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NTU_G_IO_I : Classnote 01

Theory of the firm and Incomplete Contracts.

Scope and Scale of the firm : (What determines the size of the firm?)

- – The firm as a loophole for the exercise of Monopoly power
    - ∗ horizontal merger
    - ∗ vertical foreclosure
  - – Static Synergy
    - ∗ exploit economies of scale or scope.–No reason that the scale /scope economies should be exploited within a firm. For example, through contracting?
  - – Long-Run Relationship
    - ∗ Contracts are fairly incomplete, owing to “transaction costs”. (Coase 1937, Williamson 1975)
      - · some contingencies may not foreseeable at the contracting date
      - · Contingencies are foreseeable but too many to write into the contract
      - · Monitoring the contract may be costly
      - · enforcing contracts may involve considerable legal costs.
    - ∗ “Opportunism” “Hold-up problem”

Relation-specific investment

Assumption:

- Generate greater surplus within a relationship than outside the relationship.
- Specific investments are observable by all parties but are nonverifiable.
- Whatever the allocation of property rights, the cost of the investment is born by the party who makes it.
- How the resulting income stream is shared depends on property rights.

- Only the owner receives the full benefit of his investment, while other parties, who do not receive all of the surplus generated by their investments, will tend to underinvest.
- Examples:
  - coal mine - electric utility,
  - chip maker - chip user
  - GM-Fisher (In the 1920s Fisher Bodies was producing car doors for General Motors; it therefore invested in some rather specialized machine tools and organized its production so as to respond best to the needs of General Motors. Clearly Fisher Bodies would have lost a considerable part of the value of its investments if it had left General Motors for another car maker. Therefore a contract signed in 1919 gave Fisher Bodies a ten-year exclusive dealing clause to protect it from being held up by General Motors. On the other hand, this gave Fisher Bodies the possibility of raising prices outrageously; to prevent this, the contract also contained a cost-plus clause. It turned out, however, that Fisher Bodies manipulated the price-protection clause by choosing a very low capital intensity and locating its plants far from those of General Motors. General Motors thus was effectively held up by Fisher Bodies and eventually bought it in 1926.)

Ownership matters because contracts are often incomplete.

Model: one buyer and one seller

Date 1: seller chooses investment $e \geq 0$

Game from trade realized

Date 2: Buyer and seller decide whether to trade or not.

seller's cost for the product : $c(e) : c' < 0, c'' > 0$

buyer's valuation is $v \in [0, \bar{v}]$ with probability distribution $F(\cdot)$ and density $f(\cdot)$

- First best outcome
  - Trade is efficient:

$$\text{Trade iff } v \geq c(e)$$

- Investment is efficient (e^*):

$$W(e) = \int_{c(e)}^{\bar{v}} (v - c(e)) f(v) \, dv - e$$
$$W'(e) = -(1 - F(c(e))) c'(e) - 1 = 0 \text{ call } e^*$$
$$c'(e) = -\frac{1}{(1 - F(c(e)))} < -1$$

- Separate Ownership (Williamson Outcome) (e^W)
  - $e, c(e)$ and v are observable but not verifiable to a third party: (not contractable)
  - Ex post contracting is possible
  - B & S making efficient trade decision at period 2. (equal bargaining power)

$$B(e) = 0 + \frac{1}{2}(v - c(e)) \text{ if } v - c(e) > 0$$
$$S(e) = -e + \frac{1}{2}(v - c(e)) \text{ if } v - c(e) > 0$$

Rewrite the above as $\begin{cases} B(e) = \frac{1}{2}\int_{c(e)}^{\bar{v}}(v - c(e)) f(v) \, dv \\ S(e) = -e + \frac{1}{2}\int_{c(e)}^{\bar{v}}(v - c(e)) f(v) \, dv \end{cases}$

  - First period, the seller chooses e^W satisfying

$$S'(e) = -\frac{1}{2}(1 - F(c(e))) c'(e) - 1 = 0$$
$$c'(e) = -\frac{2}{(1 - F(c(e)))} < c'(e)$$

we have $e^* > e^W$, which implies underinvestment

- Asset Ownership / incomplete contracting (Grossman and Hart (1986)): Control v.s. Ownership.

  Contractual rights can be of two types : specific rights and residual rights. Ownership is the purchase of these residual rights of control.

  Model : a_i, B_i, q_i are ex ante non-contractable (as of date 0) but ex post contractable (as of date 2), a_i is ex ante investment (Asset owner's decision at date 1)

  q_i is ex post decision. (a specific right purchased at date 0 and decided at date 2)

  B_i: profits

- Buyer purchases a specific rights $q_i = P$ (trading price on date 2) on date 0. Buyer control

  Date 2:

  If $v \geq c(e)$ buyer chooses $P = c(e)$, seller will accept

  If $v < c(e)$, buyer chooses $P = v$, seller will reject.

  Date 1:

  $$\max_e S(e) = -e + \int_{c(e)}^{\bar{v}} (P - c(e)) f(v) \, \mathrm{d}v$$

  F.O.C. $e^{BC} = 0$

- Seller purchases a specific rights $q_i = P$ (trading price on date 1) on date 0. Seller control

  Date 2:

  If $v \geq c(e)$, seller chooses $P = v$, buyer will accept

  If $v < c(e)$, seller chooses $P = c$, buyer will reject.

  Date 1:

  $$\max_e S(e) = -e + \int_{c(e)}^{\bar{v}} (P - c(e)) f(v) \, \mathrm{d}v$$

  F.O.C. $e^{SC} = e^*$

  Date 0: sign a contract {seller has the right to choose P on date 2, seller pays buyer t}, If assuming equal bargaining power, $t = \frac{1}{2} W(e^*)$

- Other possible direction for hold-up problem:

  * If v is not observable by seller, what happens?
  * Pick an initial contract at period 0, and then give the right of renegotiation to one party.
  * Is the contract renegotiation proof ?

• Damage measures for breach of contract (Shavell, Bell 1980)

Date 0, buyer and seller sign a contract that buyer will pay P at date 2 to purchase the good.

Date 1: seller invests e to lower the production cost

Date 2: buyer decides whether to breach the contract or not

v : contingency

B: breach set $\{v |$ the contract will not be performed$\}$

Seller decides the level of reliance e and Buyer decides whether to breach.

d : If breach, the buyer has to pay damage d to the seller.

Hence, $B = \{v : v - P \leq -d\}$.

- Expectation measure (ED) : $d = P - c(e)$.
  - Buyer trades if and only if $v - P \geq -d = -P + c(e)$, i.e., $v \geq c(e)$
  - Seller's investment decision:

$$Max_e - e + \int_{c(e)}^{\bar{v}} (P - c(e)) f(v) \, \mathrm{d}v + \int_0^{c(e)} (P - c(e)) f(v) \, \mathrm{d}v$$

$$\text{F.O.C :} \quad -1 - \int_0^{\bar{v}} c'(e) f(v) \, \mathrm{d}v = 0$$

$$c'(e) = -1 \quad e^{ED} > e^*$$

- Reliance measure (RD): $d = e$
  - Buyer trades if and only if $v - P \geq -d = -e$, i.e., $v \geq P - e$
  - Seller's investment decision:

$$\begin{aligned} S(e) &= -e + \int_{P-e}^{\bar{v}} (P - c(e)) f(v) \, \mathrm{d}v + \int_0^{P-e} e f(v) \, \mathrm{d}v \\ &= -e + (P - c(e))(1 - F(P - e)) + eF(P - e) \\ &= (1 - F(P - e))(P - c(e) - e) \end{aligned}$$

F.O.C.

$$-f(P - e)(P - c(e) - e) + (1 - F(P - e))(-c'(e) - 1) = 0$$

$$-c'(e) - 1 + \frac{f(P - e)}{1 - F(P - e)}(P - c(e) - e) = 0$$

$$c'(e) > -1$$

$$e^{RD} > e^{ED} > e^* > e^W$$

- Date 0, buyer and seller sign a contract that buyer will pay P at date 2 to purchase the good and pay $d = P - c(e^*)$ for not deliver the good.

  Date 1: seller invests e to lower the production cost

  Date 2: buyer decides whether to have the good delivered or not.

  - Buyer trades if and only if $v - P \geq -d = -P + c(e^*)$, i.e., $v \geq c(e^*)$
  - Seller's investment decision:

$$S(e) = -e + \int_{c(e^*)}^{\bar{v}} (P - c(e)) f(v)\,\mathrm{d}v + \int_0^{c(e^*)} (P - c(e^*))\, f(v)\,\mathrm{d}v$$

  F.O.C.

$$\begin{aligned} -1 - c'(e)\,(1 - F(c(e^*))) &= 0 \\ c'(e) &= -\frac{1}{(1 - F(c(e^*)))} \\ e^{LD} &= e^* \end{aligned}$$