

ECON 210 - MICROECONOMIC THEORY
HOMEWORK 5
UNCERTAINTY

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- (1) (a) Suppose that your utility over wealth outcomes is given by $u(c) = \log(c)$. There is a ten percent chance that tomorrow your house will slide off the side of the hill it is sitting on. Then again, it might not, with probability .9. Your house is worth 300,000 and the rest of your wealth - which would be unaffected by the mudslide - is 100,000. Assume that after tomorrow, if the house didn't slide off the hill, it never will.
- (b) What is the most a risk neutral person would pay for your house?
- (c) What is the least you would be willing to accept for your house?
- (d) If you could buy fair insurance, how much coverage would you purchase?
- (2) Al owns 100 shares in a pumpkin farm, PumpKo. The pumpkin business is very certain. No matter what happens that pumpkin farm will make a profit equal to \$100 per share.¹ Consequently the market price of PumpKo shares is exactly \$100. On the other hand, shares in Flaxilicious, a flax growing company sell for \$80 per share. The Flax business is less certain than pumpkins. With probability .25, flax seed oil will become tremendously popular and Flaxilicious will experience profits of 400 per share. With probability .75, people who eat too much flax seed oil will start to spontaneously combust in large numbers and the company will have zero profits.
- (a) Draw a diagram with Al's consumption possibilities in the two states of nature. Assume that Al cannot sell either stock short. (Is this a reasonable assumption? for both stocks?) Hint: go through these steps...
- (i) a good place to start is at the endowment point. How much will Al have in each state if he simply keeps his 100 shares of PumpKo? Plot this point in your diagram.
- (ii) Now how many Flax shares can he buy if he sells a PumpKo share?

¹We are assuming only two time periods, so in the next period, PumpKo will pay out \$100 per share in dividends, the shareholders will consume those profits and then the world will end.

(iii) With only 99 shares in PumpKo and the number of Flax shares you determined in the previous step, how much consumption will Al have in each state of the world?

(b) Suppose Al has utility

$$u(x_G, x_B) = .25 \log x_G + .75 \log x_B$$

where x_G refers to Al's consumption in the good state where Flax profits are \$400 per share and x_B refers to Al's consumption in the bad state when Flax profits are zero. How many shares of Flaxilicious should Al buy, if any?

(c) (OPTIONAL). Suppose that instead of only two states, Flaxilicious could earn profits equal to any amount between 0 and \$400 per share all with equal probability. (that is, flax profits is a uniformly distributed random variable.) Let $x(\pi_F, s_F)$ be Al's consumption as a function of per share flax profits π_F and the number of flax shares Al owns s_F . Then assume Al's expected utility as a function of the number of Flax shares he owns, s_F is given by

$$Eu(s_F) = \frac{1}{400} \int_{\pi_F=0}^{\pi_F=400} \log x(\pi_F, s_F) d\pi_F$$

What is Al's demand for Flaxilicious shares as a function of the share price?