Corporate Control

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Managerial Discipline and Takeovers

- Managers often don't maximize the value of the firm; either because they are not capable of doing so or because of an agency problem.
- An important disciplining device is the possibility of a **takeover**:
  - If a firm operates under potential, an outsider may step in, buy it, and increase its value.
- Grossman and Hart (1980) demonstrate a fundamental **free-rider** problem in this process of takeovers:
  - Small shareholders refuse to sell at below post-takeover value.

Grossman and Hart (1980): Free-Rider Problem and Dilution

- Manager takes an action $a \in A$, which generates value $f(a)$.
- Denote value given chosen action as: $q = f(a_0)$.
- Manager derives utility $U(q)$, which is affected by the value of the firm, and also some private cost needed to derive this value.
- As a result, the chosen action might not be the one maximizing firm value:

$$q \neq \max_{a \in A} f(a)$$

- A raider announces he wants to buy shares of the firm at a price p.
- If he acquires enough shares (usually, *50%*), he gets control over the firm, and can change its value to:

$$v = \max_{a \in A} f(a) + \epsilon$$

- The raider changes value by:
    - Having different ability (captured by ϵ).
    - Choosing the value-maximizing action.
- Shareholders decide whether to sell. The assumption is that they are all atomistic. They don't realize they affect takeover success.

Free-Rider Problem

- Focus on equilibria where takeovers either succeed with probability 1 or with probability 0.
- The paper shows that there is no equilibrium where the takeover succeeds.
    - If the raider offers $p < v$, each shareholder prefers not to sell, and get the higher value upon completion of the takeover.
    - If the raider offers $p \geq v$, he is losing money, assuming that making a bid has some private cost c.

The Role of Dilution

- The problem with the takeover mechanism according to Grossman and Hart (1980) is that:
  - On the one hand, in order to make a profit the raider has to offer a price to shareholders, which is below the ultimate value under his control.
  - On the other hand, shareholders, not realizing their effect on the success of the takeover, prefer to wait and capture the higher value than to get the lower price.

- The solution is to dilute existing shareholders in the takeover process: Giving them a lower value than v after the takeover is completed.
- Denote the dilution factor as ϕ. Then, the raider can guarantee the completion of the takeover by offering a price:

$$p = max(v - \phi, q)$$

- This gives the raider a profit of:

$$v - max(v - \phi, q) - c = min(v - q, \phi) - c$$

- There are various ways to achieve dilution:
  - Allowing the raider to pay large salary to himself.
  - Allowing the raider to sell assets of the acquired firm at below fair value to another firm under his control.
- These measures are often perceived as bad since they expropriate value from shareholders.
- Grossman and Hart show that these measures can actually be good for existing shareholders.
  - They break a free-riding result and allow welfare enhancing takeover to happen.

The Choice of Managerial Action

- The corrective effect of takeover is not limited to ex-post replacement of a bad manager, but extends to ex-ante provision of incentive for the manager.
    - If the manager is replaced in a takeover, he has an incentive to choose an action more closely aligned with value maximization.
- Suppose that v and c are stochastic, and that the realization of v becomes known to the raider and the shareholders, while the realization of c becomes known to the raider.

- A raid will occur for a realization of v and c such that

$$min(v - q, \phi) - c > 0$$

- Assuming that the manager receives a utility of zero when he is replaced, and using $\pi(q, \phi)$ to denote the probability that a raid will occur (i.e., that $min(v - q, \phi) - c > 0$), we can write the manager's utility from q as:

$$W(q) = U(q)\big(1 - \pi(q, \phi)\big)$$

- The first order condition determining the level of q becomes:

$$U'(q)\big(1-\pi(q,\phi)\big)-U(q)\pi_1(q,\phi)=0$$

- In the absence of takeover considerations, the manager would simply set q so that $U'(q)=0$.
- Now, the manager considers not only the direct effect of q, but also the indirect effect that it has via the probability of a takeover.
- In general, a higher level of q reduces the probability of a takeover ($\pi_1(q,\phi)\leq 0$) because the raider is less likely to be able to offer a price that will generate a profit.
- Hence, the threat of takeover induces the manager to increase q.

The Choice of Dilution Factor

- Shareholders have control over the value of the firm, in that they can set the dilution factor ϕ. They do it to maximize the expected value:

$$r(\phi) = q(\phi)\big(1 - \pi(q(\phi), \phi)\big)$$

$$+E\big(max\big(v - \phi, q(\phi)\big)\big|min(v - q(\phi), \phi) - c > 0\big)\pi(q(\phi), \phi)$$

- Overall, an increase in the dilution level ϕ has three effects:
  - o It makes takeovers more likely.
  - o It reduces the payment to shareholders in the event of a takeover.

- It increases the output q produced by the manager.
  - Since the probability of a takeover is the probability that $min(v - q, \phi) - c > 0$, a high ϕ makes it more likely that the manager will need to set q high to prevent a takeover.

- To gain some intuition, let's consider the case where v and c are non-stochastic, and where $U(v) > 0$.
  - Since there is no uncertainty, takeover happens with probability 1 or 0.
  - Since $U(v) > 0$, the manager prefers to produce value v than be taken over and let raider produce this value.

- By setting ϕ at any level above c, shareholders guarantee that the manager will set q high enough to prevent a takeover. Specifically, $q = v - c$.
- At this optimum, takeovers never occur.

- Note that this example is a bit simplistic. Since takeovers never occur, there is no cost in increasing ϕ, and the shareholders are indifferent about how high ϕ will be.
- To consider this cost, suppose that v is stochastic.
  - Again, shareholders want to set ϕ above c to have a takeover threat.

- Takeovers will sometime occur, depending on the realization of v.
  - The manager will not find it optimal to always set q sufficiently high.
- Since takeovers occur whenever $v - q > c$, their probability is independent of ϕ, once ϕ is above c. Hence, there is no additional benefit in increasing ϕ.
- Since there is a cost in increasing ϕ, it will be optimal to set it only slightly above c.

- The paper goes on to consider the results when c is stochastic, etc.

Bagnoli and Lipman (1988): Accounting for Pivotal Shareholders

- The problem with takeovers in the Grossman-Hart model stems from the fact that shareholders do not take into account their effect on the success of the takeover.
- Bagnoli and Lipman analyze a model where shareholders are not atomistic, and thus consider their effect on bid outcome.
- They show that takeovers can be successful even without dilution, and calculate the equilibria that can arise in such a game.

The Model

- A firm has N shares owned by I shareholders.
- Shareholder i holds b_i shares.
- The value of the firm under current management is p_0, and under the raider's management it is p_1.
- The raider needs to acquire K shares to get control over the firm.
- There is a sequential game, where the raider chooses what price b to offer per share, and then shareholders decide whether to sell. We are looking for subgame perfect equilibria.

Takeover Equilibria in the Subgame (with No Dilution)

- The basic result in Grossman and Hart was that there is no equilibrium where the takeover succeeds at a price below p_1. This is no longer true in the current model.
- Consider a bid price $b \in (p_0, p_1)$.
- There are many pure-strategy equilibria where shareholder i sells $\sigma_i \leq b_i$, such that $\sum_{j=1}^{I} \sigma_j = K$, and so the takeover succeeds with probability 1, and the raider makes a profit.
    - This is an equilibrium because:

    - No agent has an incentive to sell more, because, given the behavior of others, the takeover will succeed, so why sell a share worth p_1 for b.
    - No agent has an incentive to sell less, because, given the behavior of others, the takeover will fail if he sells less, so selling a share worth p_0 for b is a good deal.
  - Essentially, each shareholder is made pivotal.
- There are no pure-strategy equilibria where $\sum_{j=1}^{I} \sigma_j \neq K$.
  - If more (less) than K shares are sold, agents can benefit by reducing (increasing) sold quantity for similar considerations.

Mixed-Strategy Equilibria

- Suppose that each shareholder holds one share: $b_i = 1, \forall i$.
- Consider the following mixed-strategy equilibrium: each agent sells with probability γ, and doesn't sell with probability $(1-\gamma)$. For this to be an equilibrium:

$$b = \sum_{j=0}^{K-1} \binom{N-1}{j} \gamma^j (1-\gamma)^{N-1-j} p_0$$

$$+ \sum_{j=K}^{N-1} \binom{N-1}{j} \gamma^j (1-\gamma)^{N-1-j} p_1$$

- That is, each shareholder is indifferent between selling and not selling (and thus chooses to mix) given that other agents sell with probability γ.
- The left-hand side is the payoff if he sells, which is given by the fixed offer.
- The right-hand side is the expected payoff if he doesn't sell. Here, he may get p_0 or p_1, depending if the number of other agents who sell is below K or not.

• Note that the right-hand side is equal to $p_0 < b$ when $\gamma = 0$, and is equal to $p_1 > b$ when $\gamma = 1$. It is continuous and increasing in γ.

- As a result, for each $b \in (p_0, p_1)$, there is a unique $\gamma \in (0,1)$ satisfying the above equation and giving rise to a mixed-strategy equilibrium.
- In this equilibrium, the raider makes the following profit:

$$\sum_{j=0}^{K-1} \binom{N}{j} \gamma^j (1-\gamma)^{N-j} j p_0 + \sum_{j=K}^{N} \binom{N}{j} \gamma^j (1-\gamma)^{N-j} j p_1 - N\gamma b$$

- Substituting for b and rearranging, we get:

$$\binom{N}{K} \gamma^K (1-\gamma)^{N-K} (p_1 - p_0) K$$

- We can thus see that the raider makes a positive profit. Moreover, this profit is proportional to the probability that exactly K shares are sold, i.e., that each shareholder is pivotal.
- Given the equilibrium played in the second stage, the raider chooses the offer price in the first bid to maximize his expected profit.
- Based on the results discussed so far, it follows that when the raider can improve the value of the firm ($p_1 > p_0$), he can always make an offer that will generate a positive probability of a takeover and a positive gain for him.

Shleifer and Vishny (1986): The Role of Large Shareholders

- Shleifer and Vishny offer a different, yet related, solution to the free-rider problem in corporate control.
- A shareholder, who owns a large proportion of the firm, has the right incentive to monitor managers, as this will benefit his portfolio.
- Other shareholders are more likely to go along with the large shareholders, knowing that his incentives are aligned.

The Model

- A large shareholder (L) holds fraction $\alpha < 0.5$ of a firm's shares, while $(1-\alpha)$ is held by a group of atomistic shareholders.
- The large shareholder can pay a cost $c(I)$ to find a way to improve the value of the firm by Z with probability I.
    - Z is drawn from a cumulative distribution function $F(Z)$ between $(0, Z_{max}]$.
    - $c(I)$ is increasing and convex: $c'(I) > 0$, $c''(I) > 0$.
    - The value of the firm under current management is q.

- If the large shareholder finds the improvement of value Z, he can attempt to gain control by making an offer to buy $0.5-\alpha$ of the shares. This costs him c_T.
- Denoting the offer price as $q+\pi$, this is worthwhile if:

$$0.5Z-(0.5-\alpha)\pi-c_T\geq 0$$

- Small shareholders will sell their shares if and only if they expect that π is greater than Z.
- Their expectation of Z is calculated based on the function $F(Z)$, and on the fact that L chose to go along with the takeover:

Equilibrium in the Takeover Game

- Based on the above, small shareholders sell their shares if and only if:

$$\pi - E(Z|Z \geq (1-2\alpha)\pi + 2c_T) \geq 0$$

- The large shareholders will then offer a premium $\pi^*(\alpha)$ that is the minimum π that satisfies this condition.
- The role of size is illustrated by the result that $\pi^*(\alpha)$ is decreasing in α: the large shareholder has to pay a lower premium when he owns a bigger fraction of the firm.

- To see this, consider $\alpha_2 > \alpha_1$:
    - For every π, $(1 - 2\alpha_1)\pi + 2c_T > (1 - 2\alpha_2)\pi + 2c_T$.
    - Hence, there are more levels of π that satisfy the selling condition under α_2 than under α_1.
    - Since $\pi^*(\alpha)$ is the minimum π that satisfies the condition, $\pi^*(\alpha_1) \geq \pi^*(\alpha_2)$.
- Essentially, when he owns a large share, the large shareholder can profit from a takeover even when Z is not large relative to π, and this makes small shareholders willing to sell their shares.
    - This breaks the Grossman-Hart result.

- Now, define $Z^c(\alpha)$ as the cutoff level of the improvement Z, above which the large shareholder chooses to make a takeover attempt:

$$Z^c(\alpha) = (1 - 2\alpha)\pi^*(\alpha) + 2c_T$$

- Given that $\pi^*(\alpha)$ is decreasing in α, $Z^c(\alpha)$ is also decreasing, implying that the large shareholder is more likely to make a takeover bid when he has higher stake at the firm.
  - With a higher stake, he can pay a lower takeover premium, making the takeover more profitable.

The Decision to Monitor

- In the first stage of the game, the large shareholder has to decide how much effort to put on monitoring. This will determine the probability I that he finds ways to improve the current management.
- The benefit from monitoring is:

$$I\left(\alpha E\left(Z \middle| Z \geq Z^c(\alpha)\right) - c_T\right) pr\{Z \geq Z^c(\alpha)\}$$

  - Essentially, the large shareholder goes ahead with takeover when $Z \geq Z^c(\alpha)$, in which case he benefits from the improvement Z on his α shares and pays the cost of takeover c_T.

- Since this benefit of monitoring increases in the share α, an immediate result (given the cost function for I) is that the intensity of monitoring I is increasing in α.
- It is also shown (based on these results) that the value of the firm is increasing with the share held by the large shareholder.
- Overall, the paper demonstrates the importance of having a large shareholder, who will have an incentive to monitor existing management, and who can profit from conducting a takeover attempt.