The Theory of Incentives…ch 2:

Introduces the principal-agent model

- setting is delegation
- running example: manager-worker

- problem: private information (for worker) affecting payoffs of both

    - must pay worker to utilize info as manager would choose, if info public

    - when payoff-relevant info private, informed party receives *information rents* - additional cost

How much additional cost? Depends….

- possibilities? some trading opportunities not realized

How to tell?

method: set up model with no asymmetric info
derive equilibrium in that model

introduce asym. info
derive equilibrium

compare the two.

Basic assumptions of model(s)

1. principal (P) and agent (A) are rational economic entities - max own utility

2. (objective) distribution from which A's private info drawn is common knowledge

3. P is "Bayesian EU maximizer"
   - A has private info, max's own utility
   - P knows this; can solve A's problem, for each possible draw of info
   - P uses this knowledge to design contract

   (like Stackelberg leader)

I. One shot contract:

P hires A to produce q units of good
pays A income t

Primitives of an economic model?

technology, preferences, and information

Setting:

i) production function for good:

single agent
fixed cost (F), constant marginal cost (θ)
marginal cost high or low

$$C(q,\theta) = \theta q + F, \qquad \theta \in \{\underline{\theta}, \overline{\theta}\}$$

ii) preferences:

P: $U^{p}(q,t) =$S(q)-t, with S(0)=0, S'>0>S"

A: $U^{a}(t,q;\theta,F) = t - \theta q - F$
if accepts contract

otherwise, U^{a} =reservation wage
=0

for now, *assuming* RN (why? information is only source of potential problem in setting contract; introduce complications of risk aversion later)

iii) information:
A knows realization of θ

P knows distribution: prob $\{\theta = \underline{\theta}\}=\nu$

Elements of contract?

to be enforceable, must be based on variables which are both *observable* and *verifiable*

A=$\{(q,t): q \in R^+, t \in R^+\}$

Benchmark: perfect and complete info on θ

Steps:

1. given θ , A accepts (q,t) if

$$t - \theta q - F \geq 0$$

notice: nec'y increasing in θ : more efficient wkr requires lower pay to be willing to work, for given quantity.

2. since θ costlessly observable to P, can base payment on wkr's cost

-offers "take-it-or-leave-it", lump-sum pay schedule to A:

$\underline{t} = \underline{\theta} q + F$ for effcient wkr

$\overline{t} = \overline{\theta} q + F$ for inefficient wkr

$\overline{t} > \underline{t}$

3. P's optimal contract?

Choose q to max $S(q) - t = S(q) - \theta q - F$
FOC: $q(\theta, F)$ satisfies $S'(q) = \theta$

so if inefficient worker, $S'(\overline{q}) = \overline{\theta}$

and for efficient worker, $S'(\underline{q}) = \underline{\theta}$

Properties of full info, π - max'g contract?

1. S"(q) < 0 - higher θ means A less efficient, higher marginal cost of production, so lower optimal quantity.

2. optimal *q* independent of F: depends on marginal, not fixed cost.

NOTE: text drops F; this is the justification!

Pictures?

- in (q,t) space

- indifference curves for each type of worker (A):

  efficient: $t = k + \underline{\theta} q$

  inefficient: $t = k + \overline{\theta} q$

  steeper?

NOTE: *single-crossing property*

(why important?)

- indifference curves for P?

$$S(q) - t = k \text{, so } S'(q)dq - dt = 0$$

so IC's for P have slope $\dfrac{dt}{dq} = S'(q)$

  - IC's for P are concave

Worker/A forced down to zero surplus:

for each worker, *participation constraint* is binding:

$$\underline{t} - \underline{\theta} q \geq 0 \qquad \text{and} \qquad \bar{t} - \bar{\theta} q \geq 0$$

Are efficient workers paid more, or less?

Which type does P prefer to hire?