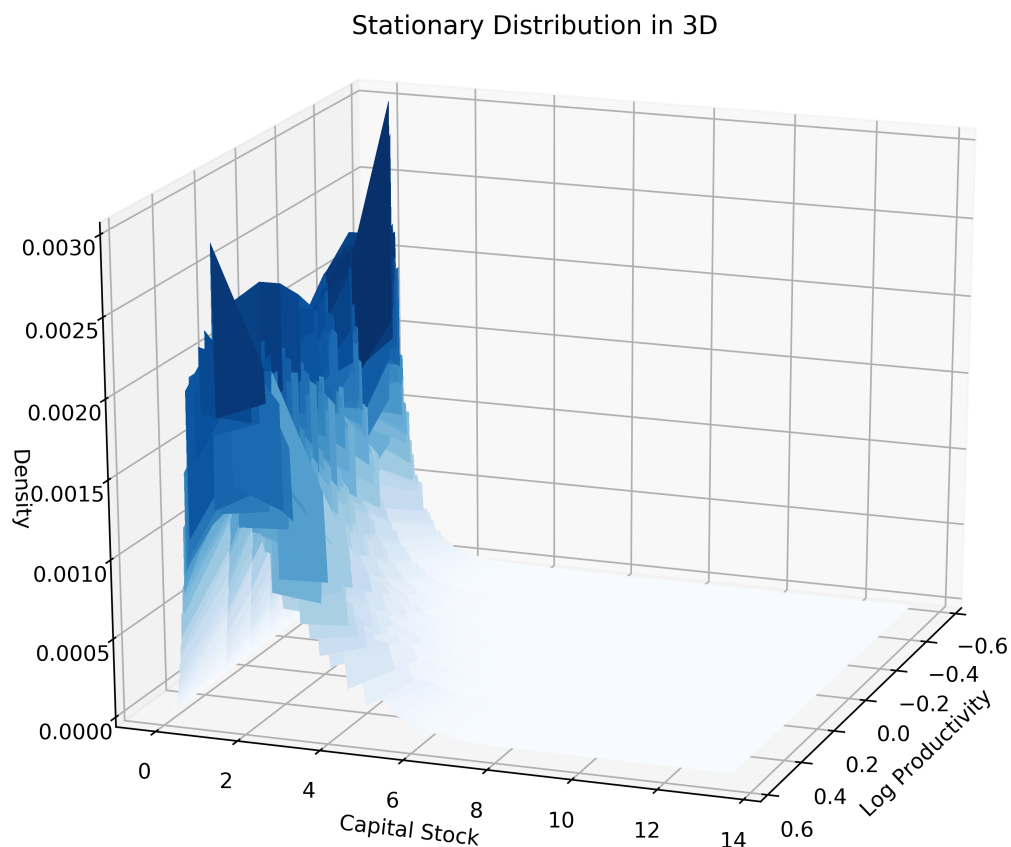
Here, we see that the stationary distribution of the firms is bimodal in log productivity. That is, for a given capital stock, the distribution has two peaks and is symmetric. This makes sense as the productivity shocks follow an AR(1) process. Meaning, some firms end up being lucky by getting high productivity shocks, and with equal likelihood, some firms end up geting low productivity shocks and become less productive.
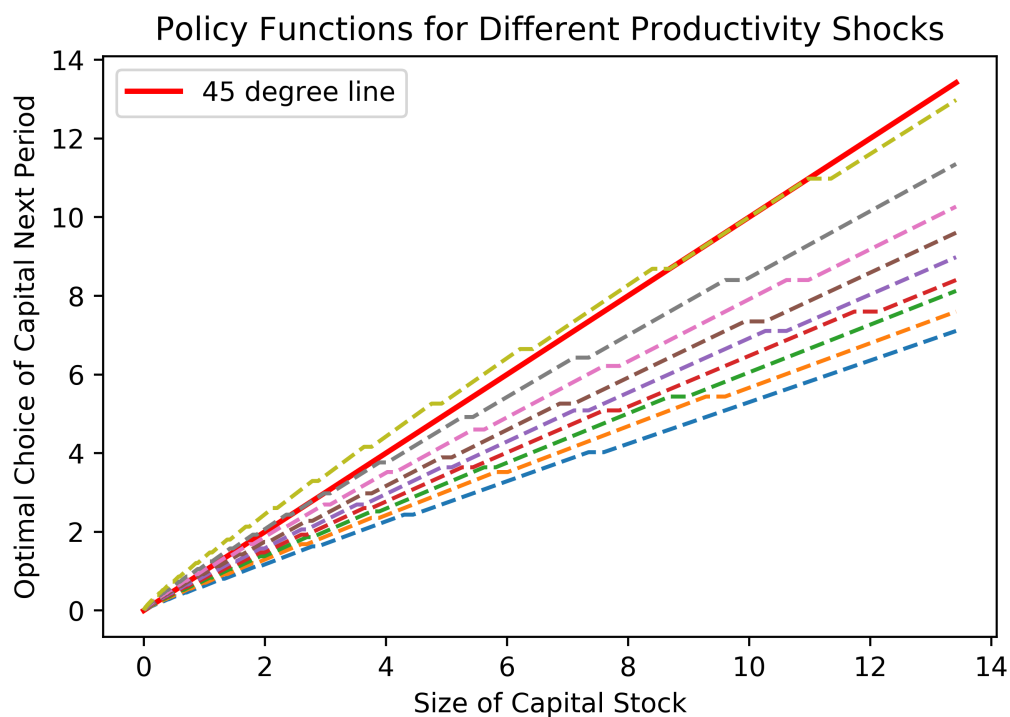
It is also evident from the policy functions with different productivity shocks that, it is more profitable for firms to hold more capital given they receive a high productivity shock. That is, they would be willing to invest more if they observe that they are more productive that period. The green line above the 45 degree line is for the highest productivity shock. This means that the firm's optimal choice of capital next period is higher given a high productivity shock. Lower productivity shocks cause firms to hold less capital.