

## Finance 360 Problem Set #10 Solutions

- 1)  
a) Calculate the expected value and standard deviations of the two gambles.

$$E(A) = .70(\$100) + .30(-\$200) = \$10$$

$$SD(A) = \sqrt{.70(\$100 - \$10)^2 + .30(-\$200 - \$10)^2} = \$137$$

$$E(A) = .40(\$325) + .60(-\$200) = \$10$$

$$SD(A) = \sqrt{.40(\$325 - \$10)^2 + .60(-\$200 - \$10)^2} = \$257$$

- b) Which option would you choose if you were risk loving? Risk neutral? Risk averse? Explain.

A risk averse person would choose option A (less risk with equal reward). A risk neutral person would be indifferent and a risk loving person would choose option B.

- 2) Explain the difference between moral hazard and adverse selection. Give an example of each.

Adverse selection takes place before a contract is signed when information is unobservable by one of the parties involved. Moral hazard involves one party changing their behavior after the deal has been made.

For example, a depositor can't observe the quality of a bank before prior to making a deposit. Therefore, banks with excellent management and safe investment strategies are not rewarded for their good behavior (adverse selection). Further, once a deposit is made, a depositor can't guarantee that those funds will be invested wisely (moral hazard).

- 3) Suppose that the probability of getting in an accident is 2%. The average cost of an accident is \$50,000. Suppose that the average car driver has preferences given by

$$U(I) = I^{\frac{1}{3}}$$

- a) Assuming that this individual earns \$100,000 per year in income, calculate his expected utility if he buys no insurance.

$$U(\$100,000) = 100,000^{\frac{1}{3}} = 46$$

$$U(\$50,000) = 50,000^{\frac{1}{3}} = 36$$

$$E(\text{utility}) = .98(46) + .02(36) = 45$$

- b) Calculate the amount this individual would be willing to pay for a full coverage insurance policy.

What level of income generates 45 units of utility?

$$I^{\frac{1}{3}} = 45 \rightarrow 45^3 = I = \$91,600$$

This individual should be willing to pay  $\$100,000 - \$91,600 = \$8,400$ .

- c) Repeat (a) and (b) for an individual who earns \$50,000 per year.

$$U(\$50,000) = 50,000^{\frac{1}{3}} = 36$$

$$U(0) = 0^{\frac{1}{3}} = 0$$

$$E(\text{utility}) = .98(36) + .02(0) = 35$$

$$35^3 = 43,900 \rightarrow 50,000 - 43,900 = \$6,100$$

- d) How much should the insurance company charge for a policy if it can't discriminate between the two individuals? What should it charge if it can discriminate?

Note that the cost to the insurance company of a wreck is  $\$50,000(.02) = \$1000$ . A non-discriminating company should charge \$6,100 to get two sales (assuming the same number of rich and poor people). A discriminating company would charge rich people \$8400 and poor people \$6100 for the same policy.

- 4) Given the following values

\$1,000, \$2,000, \$3,000, \$4,000, \$5,000.

- a) How much would you be willing to pay for a car (assuming that you were risk neutral)?

You should be willing to pay the average (= \$3,000)

- b) What should eventually happen to the price/supply of cars?

Eventually, the only cars sold will be \$1000 cars.