Homework 6

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1 Problem 1

The Bellman equation is:

$$V(p,x) = \max_{x' \in [0,x]} \{p(x-x') - \frac{1}{5}(x-x')^{\frac{3}{2}} + \delta E_{p|p'} V(p',x')\}$$

where we have that $p' = \frac{1}{2} + \frac{1}{2}p + \epsilon$, ϵ is distributed $N(0, 0.01)$, $x \in [0, 100]$, $\delta = 0.95$

The state variable is (p, x) corresponding to price and the stock available to the firm, respectively, at a time period. The policy variable is the amount of lumber available at the start of next period

2 Problem 2

I just use the tauchen function and keep the notations from the actual code of the function, i.e. "grid" and "prob".

3 Problem 3

Use value iteration for the utility function that punishes consumption that exceeds the available funds.

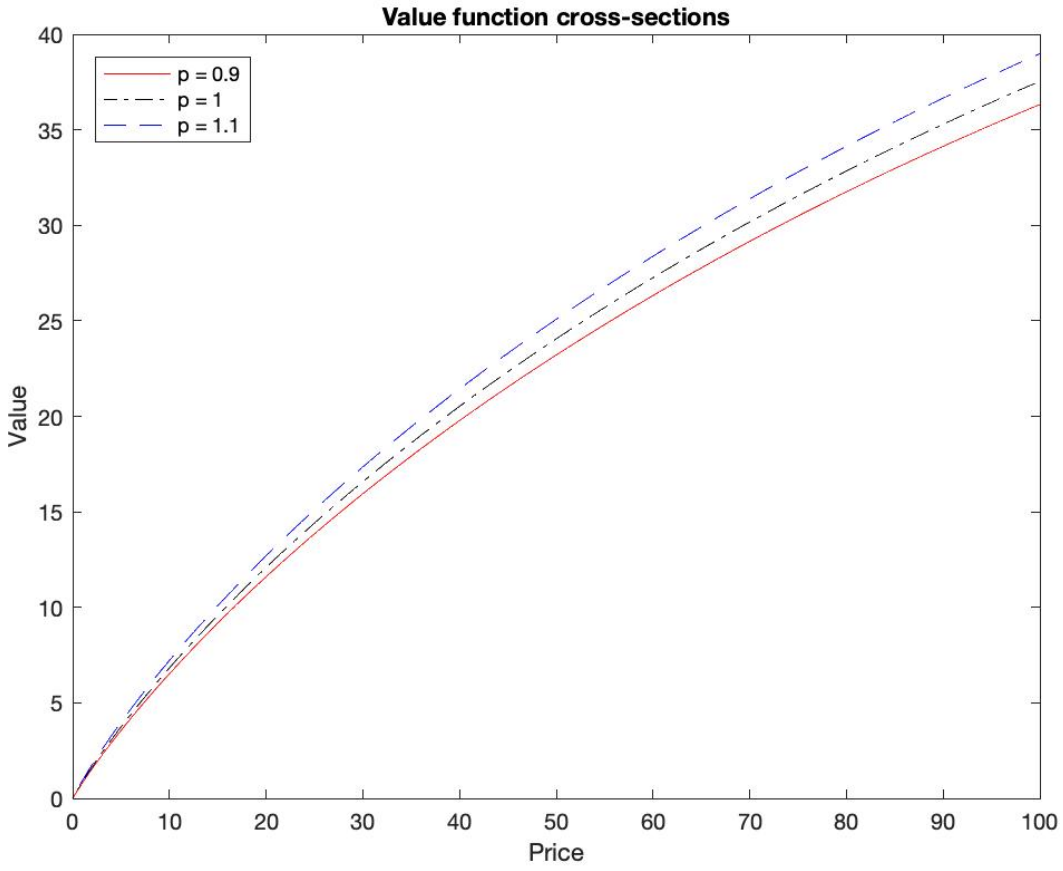

Figure 1: Value function cross-sections

4 Problem 4

Plot of the next optimal stock for different levels of starting stock.

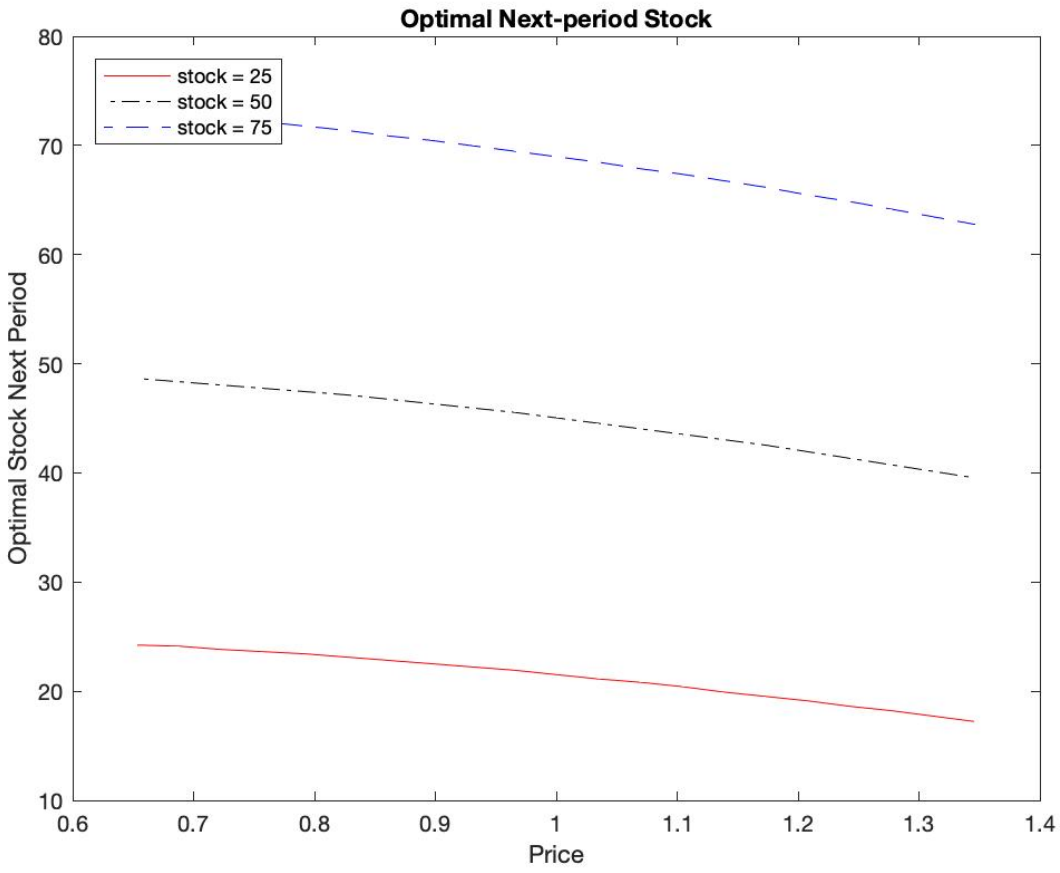

Figure 2: Optimal Next-period Stock

5 Problem 5

I generate prices, starting from 1, for the next 20 periods, 50 times. Then I calculate the averages and standard deviation pointwise. The results are shown below in Figure 3. The take away is that confidence intervals get bigger as time advances, basically showing that uncertainty becomes greater.

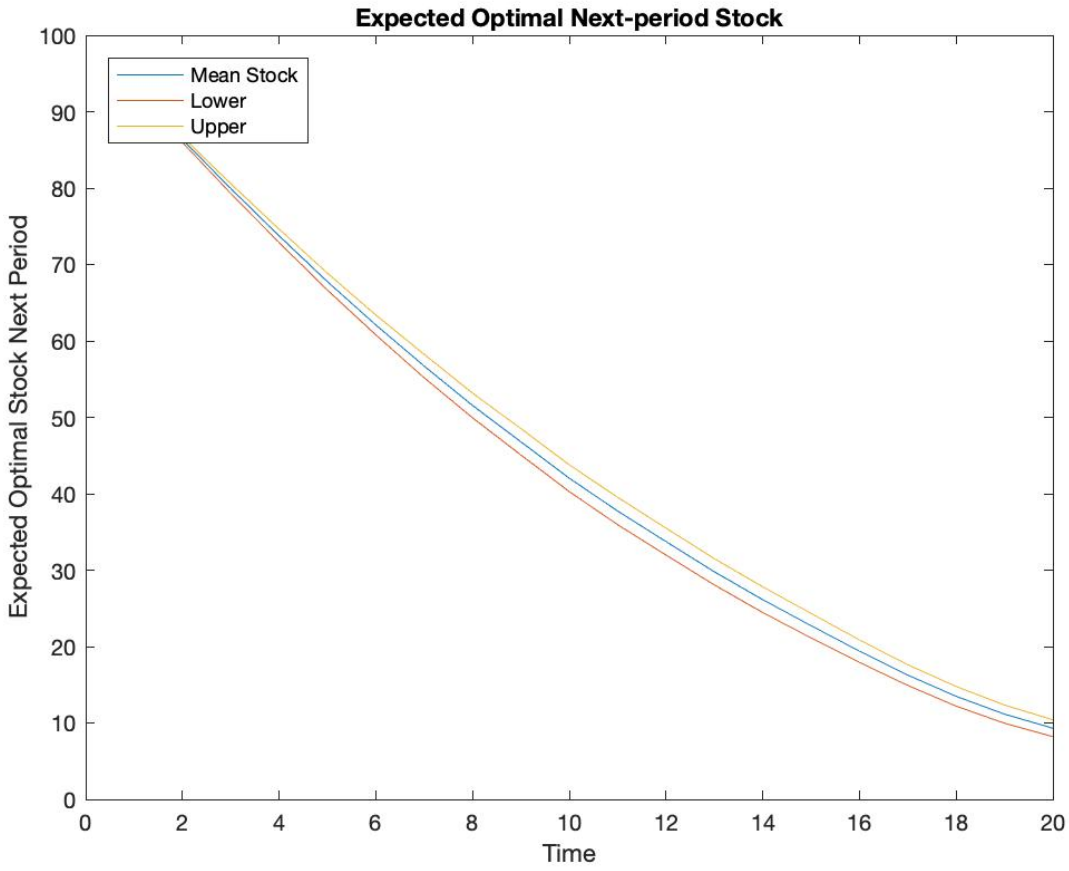

Figure 3: Expected Optimal Next-period Stock

6 Problem 6

Basically repeating the procedures in 2-4, with 5 points. Everything seems comparable, except for the value functions cross-sections which we see more far apart here, Figure 4, than in Figure 1.

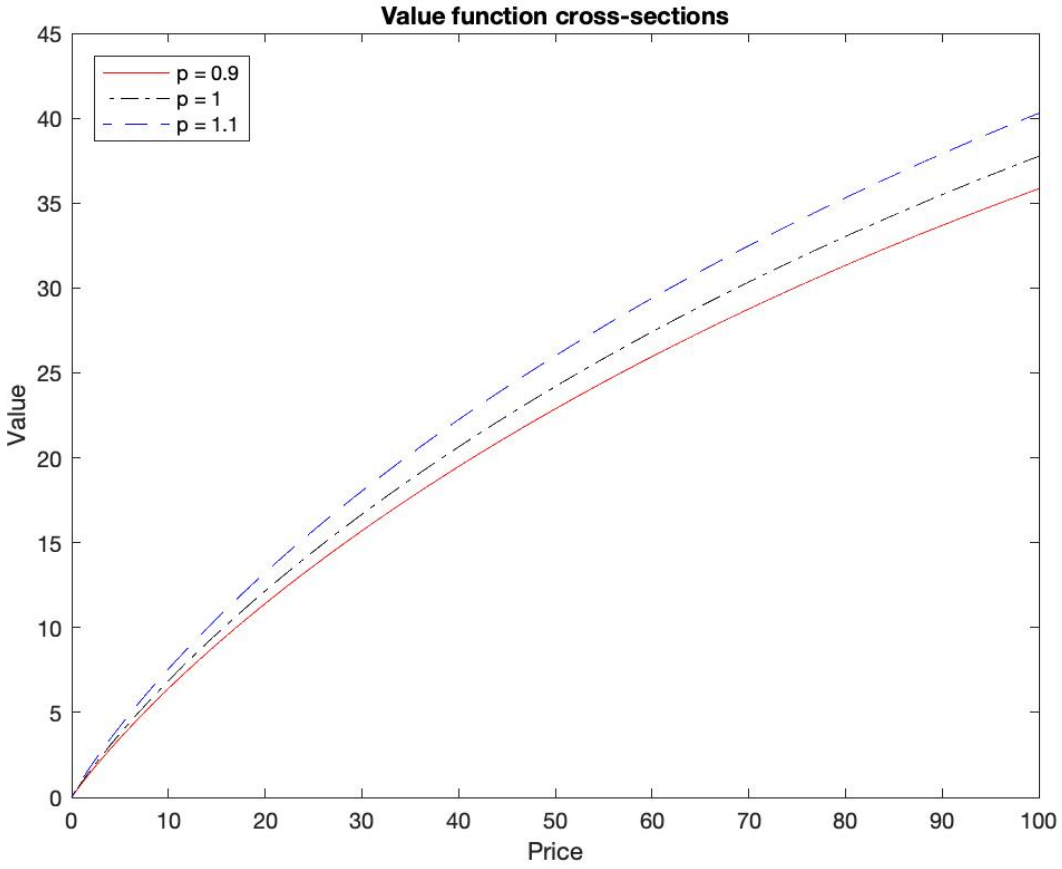

Figure 4: Value function cross-sections

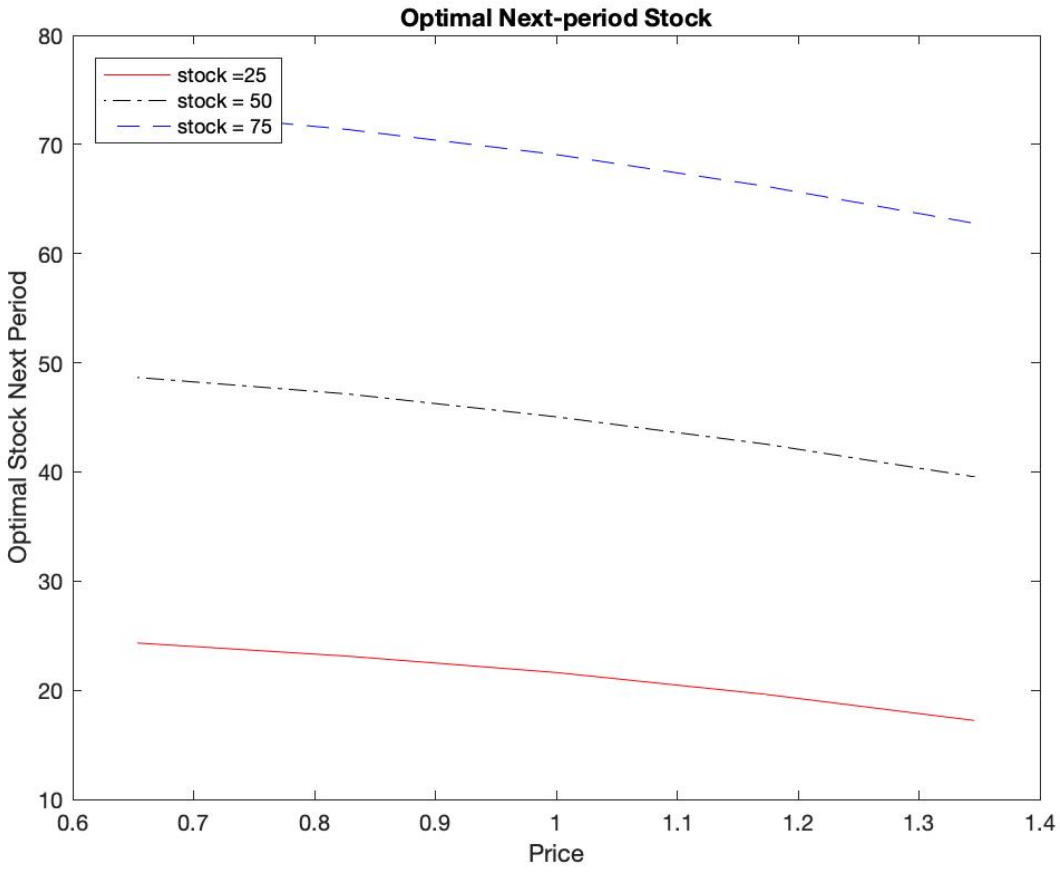

Figure 5: Optimal Next-period Stock