Maskin and Tirole – Observable but not verifiable is without foundation. Can construct mechanisms.

Next time: Foundations.

This time: Markets and contracts.

- can contracts serve as a barrier to entry?
- How does product-market competition affect the principal-agent problem.

Aghion-Bolton (AER 1987): Excellent paper

- Aghion's job market paper.
- $t = 1, 2$
- B(uyer), S(eller)
  - one incumbent firm at $t=1$
- B buys one unit of a good from S at each t.
  - Valuation is 1
- S's cost of production is $c_I \le \frac{1}{2}$
- Potential E(ntrant) has marginal costs $c_E \sim U[0,1]$
- If entry occurs, we will have Bertrand competition
- $P_1 = 1$
- Entry if $c_E \le c_I$
- $P_2 = \begin{cases} 1 & \text{if no entry} \\ \underbrace{c_I}_{=\max\{c_E, c_I\} = c_I \text{ since } c_E \le c_I} & \text{if there is entry} \end{cases}$

Spot contract:

$$E[v_B] = (1-\Pr[\text{Entry}])\cdot 0 + \Pr[\text{Entry}](1-c_I)$$
$$= c_I(1-c_I)$$

$$E[v_I] = 1-c_I + (1-\Pr[\text{Entry}])(1-c_I)$$
$$= (1-c_I) + (1-c_I)^2$$

Long-term contract:

$$(\underbrace{p_1, p_2}_{\text{prices I will charge}}, \underbrace{d}_{\text{damages if B buys from E}})$$

When does buyer breach contract?

$$1-(p_E+d) \geq 1-p_2$$

$$\Pr[\text{Entry}] = \Pr[c_E < p_2 - d] = p_2 - d$$

$$E[v_B] = 1-p_1 + (1-p_E) - d$$
$$= 1-p_1 + (1-(p_2-d)) - d$$
$$= (1-p_1) + (1-p_2)$$

$$E[v_I] = p_1 - c_I + (1-\Pr[\text{Entry}])(p_2-c_I) + \Pr[\text{Entry}]\cdot d$$
$$= p_1 - c_I + (1-(p_2-d))(p_2-c_I) + (p_2-d)d$$

B accepts iff $(1-p_1)+(1-p_2) \geq c_I(1-c_I)$

I wants to

$$\max_{p_1,p_2,d} \left\{ (p_1 - c_I) + (1-(p_2-d))(p_2 - c_I) + (p_2 - d)d \right\}$$

$$\text{s.t. } (1-p_1) + (1-p_2) \geq c_I(1-c_I)$$

Can set $p_1 = 1$

Then we get: $d^* = \dfrac{1 + (1-c_I)(1-2c_I)}{2} > 0$

- $\Pr[\text{Entry}] = p_2 - d^* = \frac{c_I}{2} < c_I \Rightarrow$ Entry is less likely now $\Rightarrow$ loss in efficiency.
- Can extract surplus from the potential entrant.

<u>Product market competition</u> and the principal-agent problem.

Leibenstein (1967) - firms might be producing inside their production possibilities frontier.
X-efficiency,

- Hart (Restud '83)
- Scharfstein (RAND '87) - MIT thesis
- Martin (1993)
  - Supermodular games become important here.

- Schmidt (1997 Restud) - presents four models - two go one way, two go the other way.

Recall $\pi: A \to S$

$q_1(\varphi), \ldots, q_n(\varphi)$ φ is a measure of product market competition.

$\pi_1(a), \ldots, \pi_n(a)$

$$\sum_{i=1}^{n} \pi_i'(a) q_i'(\varphi) \geq 0 \quad \forall (a, \varphi)$$

$\Rightarrow \varphi \uparrow$ induces more effort

Schmidt I:

- 2 cost states: L, H
- $a \in A \Rightarrow \pi_L(a), \pi_H(a) = 1 - \pi_L(a)$, FOSD
- If H, then with probability $\ell(\varphi)$, go bankrupt. $\ell'(\varphi) > 0$ (ie more competition causes high cost firms to go out of business with higher probability.)

  $\Rightarrow$ agent gets loss L.
- Need $\pi_L'(a) q_L'(\varphi) + \pi_H'(a) q_H'(\varphi) \geq 0$ for $\varphi \uparrow$ to imply $a \uparrow$

$$\Leftrightarrow \underbrace{\pi_L'(a)}_{\substack{(+) \\ \text{by FOSD}}}[q_L'(\varphi) - q_H'(\varphi)] \geq 0$$

$$\Leftrightarrow q_H'(\varphi) \leq q_L'(\varphi)$$

- assume PC binds. Then this inequality should hold.
- Thus, people work harder in a more competitive product market environment.