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 \( b = \frac{1}{1 + r k V[e]} \)
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