

Module 5: "Dynamic games of incomplete information"

Lecture 39: "Moral Hazard"

The Lecture Contains:

- Incomplete Information Problem: Moral Hazard
- Principal-Agent Problem
- Moral Hazard: Some example
- How to solve moral hazard: Proper Incentive Scheme

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Incomplete Information Problem: Moral Hazard

- Moral Hazard - Hidden Action Problem
 - Two parties to a transaction
 - One party to the transaction undertakes certain actions that affect the other party's payoff from the transaction
 - This action cannot be monitored by the other party.
- Most common example
 - Insurance market
 - After buying the insurance a person will have less incentive to take proper care of the insured object
 - In case of theft insurance say of laptop in office, one might be less careful about locking the door of the office room
 - Conflict of interest between the insurance company and insured agent
 - insured agent prefers to do something that the insurance company would not want
 - Agent's action is not observed by the insurance company

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Principal-Agent Problem

- This is called the principal agent problem
 - arises when one economic agent, **the agent** (in this example, insured person) takes an action that affects another economic agent - **the principal** (in this example insurance company)
- What is good for agent is not necessarily good for principal
- Agent's action is not observed by the principal
- Way out- principal has to design a scheme that will induce the agent to act in the interests of principal, eg. deductible amount present in almost all insurance policies
 - If a car insurance has a x deductible then in case of any damage to car, x unit of money will be paid by the insured agent \Rightarrow the agent will be careful in driving or parking the car safely

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Moral Hazard: other examples

- Manager - Agent
 - Takes a number of actions that affect profitability of firm
- Owner-principal
 - Activities of agent unobserved by the owner
- Interests of owner and manager often in conflict
 - owners care about firm's profit
 - managers care about the number of hours that they work and number of people under their direct control
- Client - Service Provider
 - (eg. Client-Lawyer, Patient-Doctor)
 - Patient - Principal
 - Doctor - Agent
 - Actions of doctor- the properness of conducting tests, making diagnosis, prescribing care- unknown to patient
 - Conflict of interest between doctors and patient
 - patient is primarily interested in getting better
 - doctor cares about fees, likelihood of getting recognition in addition to treating patient.

How to solve moral hazard: Proper Incentive Scheme

- Principal needs to design the incentive in such a way that agent in its own interest will serve the interest of the principal
- Illustration with an example of a particular principal-agent problem
 - A land lord hires a peasant to plow, sow and reap a rice field. Landlord's profits are π_h if crop is good and $\pi_l < \pi_h$ if crop is poor. Peasant either exerts high effort e_h or low effort e_l . The probability of good crop when peasant exerts high (low) effort = P_h (P_l) where $0 < P_l < P_h < 1$. Landlord cannot observe peasant's efforts. Suppose peasant's utility function is given by $U(\omega) - c(e)$. Where ω is the wage paid by landlord $c(e)$ is the cost of exerting effort. Assume $c(e_l) < c(e_h)$, $U' > 0$, $U'' < 0$
 - How can the landlord design the wage contract such that the peasant exerts high effort only.

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Proper Incentive Scheme [Contd...]

- Principal- Landlord; Agent - Peasant
- If landlord pays a fixed wage- moral hazard will not be eliminated
- Wage conditional on performance
 - this will design the incentives optimally
- Suppose landlord pays wage w_h if crop is good, w_l if crop is bad
- Principal's objective: Minimize the expected wage subject to two constraints
- Incentive compatibility constraint (ICC)
 - wage should be such that the worker would exert high effort and not low effort
 - payoff from exerting high effort > payoff from exerting low effort
- Payoff in case of high effort
 $= [P_h U(w_h) + (1 - P_h) U(w_l) - C(e_h)]$
- Payoff in case of low efforts = $P_l U(w_h) + (1 - P_l) U(w_l) - C(e_l)$
- ICC
 - $P_h U(w_h) + (1 - P_h) U(w_l) - C(e_h) \geq P_l U(w_h) + (1 - P_l) U(w_l) - C(e_l)$

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Proper Incentive Scheme [Contd...]

- Individual rationality constraint of worker
- Peasant should not think of quitting job and work elsewhere
- Let \bar{U} be the highest obtained pay off by working elsewhere
- Individual rationality constraint
- Hence the optimal design of average contract will be obtained by solving the problem listed below

$$P_h U(\omega_h) + (1 - P_h) U(\omega_l) - C_h \geq \bar{U}$$

$$\text{Min } P_h \omega_h + (1 - P_h) \omega_l$$

ω_h, ω_l Subject to

$$P_l U(\omega_h) + (1 - P_l) U(\omega_l) - C(e_h) \geq P_l U(\omega_h) + (1 - P_l) U(\omega_l) - C(e_l) \text{ -----(1)}$$

$$P_h U(\omega_h) + (1 - P_h) U(\omega_l) - C(e_h) \geq \bar{U} \text{ -----(2)}$$

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