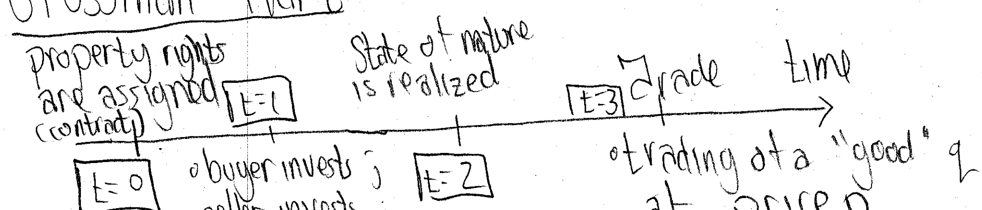
Incomplete Contracts

- Regular contracts: maximizing subject to informational constraints
- Incomplete contracts
  - make or buy decision - what should be done within and outside the firm?
  - Coase - Transaction costs
  - Williamson - Relation specific investments and the hold-up problem. (Example of transaction costs)
    - silent about what happens w/in the firm
  - Grossman-Hart: firm is a nexus of contracts
    - Insights: production requires assets, and the ownership structure affects incentives to invest.
  - Only property rights can be assigned. Nothing else is possible.

Grossman-Hart:



- contract cannot specify the "good" to be traded.

- The specifics of the trade are contractible only ex post.

Two assets: "B" and "S"
- surplus in relationship: $V(i,j)$ $V_i>0$, $V_j>0$
- surplus outside the relationship
  - $B(i,j)$ for the party owning asset B
  - $S(i,j)$ for the party owning asset S.

0 if own neither
B+S if own both

- Since there is some asset specificity in this relationship, $V(i,j) > B(i,j) + S(i,j)$
  - assume: $V_k(i,j) > B_k(i,j) + S_k(i,j)$, $k \in \{i,j\}$
- Sunk cost of investment: $\varphi(i)$, $\psi(j)$ increasing, convex
- Nash Bargaining (as opposed to Rubinstein bargaining.)
  - Efficient, symmetric bargaining.
    - Each gets 50% of the surplus over their outside option.

<u>Contract 1</u>: Each has one asset (non-integration)
- buyer has B, seller has S
- buyer gets $B(i,j) + \frac{1}{2}[V(i,j) - B(i,j) - S(i,j)]$
- seller gets $S(i,j) + \frac{1}{2}[V(i,j) - B(i,j) - S(i,j)]$

Investments:
- buyer:
  (i): $\frac{1}{2}V_j(i,j) + \frac{1}{2}B_j(i,j) - \frac{1}{2}S_j(i,j) = \psi'(j)$
- seller:
  (j): $\frac{1}{2}V_i(i,j) + \frac{1}{2}S_i(i,j) - \frac{1}{2}B_i(i,j) = \varphi'(i)$

First best: $V_i(i^*,j^*) = \varphi'(i^*)$, $V_j(i^*,j^*) = \psi'(j^*)$

We will have underinvestment.

- The more assets you have, the more incentive to invest.

<u>Contract 2:</u> Buyer owns B and S

- Buyer gets $B(i,j) + S(i,j) + \frac{1}{2}[V(i,j) - B(i,j) - S(i,j)]$
- Seller gets $\frac{1}{2}[V(i,j) - B(i,j) - S(i,j)]$

Investment decisions:

(buyer): $\frac{1}{2}V_j(i,j) + \frac{1}{2}B_j(i,j) + \frac{1}{2}S_j(i,j) = \psi'(j)$

(seller): $\frac{1}{2}V_i(i,j) - \frac{1}{2}B_i(i,j) - \frac{1}{2}S_i(i,j) = \varphi'(i)$

- integrated, buyer-owned, firm

Can discuss advantages of one type of ownership structure over the others

- if buyer's investments are more important, might want buyer to own both assets!

Doing "optimal" contracts on a very limited contract set.

Maskin-Tirole: ReStud '99

- payoffs $V(i,j)$ are foreseen
- can have reasonably sophisticated revelation schemes that will let you circumvent the "observable but not verifiable" issue.

(*) Maskin lives in Einstein's house!

$t=0$ | $t=1$ | $t=2$ | $t=3$

- $t=0$: contract
- $t=1$: buyer invests j; seller invests i
- $t=2$: state of nature $(\underbrace{v}_{\text{value to buyer}}, \underbrace{c}_{\text{cost to seller}})$ — not verifiable
- $t=3$: trade $q \in [0,1]$

__First-best:__ $$\max_{i,j} E\left[\max\{(v-c)q, 0\}\right] - \psi(j) - \varphi(i)$$

s.t. $q \in [0,1] \quad \forall (v,c)$

- $E[v] \uparrow$ with j
- $E[c] \downarrow$ with i

Want ex-post efficient trade and ex ante efficient investment.

- ex-post efficient trade: $q = \begin{cases} 1 & \text{if } v>c \\ 0 & \text{if } v<c \end{cases}$
- Let i^*, j^* denote efficient investment levels

__Utility:__

- B: $vq - p$
- S: $p - cq$

- i and j are privately observed - cannot contract on them (moral hazard)
- (v,c) observed by both parties but not by outsiders.

Define $\tilde{q}$ s.t. $\underbrace{\frac{d}{di} E_i[-c\hat{q}]}_{>0} = \varphi'(i)$ at $i=i^*, j=j^*$

level of output (avg output level)

since $\frac{dc}{di} < 0$

Then, have the following game:

Stage 1: buyer can offer a trade to seller (ie a q and a p)

Stage 2: seller can say yes or impose a trade $(\tilde{p}, \tilde{q})$ s.t. $\tilde{p}$ is chosen to ensure that the participation constraint is binding.

Then, this bargaining under symmetric information will lead to ex post efficiency.

Seller payoff is equal to $\tilde{p} - E_{i,j}[c\tilde{q}] - \varphi(i)$, so by construction, seller chooses i^*.

Buyer chooses j^*, because he expects ex post efficiency and he is the residual claimant.

This works, provider that the buyer investment affects only $E[v]$ and seller investment affects only $E[c]$. (ie no direct externalities.)

This is a first-best contract which lies outside the Grossman-Hart set of contracts.