

Exam
Incentives in Organizations and Innovation
Summer Semester 2017

Please answer either Question I or Question II. If you answer both, we will only consider Question I.

Question I

A principal hires a risk averse agent. The expected utility of the agent is $EU = E(w) - 0.5e^2 - 0.5rVar(w)$, where w denotes the wage, e the effort and r the coefficient of absolute risk aversion. The reservation utility of the agent is equal to zero. The production function is $q = e + \epsilon$, where ϵ is a normally distributed random variable with the expected value $E(\epsilon) = 0$ and $Var(\epsilon) = \sigma_\epsilon^2$. The principal can observe q , but not e . Additionally, she can observe a signal μ that is normally distributed with the expected value $E(\mu) = 0$ and $Var(\mu) = \sigma_\mu^2$. The random variables ϵ and μ are correlated. The wage of the agent is $w = \alpha(q + \gamma\mu) + \beta$, where α , β and γ are set by the principal. Let $\sigma_\mu^2 = \sigma_\epsilon^2 \equiv \sigma^2$.

I.1 Identify the participation constraint and the incentive-compatibility constraint.

I.2 Identify α , β and γ .

Question II

II.1 A principal hires an agent who has a reservation utility equal to zero. The agent produces a revenue $q = 1$ with probability p where p is a function of the agent's effort e : $p(e) = e$. The agent produces a revenue $q = 0$ with probability $1 - p$. The principal can observe q , but not e . The agent's wage is $w = \alpha q + \beta$. His utility function is $U(w, e) = w - 0.5e^2$. Identify the profit-maximizing α , the profit-maximizing β and the maximum expected profit.

II.2 An employer hires an employee. The labor contract specifies the employee's effort level e and the wage w . The output produced by the worker is $Q(e) = 80e$. The employee's utility function is $U(w, e) = w^{0.5} - e$. The worker decides whether to exert the specified effort level or to exert no effort at all (shirking). The probability that shirking is detected is equal to 0.5. If the worker is caught shirking, he is dismissed. His reservation utility is equal to zero. Identify the no-shirking condition and the profit-maximizing effort level specified in the labor contract.

Time: 90 Minutes