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

Problem Set #6   Name: _____

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1. Suppose the typical Florida resident has wealth of $500,000, of which his or her home is worth $100,000. Unfortunately, Florida is in hurricane alley, and it is believed there is a 10 percent chance of a hurricane that could totally destroy the house (i.e., a loss of $100,000). However, it is possible to retrofit the house with various protective devices (shutters, roof bolts, etc.) for a cost of $2,000. This reduces the size of loss from a 10 percent chance of loss of $100,000 to a 5 percent chance of a loss of $50,000. The homeowner must decide whether to retrofit and thereby reduce the expected loss.

   The problem for an insurance company is that it does not know whether the retrofit will be chosen and therefore cannot quote a premium conditioned on the policyholder choosing this action. Nevertheless, the insurance company offers the following two policies from which the homeowner can choose: (1) The premium for insurance covering total loss is $12,000 or (2) the premium for insurance covering only 50 percent of loss is $1,500. The typical homeowner has a utility function equal to the square root of wealth; i.e., $U(W) = \sqrt{W}$.

   With this information, answer the following questions:

   A. Assume that the purchase of homeowners insurance is *compulsory*. Which insurance policy will the homeowner buy? Will the insurance company make a profit (on average) given the homeowner's choice? Will the homeowner retrofit the house?

   B. Now assume that the purchase of homeowners insurance is *not* compulsory. Show that in this case, the homeowner will *not* purchase insurance, but nevertheless choose to retrofit the house.

   C. Find the maximum price which the insurer can charge for the coinsurance contract such that profit can still be earned while at the same time providing the typical Florida homeowner with higher expected utility from insuring and retrofitting. How much profit will the insurer expect to earn on a per policy basis?

2. Some people are good drivers and others bad drivers. The former have a 10% chance of crashing their cars and the latter have a 30% chance. All have a total wealth of $400 but this will fall to $100 if they crash their cars. In other words, each will lose $300 if they crash. Furthermore, all drivers have $U(W) = \sqrt{W}$.

   Suppose an insurer wishes to offer a pair of policies to all drivers. Each policy is designed to break even (zero profit) given the people that choose to buy that policy. The first policy has a premium of $90 and covers all losses (i.e., will pay $300 in the event of a crash. The second policy has a premium of $5 and will pay $50 in the event of a crash. Who will buy which policy? Will the insurer, (a) make a profit, (b) break even or (c) lose money?