# EE431/438 Economics of Financial Markets and Institutions

## Exercise 2: Decision Under Uncertainty

1. Ms. Mary Kelly has initial wealth $W_0 = \$1,200$ and faces an uncertain future that she partitions into two states, $s = 1$ and $s = 2$. She can invest in two securities, $j$ and $k$, with initial prices of $p_j = \$10$ and $p_k = \$12$ , and the following payoff table:

| Security | s = 1 | s = 2 | Security Price |
|---|---|---|---|
| j | \$10 | \$12 | \$10 |
| k | \$20 | \$8 | \$12 |

   (a) If she buys only security $j$, how many shares can she buy? If she buys only security $k$, how many shares can she buy? What would her final wealth, $W_s$, be in both cases and each state?

   (b) What are the prices of the pure securities implicit in the payoff table?

   (c) What is the initial price of a third security $i$, for which the payoff in state 1 is \$5 and the payoff in state 2 is \$12.

   (d) If she want her wealth in both states to be equal, how many security $j$ and security $k$ she should buy ? (she is allowed to buy fractions of shares.)

2. Ms.Brenda only cares about the level of her wealth. Her preferences are represented by the following utility function: $U = \sqrt{W}$, where $W$ is wealth. Her current wealth is £400. Ms.Brenda considers whether or not to buy corporate bonds issued by the Trustmeplease Company. One bond costs £200 pounds. With probability p = 0.5, the bond will pay back £329 (i.e. a net gain of £129). With probability 1 – p = 0.5, the bond will only pay back £161 (i.e. a net loss of £39).

   (a) Should Ms.Brenda invest in one of these bonds? (Hints: compare her utility in absence of any investment with her utility if he buys one bond.)

   (b) Should Ms.Brenda buy two of these bonds? (Hints: compare her utility in absence of any investment with her utility if he buys two bonds.)

   (c) What is the maximum price P that Ms. Brenda would pay for one bond yielding £284 (i.e. net gain of £284) with a probability of 0.5 and £124 with a probability of 0.5? [ Hints: At the maximum price, her utility in absence of any investment his utility if she buys one of the bond at price P. Just write down the formula that would determine P. If you want to solve it, plug in values to get an approximation. ]