

ASYMMETRIC INFORMATION – PART 1

MAIN TYPES OF INFORMATION ASYMMETRY (names from insurance industry jargon)

MORAL HAZARD

Economic transaction – person A's outcome depends on person B's action

B's action is not observable to A / verifiable to outside parties (court enforcing contract)

Only imperfect and indirect indicators or inferences available

Examples: 1. Firm's owner can't observe amount or quality of manager's or worker's effort
2. Insurance company can't observe contributory negligence of policyholder
3. Policyholder exaggerates amount of loss

Problem: Shirking or cheating / fraud

ADVERSE SELECTION

One side to a transaction has better advance information about some relevant attribute of the item being transacted than does the other party

Examples: 1. Seller of used car knows its quality better than does the prospective buyer
2. Employer does not know job applicant's skills, work attitude, collegiality, ...
3. Insurer does not know perfectly insurance applicant's driving skill, prior health, ...

Problem for the less-informed: contract tailored to average member of population may selectively attract the worse than average

Problem for the better-informed: if you are of good "type" (high skills, good health, ...) how to credibly convey this information to the other party

MORAL HAZARD

INSURANCE

Often the insured can reduce the probability of loss by care in use or precautionary measures

If these are not too costly, it may be socially efficient to do so

If insured's care or use of other measures can be publicly observed,

it can be made part of the insurance contract

Otherwise the insurance company fears that the insured may be careless

(or worse, fraudulently claim to have had a loss or exaggerate size of loss)

This is origin of term "moral hazard"

If competitive insurance market offers statistically fair insurance

and people can choose level of coverage, they will choose full insurance

and then not exert any effort to reduce risk

Solutions that have evolved in the insurance industry:

[1] deductibles, limited coverage or percentage coinsurance,

[2] prevent circumvention of these requirements by purchasing policies from many companies:

exclusivity requirement, or making every contract for secondary / residual coverage

Thus information asymmetry carries a social cost – pooling of risks by insurance is constrained;

constrained optimal insurance balances two objectives: insuring the risk-averse consumer,

and creating incentive for consumer to make effort to reduce the level of the risk

Similar tradeoff in other contexts, especially incentive payments to employees

INCENTIVE PAYMENTS IN FIRMS, PROCUREMENT CONTRACTS ETC.

Economic transaction where one side “the principal” needs another “the agent” to take action
Principal’s outcome depends on agent’s action

If action can be directly observed (and verified to a court of law if need arises),
then the two can write a mutually agreeable and enforceable contract of the form
“The agent will do X and the principal will pay him W”

But often action is not observed by principal, or not provable to any outsider

Then agent may shirk, or try to cheat the principal

Examples – [1] worker and managers shirk on job, especially as regards quality of effort

[2] insured is careless, or worse may engage in arson or other fraud

[3] managers defraud shareholders, ...

Some observable / verifiable indirect indicators exist whereby action can be imperfectly inferred

Making agent’s payment depend on these indicators partially mitigates moral hazard

Questions – how good a job can such indicators do and when?

What are the best feasible contracts for coping with moral hazard?

Will offer some simple examples, and then state a few other general concepts

BONUSES AND INCENTIVES

Consider mini-firm with one owner and one worker or manager

Worker's effort (esp. quality of it) X leads to owner's outcome $Y(X)$ (e.g. profit)

Effort entails cost (disutility) to worker; let its money-equivalent be $C(X)$

If effort were directly observable, owner could offer a contract:

Make effort X and I will pay you W , such that

$W - C(X)$ = net money-equivalent of utility the worker could get elsewhere, say U^*

In this, owner can choose X to maximize $Y(X) - W = Y(X) - C(X) - U^*$

Therefore $Y(X) - C(X)$ is maximized: this is called an ideal "first best"

Often X is not observable (at least, not verifiable to outside parties such as a court that may have to adjudicate on the contract). But Y may be better verifiable.

Then the wage offered to the worker can be a function of Y but not of X

Typically, Y is not perfectly related to X , e.g.

$Y = X + e$, where e is random term

(other influences on Y , or measurement error) with variance $V[e]$

Therefore contract $W = W(Y)$ can only achieve a constrained optimum. Some examples:

1. Profit-sharing or equity participation: $W = s + b Y = s + b X + b e$

where s is salary, and b is bonus coefficient, $0 < b < 1$

($b = 1$ would make the worker an owner, or "residual claimant";

then s could be negative, in effect selling the firm to the worker)

If b is high, the worker has stronger incentive to make effort to raise expected Y

but then the worker's income will be riskier: variance is b^2 times the error variance $V[e]$.

Math of this is difficult, but result instructive. If $C(X) = \frac{1}{2} k X^2$, worker's utility $E[W] - \frac{1}{2} r V[W]$,

Then the owner's optimum choice of b is given by $b = 1 / \{ 1 + r k V[e] \}$

Incentives must be weaker when any of r , k and $V[e]$ are larger

Top management: may be selected for lower r , k ; but $V[e]$ is still large

because there are too many other influences on outcome even beyond CEO's control

Lower level workers: $V[e]$ can be huge; r , k probably also large

2. Bonus for exceeding quota: The owner fixes a quota Y^* such that

$W = s$ if $Y < Y^*$, and $W = s + b$ if $Y \geq Y^*$

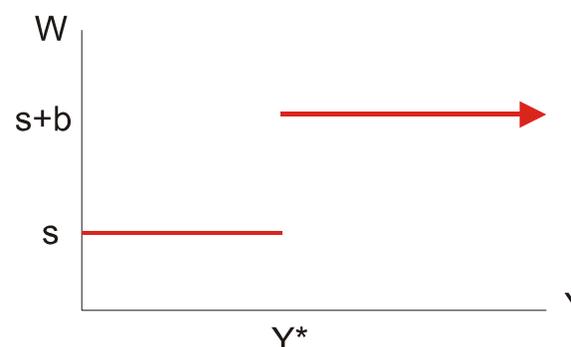
This can be a very powerful incentive if

target can be so precisely chosen that a marginal increase in effort X raises the probability of meeting the target by a lot

Otherwise, manager may think the target is unachievable or already achieved, and relax

This is a significant risk when quota must be based on outcome over a year or such

This is an argument in favor of linear or smooth incentive schemes



3. Career-concerns etc: Instead of or in addition to immediate cash (or stock) payments, the pay package consists of future salary increases, promotions, stock options, ...

This is stronger for people who have longer futures with the company ahead of them

Not very useful for the beginner who will move a few times before settling on a job

Promotion incentives most useful for younger employees at lower and middle levels

4. EFFICIENCY WAGE (P-R pp. 635-8)

Pay more than outside opportunity, but fire if caught shirking

The wage prevailing in the outside market for jobs not involving moral hazard is U^*

Suppose you pay your workers $U^* + E$ so long as they are not detected shirking

Worker's utility cost of working hard is C , measured in money-equivalent units

A worker who shirks has probability P of being caught

If caught, will be fired and have to go take another job in the outside market next year on

So by shirking, the worker will benefit C right now. But with probability P , will lose

$(E-C)$ from next year on, which has present discounted value $(E-C) / r$

To prevent shirking, the owner should keep $P (E-C) / r > C$, or

“efficiency premium” $E > C (P+r) / P = C [1 + (r / P)]$

But – if the same person who earns only U^* outside can get $(U^*+E-C) > U^*$ from this job, surely a long line of people waiting to work for you will build up

Those waiting on this line will waste some time,

which they could have used for earning income elsewhere or enjoying leisure

They will compete with others on line, and so have a probability < 1 of getting a job from you or maybe they will have to bribe your manager to increase that probability

For a combination of all these reasons, their expected utility from getting into line will fall below that of a sure (U^*+E-C) . In equilibrium, they won't do any better from waiting on your line than in work elsewhere – kind of “free entry implies zero profit” idea

FURTHER EXTENSIONS AND ISSUES

1. Two key aspects of incentive contract: average payment to the agent, and the spread of payments in good versus bad outcomes
For a given spread (power of incentive), if average is low, this is a “stick” type incentive
if average is high, it is a “carrot” type incentive, more costly to the principal
The average is determined by the agent’s outside opportunity
Principal may deliberately seek agents with poor alternatives, but they may have low skill
In some cases principal may lower agent’s alternatives – Stalinist policy
2. Often the owner’s outcome Y is also unobservable / unverifiable
Instead, some other indicator Z must be used
But when incentives are offered for Z , agents will focus efforts on what helps Z
and this may work to the detriment of Y which the principal really cares about
Therefore how good such an indicator is depends on how well the marginal products of effort X on the true Y and the usable Z are correlated with each other
This is especially important when there are multiple dimensions of effort
3. The same agent often performs multiple tasks for the principal
Outcomes from some of them may be observable with less error (lower $V[e]$),
and this may seem to justify higher-powered incentives for those (higher b)
But that will cause the agents to focus on these tasks and ignore the others
So the principal has to accept weaker incentives all round
Perhaps can mitigate this problem by grouping together the tasks appropriately –
one agent performs a set of tasks where his efforts are complements, not substitutes
so focusing on one task does not hurt the outcomes of the others

4. Repeated relationships – the same agent takes similar actions repeatedly
If luck at different times is independent, then average output is
a more accurate measure of average effort; can allow more powerful incentives
5. Comparison with others – the same principal employs many agents performing similar tasks
if luck component is correlated across people
then the ranking of your outcome is accurate indication of the ranking of your effort
so prizes for best performances good incentives
6. Motivated agents – care directly about principal's outcome, so need less incentive
Important in charities, public sector agencies, health, education ...
These “intrinsic” incentives can actually decrease if large “extrinsic” monetary ones offered
7. Multiple tiers of agency – in a company, hierarchy of shareholders, board of directors,
top management, middle management, foremen, workers
Principal must recognize danger of collusion at lower tiers
If lower level workers have high-powered incentives, then their supervisors may collude
with them and get kickbacks for falsely certifying they have earned the bonuses
So top principal may have to accept weaker incentives at the lowest level
8. Multiple owners (principals) with imperfectly aligned or conflicting objectives
Then the agent's incentives (sticks or carrots) coming from any
one principal can be offset by those offered by other principals
Result – weak incentives in the aggregate
Especially important in politics and public sector