

The homework is due on Wednesday, November 18. Each question is worth 0.8 points each.

Question 1 The profit of a firm is given by $f(e) = 100e - e^2$, where e is the manager's effort. The manager's cost of effort is given by $c(e) = 2e$. The manager receives a share s of the firm's profit as compensation, i.e., the compensation is $sf(e)$. Including the cost of effort, the manager's net-payoff is $sf(e) - c(e)$. The owner of the firm receives $f(e)$ minus the payment to manager, i.e., $f(e) - sf(e)$.

- (a) Currently the manager receives a share $s = 0.05$ of the firm's profit. However, the owner is not satisfied with the manager's effort and the firm's profit and considers increasing the manager's compensation to $s = 0.1$. Determine the owner's payoff for $s = 0.05$ and $s = 0.1$.
- (b) Now assume that the manager can falsely report higher profits by using some accounting tricks. In particular, the firm's reported profit can be increased by $400\sqrt{t}$ at a cost of t , i.e., given s , the manager's payoff changes by $s400\sqrt{t} - t$ compared to (a). The firm's true profit, however, remains $f(e)$. The owner's payoff is therefore $f(e)$ minus the payment to the manager. e and t are chosen optimally by the manager. Determine the owner's payoff for $s = 0.05$ and $s = 0.1$.

Question 2 Assume there are two types of workers, h , and l that are seeking a job from a firm. Type h workers are more productive than type l workers, but the firm cannot distinguish them at the outset. For simplicity assume that both types only work for two periods. A worker's utility is $\sqrt{x_1} + E[\sqrt{x_2}]$ where x_1 is the worker's wage in the first period, and $E[\sqrt{x_2}]$ denotes the worker's expected utility of the wage in the second period (e.g., if the worker receives wage x_2 with probability p and x'_2 with probability $1 - p$ then $E[\sqrt{x_2}] = p\sqrt{x_2} + (1 - p)\sqrt{x'_2}$.)

- (a) Assume that after one period, the firm is able to identify a type h worker with probability 0.6. That is, if a worker is of type h then at the beginning of the second period the firm will identify the worker as type h with probability 0.6, and incorrectly identify the worker as type l with probability 0.4.

Assume that workers can choose one of the following schedules.

1. A wage of 40,000 in each of the two periods.
2. A wage of m Dollars in the first period. If after the first period, the firm identifies the worker as type h then he/she receives m Dollars again in the second period. Otherwise, the worker is fired and receives 0.

Assume that m is chosen such that a type h worker is just indifferent between the two wage contracts. Determine m .

- (b) Instead, assume that the firm only wants to hire type h workers. Assume that both type h and type l workers can always find another job that pays 32,400. The firm offers the following wage contract. A wage of 10,000 in the first period. In the second period, the wage is 40,000 if the worker is identified as type l and m if the worker is identified as type h .

Assume that m is chosen such that a type h worker is just indifferent between signing up for this contract or getting a wage of 32,400 each period in the other job. Determine m .

Question 3 Suppose all consumers have Bernoulli utility \sqrt{x} and an income of 10,000. If a consumer has an accident then the loss is 9,600. Risky consumers have an accident probability of 0.2 while low risk consumer's accident probability is 0.05.

- (a) Determine the maximum amount, p , a high risk person is willing to spend to get full coverage.
- (b) Suppose the insurance company offers two contracts: One contract offering full coverage at a price of 1,351 Dollars, and a contract with a deductible D at a price of q Dollars. The full coverage contract is intended for high-risk and the second one of low-risk consumers. In order for candidates to self-select the appropriate contract, one must ensure that the high-risk consumers are not better off switching to the contract with the deductible, and that low-risk consumers are better off being insured than being uninsured. Find values for D and q that satisfy both of these constraints. (*Note:* You can use Excel to help you find the answer. However, you first need to specify both constraints formally.)

Question 4 A country currently has a government run health care system. Since costs are high the governments wants to rely more on the private sector to fund health care. Discuss some of the pros and cons of such an approach. Specifically, you should mention the effects of moral hazard and adverse selection.