

Problem Set 6, Introduction to Game Theory (Part B), Winter Term 2017

1. Consider the regular moral hazard model with a risk-neutral principal and a risk averse agent. The agent can choose between two effort levels, $a_i \in \{\underline{a}, \bar{a}\}$ with associated cost $c_i \in \{\underline{c}, \bar{c}\} = \{0, c\}$; with $c > 0$. Each action generates stochastically one of two possible profit levels, $x_i \in \{\underline{x}, \bar{x}\}$ with $p(\underline{x} | \underline{a}) > p(\underline{x} | \bar{a})$. The utility function of the agent is

$$u(w, c_i) = \ln w - c_i$$

The value of outside option is normalized to 0. (Risk-neutrality of the principal implies that his payoff function is $x - w$.)

- a. Carefully describe the principal-agent problem when the principal wishes to implement the high effort level \bar{a} .
 - b. Solve explicitly for the optimal wage schedule to be offered to the agent which implements the high effort level \bar{a} .
2. A monopoly insurance company provides accident insurance to two types of customers: low risk customers, for whom the probability of an accident is 0.25, and high risk customers, for whom the probability of an accident is 0.5. There is an equal number of both types of customers. Without insurance, each customer's wealth is 16 if there is no accident, but 0 if there is an accident. Customers' von Neumann Morgenstern utility of wealth is: $u(w) = \sqrt{w}$. The insurance company cannot identify the type of a customer when the customer applies for an insurance contract. Suppose the insurance company offers the following two contracts. The first contract offers a payout of 8 in case there is an accident, and requires customers to pay a premium of 7. The second contract offers a payout of 16 in case there is an accident, but requires customers to pay a premium of 10.
 - a) Determine for low risk customers and then also for high risk customers which, if any, of these contracts they will buy. Consider the low risk (LR) customer first.
 - b) What is the expected payoff of the insurance company?
 3. Suppose that worker i 's productivity in a competitive industry is given by θ_i , which ranges between 0 and 1 and that $E(\theta) = c$. Suppose further that each worker can costlessly reveal her productivity prior to negotiating a wage. What are the equilibria of this game? Is there an equilibrium in which all workers with productivities of at least c reveal their types and workers with productivities below c do not reveal their types? Why or why not?