1 Econ 260A. Fall 2018. Homework Challenge 4

1. Consider the following two-period investment opportunity. The cost of the investment is $I = 400$ and the revenues generated in year one are $V_1 = 200$. In year two, the investment will generate revenues of $V_2 = 600$ with probability p and $V_2 = 100$ with probability $1 - p$. The investment is irreversible once made, and the value of V_2 is revealed at the start of year two. Assume, for now, that the discount factor δ is equal to one.

a. Derive an expression for the Dixit-Pindyck option value in terms of p. Display this graphically and interpret.

b. Suppose there is a spread in the distribution of year two revenues. Specifically, $V_2 = 600 + 100u$ with probability p and $V_2 = 100 - 100u$ with probability $1 - p$ where $0 \leq u \leq 1$. Derive an expression for the Dixit-Pindyck option value in terms of p and u. How does the option value change as u gets larger? Explain. How does the option value vary across $p - u$ space?

c. Now suppose that $\delta \leq 1$ and $u = 0$. Derive an expression for the option value in terms of p and δ. How does the Dixit-Pindyck option value change as δ gets larger? Explain. How does the option value vary across $p - \delta$ space?