What is Contract Theory About?

- Exchange of goods and services had been studied by equating supply with demand.

- Even with uncertainty, the "state-contingent" approach (Debreu 1959) makes it as if only the number of commodities has increased; otherwise all others remain the same as in the case of certainty.

- All these can be described as "spot exchange" models.

- Many exchanges, however, involve negotiation, private information, and intertemporal transactions.

- Contract theory looks into more details of these exchanges about how the terms of exchange are affected by the external factors such as uncertainty, bargaining positions, degree of risk-aversion, intertemporal resource allocation, etc.

Big Issues

- If contract requires relationship-specific investment by at least one contracting party, how to prevent ex-post holdup?
- What is the optimal renegotiation proctocal for contract in a dynamic setting in response to
  (1) interim or ex-post informational revelation?
  (2) unforseen event?
- What remedies to be evoked in the case of contract breach? (liquidated damages, expectation damages, punitive damages, reliance damages, ... etc.)
- How to interpret events which are not written in the contract? (Incomplete contract.)
- In an uncertain world, how does each party share the risks inherent in the contract?

A. Labor Contract: A Synopsis

- Genesis: Suppose a principal hires an agent to engage in a production, but cannot observe the effort of the agent, how can he provide incentives?

- Answer: The payment to the agent can be output-contingent.

- ▶ Underlying assumptions:

    (1) Agent dislikes effort.

    (2) Principal values output.

    (3) Both are risk-averse.

    (4) Output is positively, but only stochastically, related to effort.

- ▶ Idea: If the wage of the agent (which is called "contract") is linked to output, then he has incentive to exert effort, as higher effort means high output which, presumably, means higher wage.

- ▶ Important issues:

  (1) If both are risk-averse, and output is only stochastically related to effort, a labor contract thus constructed will introduce risks to both principal and agent. In that case how to optimally allocate risk?

  (2) What is the form of optimal wage contract, which balances the tradeoff between risk and incentive-provision?

- ▶ The real world is much more complicated, and there are lots of variations to the above simple setting.

Complication 1: Multiple Agents

- Suppose the principal hires more then one agent, what additional issues should be considered?

- Basically two:

  A. Team production, in which although more than one agent engages in production, only a joint output is observed.

  B. Each agent might have his own observable output, but outputs are correlated.

- ▶ In case A, the issues to think about are

  (1) How to prevent free-riding?

  (2) Is there additional efficiency loss (to the basic model) when only joint output is observable?

- ▶ In case B, the issues to think about are

  (1) Should the principal offers each agent a separate contract, or to offer all a "grand" contract?

  (2) If a grand contract is better, should an agent's pay be related to the performances of the others?

Complication 2: Multiple Tasks

- Suppose there are multi-dimensional efforts, what additional complications should be considered?

- The ratio of marginal costs between efforts might be different from the ratio of marginal products of these effort. In other words, the principal and the agent might view the cost and benefit of efforts differently.

- The agents can even engage in influence activities or sabotage. How to prevent them?

- In general, how to induce "correct" effort?

Complication 3: Unverifiable Outputs

▶ Suppose output is observable, but unverifiable, by either party in the court, how to enforce the terms of contract?

▶ Way out: Self-enforcing implicit contract, which is designed in a way that the agent and, more importantly, the principal are willing to fulfill their duties without legal enforcement.

Complication 4: Subjective Evaluation

- Suppose not only output is unverifiable, but also that its value is "subjective", how can a labor contract work?

- Being "subjective" means that performances are viewed differently by different parties.

  For example, if true output is y, then the principal's observation of output is $y_P = y + \tilde{\varepsilon}_P$, while that of the agent is $y_A = y + \tilde{\varepsilon}_A$; where $\tilde{\varepsilon}_A$ and $\tilde{\varepsilon}_P$ may or may not be correlated.

Complication 4: Subjective Evaluation

- Is there still way to provide incentives to the agent?
- Whose observation should be in the contract, y_A or y_p?
- How to prevent the principal (agent) from under-stating (over-stating) his observation?
- How compromise between y_A and y_p?

B. Holdup Problem and Property Rights: Synopsis

- When contract requires relationship-specific sunk investment, there will be ex-post holdup problem.

- Holdup problem: when one party of a contract has made an investment which is of no value outside of the contract, the other party will have incentive to opportunistically "holdup" the party which made the investment.

- Investment will be inefficiently low.

- Remedy:
    i. Contract design.
    ii. Property rights assignment.

C. Contract Damages: Synopsis

- While economists are more concerned with designing contracts which are incentive compatible, the legal scholars are more concerned with the design of remedy after contract is breached.

- The way damages are designed greatly influences the incentives of the contracting parties, either in relation-specific investment or in breach incentive.

- What are the respective optimal damages under various environments?