

BAYLOR UNIVERSITY  
HANKAMER SCHOOL OF BUSINESS  
DEPARTMENT OF FINANCE, INSURANCE & REAL ESTATE

Risk Management  
Dr. Garven  
Problem Set #4

Name: \_\_\_\_\_

**Problem 1.**

Consider two mutually exclusive risky investments, 1 and 2, with payoffs given by:

$$W_{1,s} = \begin{cases} \$1 & \text{with probability } 20\% \\ \$3 & \text{with probability } 50\% \\ \$5 & \text{with probability } 30\% \end{cases} \quad \text{and} \quad W_{2,s} = \begin{cases} \$2 & \text{with probability } 60\% \\ \$4 & \text{with probability } 40\% \end{cases}$$

Suppose that Sophia's initial wealth  $W_0 = \$0$ , and her utility  $U(W) = W^5$ .

- A. Calculate Sophia's expected utility ( $E(U(W))$ ) for both investments.
  
  
  
  
  
  
  
  
  
  
- B. Now suppose that Liam also has initial wealth  $W_0 = \$0$ , but his utility function is  $U(W) = \ln(1 + W)$ . Calculate Liam's expected utility ( $E(U(W))$ ) for both investments.
  
  
  
  
  
  
  
  
  
  
- C. Does either investment first order stochastically dominate the other? Explain why or why not.
  
  
  
  
  
  
  
  
  
  
- D. Compare these investments once again. Is there second order stochastic dominance? Explain why or why not.
  
  
  
  
  
  
  
  
  
  
- E. Which investment should Sophia choose? Explain why.
  
  
  
  
  
  
  
  
  
  
- F. Which investment should Liam choose? Explain why.

**Problem 2.**

Investor A has a square root utility function (i.e.,  $U(W) = \sqrt{W}$ ), whereas Investor B has a logarithmic utility function (i.e.,  $U(W) = \ln W$ ). Both investors have initial wealth  $W_0 = \$1,000$  and must decide how much to invest in a bond and how much to invest in a stock. The current ( $t = 0$ ) prices of the bond and stock are  $B_0$  and  $S_0$  respectively.

Both investors expect to receive income from selling these securities at their  $t = 1$  prices, which are  $B_1$  for the bond and  $S_1$  for the stock. Since the bond is riskless, its  $t = 1$  price is known with certainty to be  $B_1 = B_0(1+r)$ , where  $r$  is the riskless rate of interest. The price of the stock at  $t = 1$  can be high or low; i.e., it will be  $S_0(1+s)$  with probability .6 and it will be  $S_0(1-s)$  with probability .4. Furthermore, assume that  $r = .02$  and  $s = .12$ .

A. How much (in dollars and percentages) of Investor A's initial wealth should be invested in the stock and in the bond?

B. How much (in dollars and percentages) of Investor B's initial wealth should be invested in the stock and in the bond?

C. Who is more risk averse - Investor A or Investor B? Explain why.