Dilution Of Voting Right And The Market For Corporate Control

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January 21, 2004

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JEL classification: G34

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Abstract:

In a takeover raid, it has been often observed that inefficient takeovers do take place. Corporate charters provide various takeover defenses which make change in control in the firm virtually impossible. Empirically it has been observed that takeover defenses have a negative influence on the firm value. However as these measures also deter inefficient raiders from taking over the firm, it has been often argued in favor of these methods. In this paper I have considered a new method of takeover. Raider offers to buy 50% of the voting stock and commits to dilute her voting stake once she gets control. Also following change will be made in the corporate charter. In any future takeover raid if both incumbent and outsider shareholders submit their shares, outsiders shares will be picked first by the raider. It will be shown that this mechanism is ex ante efficient, because it removes the need for costly takeover defense methods and it is ex post efficient also, as it enables only the good raiders to takeover the firm.

Keywords: Raider, Private Benefit, Takeover, Dilution of Voting Rights.

1 Introduction

One of the most controversial mechanism for disciplining and replacing managers is hostile takeover. In a hostile takeover the raider makes an offer to buy all or a fraction of outstanding shares at a stated tender price. The takeover is successful if the raider gains more than 50% of the voting shares and thereby obtains effective control of the company. With more than 50% of the voting shares, in due course she will be able to gain majority representation on the board and thus be able to appoint the CEO.

Research has been done on the ex ante and ex post efficiency of the takeover process. Scharfstein (1988) considers the ex-ante financial contracting problem between a financier and a manager. This contract specifies a state contingent compensation scheme for the manager to induce optimal effort provision. In addition the contract allows for ex-post takeovers, which can be efficiency enhancing if either the raider has information about the state of nature not available to the financier or if the raider is a better manager. In other words, takeovers are useful both because they reduce the informational monopoly of the incumbent manager about the state of the firm and because they allow for the replacement of inefficient managers.

The important observation made by Scharfstein is that even if the firm can commit to an ex-ante optimal contract, this contract is generally inefficient. The reason is that the financier and manager partly design the contract to try and extract the efficiency rents of future raiders. They can design the contract such that the price of the acquisition is above the efficient competitive price. As a result, the contract will induce too few hostile takeovers on average. Scharfstein's observation provides an important justification for regulatory intervention limiting anti-takeover defenses, such as super-majority amendments, staggered boards, fair price amendments and poison pills. These defenses are seen by many to be against shareholders' interests and to be put in place by managers of companies with weak corporate governance structures (Gilson 1981 and Easterbrook and Fischel, 1981). Others,

however, see them as an important weapon enabling the target firm to extract better terms from a raider (Baron, 1983, Macey and McChesney, 1985, Shleifer and Vishny, 1986, Hirshleifer and Titman, 1990, Hirshleifer and Thakor 1994, and Hirshleifer 1995). Even if one takes the latter perspective, however, Scharfstein's argument suggests that some of these defenses should be regulated or banned. These amendments raise the majority rule above 50% in the event of a hostile takeover. Most poison pills give the right to management to issue more voting shares at a low price to existing shareholders in the event that one shareholder owns more than a specified fraction of outstanding shares. Such clauses, when enforced, make it virtually impossible for a takeover to succeed. When such a defense is in place the raider has to oust the incumbent board in a proxy fight and remove the pill.

A much larger literature exists on the issue of ex-post efficiency of hostile takeovers. The first formal model of a tender offer game is due to Grossman and Hart (1980). They consider the following basic game. A raider can raise the value per share from $v = 0$ under current management to $v = 1$. She needs 50% of the voting shares and makes a conditional tender offer of p per share. Share ownership is completely dispersed; indeed to simplify the analysis they consider an idealized situation with an infinite number of shareholders. It is not difficult to see that a dominant strategy for each shareholder is to tender if $p \geq 1$ and to hold on to their shares if $p < 1$. Therefore the lowest price at which the raider is able to take over the firm is $p = 1$, the post-takeover value per share. In other words, the raider has to give up all the value she can generate to existing shareholders. If she incurs costs in making the offer or in undertaking the management changes that produce the higher value per share she may well be discouraged from attempting a takeover. In other words, there may be too few takeover attempts ex-post. Grossman and Hart (1980) suggest several ways of improving the efficiency of the hostile takeover mechanism. All involve some dilution of minority shareholder rights. Consistent with their proposals for example is the idea that raiders be allowed to "squeeze out" minority shareholders that have not tendered their shares, or to allow raiders to build up a larger "toehold" before they are required to disclose their

stake. A conditional offer is one that binds only if the raider gains control by having more than a specified percentage of the shares tendered. It forces minority shareholders to sell their shares to the raider at (or below) the tender offer price. When the raider has this right it is no longer a dominant strategy to hold on to one's shares when $p < 1$. A toehold is the stake owned by the raider before she makes a tender offer. The raider can always make a profit on her toehold by taking over the firm. Thus the larger her toehold the more likely she is to make a takeover attempt (Shleifer and Vishny 1986 and Kyle and Vila, 1991). Following the publication of the Grossman and Hart article a large literature has developed analyzing different variants of the takeover game, with non-atomistic share ownership (e.g. Kovenock, 1984, Bagnoli and Lipman, 1988, and Holmstrm and Nalebuff 1990), with multiple bidders (e.g. Fishman, 1988, Burkart, 1995 and Bulow,Huang and Klemperer 1999), with multiple rounds of bidding (Dewatripont, 1993), with arbitrageurs (e.g. Cornelli and Li, 1998), asymmetric information (e.g. Hirshleifer and Titman, 1990 and Yilmaz 2000), etc. Much of this literature has found Grossman and Hart's result that most of the gains of a takeover go to target shareholders (because of "free riding" by small shareholders) to be non-robust when there is only one bidder. With either non-atomistic shareholders or asymmetric information their extreme"free-riding" result breaks down. In contrast, empirical studies have found again and again that on average all the gains from hostile takeovers go to target shareholders (Jensen and Ruback 1983). While this is consistent with Grossman and Hart's result, other explanations have been suggested, such as (potential) competition by multiple bidders, or raiders' hubris leading to over-eagerness to close the deal (Roll, 1986). More generally, the theoretical literature following Grossman and Hart (1980) is concerned more with explaining bidding patterns and equilibrium bids given existing regulations than with determining which regulatory rules are efficient.

Formal analyses of optimal takeover regulation have focused on (1) deviations from an "one-share-one vote" rule result in inefficient takeover outcomes; (2) whether takeovers may result in the partial expropriation of other inadequately protected claims on the corporation,

and if so, whether some anti-takeover amendments may be justified as basic protections against expropriation. Deviation from one share one vote was banned by law in many stock exchanges. For example from 1926 to 1986 one of the requirements for a new listing on the New York Stock Exchange was that companies issue a single class of voting stock (Seligman 1986). That is, companies could only issue shares with the same number (effectively one) of votes each. Does this regulation induce efficient corporate control contests? The analysis of Grossman and Hart (1988) and Harris and Raviv (1988a, 1988b) suggests that the answer is a"yes". They point out that under a"one-share-one-vote" rule inefficient raiders must pay the highest possible price to acquire control. In other words, they face the greatest deterrent to taking over a firm under this rule. In addition, they point out that a simple majority rule is most likely to achieve efficiency by treating incumbent management and the raider symmetrically. Deviations from"one-share-one-vote" may, however, allow initial shareholders to extract a greater share of the efficiency gain of the raider in a value-increasing takeover. Indeed, Harris and Raviv (1988a), Zingales (1995) and Gromb (1996) show that maximum extraction of the raider's efficiency rent can be obtained by issuing two extreme classes of shares, votes-only shares and non-voting shares. Under such a share ownership structure the raider only purchases votes-only shares. He can easily gain control, but all the benefits he brings go to the non-voting shareholders. Under their share allocation scheme all non-voting shareholders have no choice but to"free-ride" and thus appropriate most of the gains from the takeover.

Family-owned firms are often reluctant to go public if they risk losing control in the process. These firms might go public if they could retain control through a dual-class share structure. As Hart (1988) argues, deviations from one-share-one-vote would benefit both the firm and the exchange in this case. They are also unlikely to hurt minority shareholders, as they presumably price in the lack of control rights attached to their shares at the IPO stage. Burkart, Gromb and Panunzi (1998) extend this analysis by introducing a post-takeover agency problem. Such a problem arises when the raider does not own 100% of the firm's

shares ex post, and is potentially worse, the lower the raider's post-takeover stake. They show that in such a model initial shareholders extract the raider's whole efficiency rent under a"one-share-one-vote" rule. As a result, some costly takeovers may be deterred. To reduce this inefficiency they argue that some deviations from"one-share-one-vote" may be desirable. The analysis of mandatory bid rules is similar to that of deviations from"one-share-one-vote". By forcing a raider to acquire all outstanding shares, such a rule maximizes the price an inefficient raider must pay to acquire control. On the other hand, such a rule may also discourage some value increasing takeovers (see Bergstrom, Hogfeldt and Molin, 1997). One lesson emerging from this research is that efficiency depends critically on which type of anti-takeover protection is put in place. For example, Schnitzer (1995) shows that only a specific combination of a poison pill with a golden parachute would provide adequate protection for the manager's (or employees') specific investments. The main difficulty from a regulatory perspective, however, is that protection of specific human capital is just too easy an excuse to justify managerial entrenchment. Little or no work to date has been devoted to the question of identifying which actions or investments constitute"entrenchment behavior" and which do not. It is therefore impossible to say conclusively whether current regulations permitting anti-takeover amendments, which both facilitate managerial entrenchment and provide protections supporting informal agreements, are beneficial overall.

Anti takeover defenses are widely disputed as anti investor. The latest finding by (Gompers Ishii Metrick 2001) shows that it has a negative influence on firm value. On the other hand the threat of an inefficient takeover cannot be ignored. But anti takeover strategies can be costly to the firms like increasing the leverage, selling firm's important asset to make the target firm unattractive. Regulator's ambiguity on this issue can be best understood from the Euro-Shareholder Guidelines (2000), which states that"anti-takeover defenses or other measures which restrict the influence of shareholders should be avoided".

To stop inefficient raids, regulations such as Mandatory Bid Rule has been prescribed by European Council's 13th Directive on company law concerning takeover bids. This directive

oblige parties, who purchase an amount of shares that gives them the control of the company, to extend the offer to all remaining shareholders. More precisely, shareholders can sell their shares at the initiator of the takeover bid, even if the latter do not want to acquire 100% of the equity. Partial bids are not allowed. This rule can successfully block any value deceasing takeover, but it has been criticized as it not only deter value-decreasing transfers of control, but is also making all transfers, both efficient and inefficient ones, more costly. If the control benefit is significant then offer price will be higher than the post takeover value of the firm. With a price like this, all rational shareholders will sell their shares. The mechanism that aims to protect the shareholders, but actually it leads to expel most of them from the firm. In emerging economies like india it may not be possible for the acquirer to raise this much of money in a cash tender offer for the takeover and the they have to bear all the risk. This ruling will prevent value increasing takeovers because of the associated cost. So we see defining a optimal regulation for takeover is difficult and regulations tend to have heavy bias against the incumbent (one share one vote partial offers) or the raider (Mandatory Bid Rule).

In this paper our approach is rather than defining an optimal regulatory framework for takeover, is it possible to design a market based mechanism which can automatically deter the inefficient raider? We especially look into the situation where a takeover by inefficient raider means no further value increasing takeovers can be under taken by an efficient raider in later date. The main problem in a takeover contest is, raider's type is not revealed through the offer price. If we can design a mechanism which can reveal the ability of the raider manager to the outsider shareholders, then one does not need any artificial takeover amendments to protect shareholders right. The problem however is more complex than it seams. The incumbent management, if they have a substantial holding in the firm, it can be shown that they will prefer not to defend against an inefficient raider. If the private benefit of control is significant, incumbent will find that to defend a raid she has to buy shares from the outsiders at a premium. As she had substantial holding in the firm, then it is optimal

for her to submit the shares to the raider and gain on the premium that has been offered for these shares. It will be shown that this encourages inefficient raids. So to make our mechanism work (revealing the type of the raider) will require a change in the corporate charter also, which should make provisions such that the incumbent manager is forced to makes a counter offer to block the raid. Let us assume that the private benefit of control is significantly high for the incumbent management. An inefficient raider has taken over the firm in the past and now owns all the shares in the firm. Then even if she has an option of recruiting most efficient manager, she will keep control in the firm to enjoy private benefit of control. So if the firm which is taken over by an inefficient manager cannot be improved upon.

The Mechanism

When a raider comes, she will announce a price at which she will buy 50% of the voting shares and after the successful raid she commits to dilute her voting stake from 50% to $\gamma < 50\%$. This will open up further possibility of takeover. A raider will only do the above if she is good enough to withstand a future potential raid attempt. It will signal about her 'quality' and the winning offer price will be less than what it would have been under one share one vote regime. Also following change is required in the corporate charter. In case of a future takeover attempt, outsiders shares will be given a preferential treatment. Their shares will be picked up first if both outsiders and incumbent management submit their shares. If the above dilution of voting right is allowed with the clause of preferential treatment, then incumbent management does not need costly takeover defense strategies to retain control. It will automatically deter inefficient raiders to takeover the firm. This mechanism is ex ante efficient, because it removes the need for costly takeover defense methods and it is ex post efficient also, as it enables only the good raider to takeover the firm. This scheme will also be socially optimal because it will increase the expected return from the project.

Here are some of the findings in the paper. (i) Under One share one vote with partial offers, inefficient takeovers can happen even if incumbent management has substantial stake

and significant amount of private benefit of control. Introducing preferential treatment for outsider shareholders in takeover can stop inefficient takeover up to a certain extent. But 'excessive' optimism of outside shareholders about the raider's type, can lead to inefficient takeover.

(*ii*) Introducing dilution of voting right with preferential treatment for outsider shareholders in takeover can stop inefficient takeover completely under the above condition.

(*iii*) Even if the above condition for private benefit is not satisfied, I will show that dilution of voting right mechanism will work up to a certain level and beyond that, even if inefficient takeover has occurred, an efficient raider coming on a later date can struck a 'friendly deal' with the incumbent management for takeover.

The importance of these results are, dilution of voting right blocks inefficient raid in certain cases and where it fails to block inefficient takeover, in that case, an inefficient raider who has majority holding in the firm can be replaced by an efficient raider in future (will be able to make an offer to induce the incumbent giving up control). Rest of the paper is organized in the following manner. Section 2 describes the model. Section 3 shows how inefficient takeover occurs under one share one vote. Section 4 shows how dilution of voting right works. Section 5 compares these two mechanisms and section 6 concludes.

2 Model

Let us consider an infinitely lived firm, whose return in each period under the current management is denoted by y. This return depends on the manager's ability V and on a random disturbance term ϵ. Let us assume $y = V + \epsilon$, where ϵ is a random shock with zero mean and variance σ^2. It is a 100% equity based firm. Controlling manager has $\alpha < 50\%$ proportion of shares in the firm. She also enjoys a private benefit of amount B in each period. Both V and B are common knowledge. Rest of the shares are held by the outsider shareholders and the largest outsider shareholder has voting stock less than 50%. This is the situation at

date 0. At any date t, $(t = 1, 2....)$ a raider may appear and try to raid the firm. One needs at least 50% of the voting shares to acquire the firm and change the management. In case of a tie between incumbent management and the raider, incumbent will win the takeover contest. If more than 50% share is submitted, raider will buy the amount of shares such that its voting right is 50%. She will take shares on a pro rata basis. In this paper we will consider two types of tender offer. The first one will be standard tender offer where a raider offers a price v_r to acquire 50% of the voting stock. The second type of tender offer will be the 'dilution of voting right' offer, where a price v_r will be paid for each share to acquire 50% of the voting stock and raider commits to dilute her voting stock from 50% to some γ ($\gamma < 50\%$) and introduce the preferential treatment clause as described above once she gets control. For convenience we will call these two tender bids as 1S1V (one share one vote) and DVR (dilution of voting right) respectively. We assume raiders and the incumbent management will make an open offer., meaning they cannot make any private offer to any particular shareholder.

Raider knows her ability to run the firm and it is unknown to the outsider shareholders and cannot be verified expost. Suppose a change in the management takes place in the firm through a hostile takeover. In future date, a raider may come to takeover this firm. Raiders are the people with special skills who can learn about the type of the incumbent management costlessly. This is not an unrealistic assumption because typically a raider will be an informed agent in the market who has substantial network/contact which supplies this information without any additional cost. Let a_i denote the additional value created by the raider and the post takeover per period return from the firm will be $y_1 = V + a_i + \epsilon$. The raider is one of the two types, 'good' or 'bad'. If the firm is run by a good raider, the return will increase and it will decrease if it is run by a bad raider. Let a_1 and a_2 denote the additional value created by the good and the bad raider respectively and $a_1 > 0 > a_2$. As per our description of the model, the value of a_i for the initial incumbent manager is zero.

As we want to highlight the situation where both good and bad raiders can takeover

the firm. For simplicity we assume that raiders will come in sequentially. In a given date at most one raider will come to takeover the firm. This is a dynamic game of incomplete information.

At date t, three events can take place. (1) Good raider comes. (2) Bad raider comes. (3) No raider comes.

In cases of (1)and (2), the raider can (i) make a takeover offer or (ii) does not make an offer and leave the market. On winning she will be the manager of the firm. Incumbent can (i) defend her position through an alternative offer (ii) submit her shares to the raider (iii) hold on to the shares. Small share holders can (i) submit their shares to the raider (ii) submit their shares to the incumbent (iii) hold on to their shares. In situation (3), the firm will be continued to be run by the incumbent management. At date $(t+1)$ the same process will be repeated. There is a fixed cost c_R incurred by the raider in a takeover contest.

Shareholders and incumbent management have a prior probability distribution over these three events.

Let event i indicates that the raider of type a_i has come. Event 3 denotes that no raider has come.

$$Probability\{Event\ i\ occurs\} = \theta_i$$

for $i = 1, 2, 3$.

$$\theta_1 + \theta_2 = \theta\ <\ 1$$

This means there is a positive probability that no raider appears in a given date t. For convenience we will call type a_1 and a_2 as type 1 and type 2 raiders respectively. All the agents in our model are risk neutral. Observing a raider's offer v_r in the 1S1V regime, investors will update their belief about raider's ability through a function $g(v_r)$ and under DVR regime observing a raider's offer (v_r, γ), will update their belief through a function $g(v_r, \gamma)$. So post takeover per period return of the firm as per the outside shareholder will

be $V + g$.

Utility functions of the incumbent and the raider manager

Let us state the expected utility of the manager. Let u_t denotes the expected utility derived by the manager conditional on the fact that she keeps control in the firm for exactly t periods. Let $P_t > 0$ denotes the probability that a successful raid occurs after t periods and the manager is replaced. Let X and Y be the expected utility per period before and after loosing control respectively. Future cash flow of the manager is discounted using a discount factor $\delta < 1$. As the takeover takes place after t periods, the manager will enjoy an expected utility of amount X for each of the t periods and then Y for the rest of the periods. So u_t, the expected utility conditional on the fact that takeover occurs exactly after t periods, is given by the following expression.

$$u_t = [X + \delta X + \delta^2 X + ...\delta^{t-1} X + \delta^t Y + \delta^{t+1} Y + ...]$$

If this manager has N proportion of shares, the expected utility per period enjoyed by her when she has control is given by $X = N(V + a_i) + B$. When she looses control in a takeover, expected utility per period will be only from the shares she holds in the firm. As the firm's output under raider will be $V + g$, $Y = N(V + g)$. So

$$u_t = [\{N(V + a) + B\} \frac{(1 - \delta^t)}{1 - \delta} + \frac{\delta^t}{1 - \delta} \{N(V + E(./v_r))\}]$$

Let U_M denote the expected utility of the manager. As she can retain control for $1, 2...$ periods, $P_t u_t$ gives unconditional expected utility if she remains in the firm exactly t periods. Sum over 1 to infinity gives the expected utility of the controlling manager.

$$U_M = \sum_{t=1}^{\infty} P_t . u_t$$

Special Case: Suppose a manager of type a_i has N proportion of the shares and she remains in the firm for ever, $(P_t = 0)$ then her payoff will be

$$U_M \ = \ [N(V + a_i) + B][1 + \delta + \delta^2 + ...]$$

The above expression will be equal to

$$U = \frac{1}{1-\delta}[N(V+a)+B]$$

Call $\frac{1}{1-\delta} = k$. If the manager is the initial incumbent manager, then a_i will be zero.

Let us state some restriction we put on the parameters of the model.

$(A.1)$ $B > (a_1 - a_2)$

$(A.2)$ $k\frac{a_1}{2} > c_R$

$(A.3)$ $\delta > \frac{1}{1+\theta_2}$

Assumption 1 tells us that suppose the type 2 manager owns all the shares in the firm, as private benefit is significantly large, then even if she has an option of recruiting a type 1 manager, still she will keep control in the firm . Utility of the type 2 manager running the firm is given by

$$U_1 = k(V + a_2) + Bk$$

Utility of the type 2 manager if she employs a type 1 manager is

$$U_2 = k(V + a_1)$$

We assume $U_1 > U_2$. Which implies $B > (a_1 - a_2)$.

The second assumption implies if the type 1 raider buys 50% of the shares in the firm, then the value created by her on those shares given by $k\frac{a_1}{2}$ is greater than c_R, the cost of raid.

As per assumption 3, the discount factor should be greater than some δ_0. This means manager should not be myopic. Also this condition means probability of takeover by inefficient raider should be greater than a threshold level.

If incumbent management has 50% of the voting shares then no hostile takeover can take place. Only way the change in management can happen if the incumbent management submits her shares to an outsider raider. We rule out any private deal between incumbent management and the raider.

It will be shown how value reducing takeover can take place under one share one vote. If a takeover occurs at date t, there will be no successful takeover in future under one share one vote. The implication of the above result is that if an inefficient type 2 raider becomes manager of the firm then a superior manager cannot replace him in future. Is it possible for a type 2 raider to become a manager in the firm? It will be shown that under one share one vote regime it is indeed possible and dilution of voting right along with preferential treatment of the outsiders share in a takeover contest can stop inefficient raid. We will first analyze the 1S1V regime.

3 One Share One Vote Regime

As we have said raider's type is not known to the outsider shareholders and they have a prior probability distribution defined over the different ability level of the raider manager. In 1S1V regime outsider investors observing an offer v_r will update their belief through a function $g(v_r)$. We will explain now how this function is determined.

Suppose at date t a raider offers a price v_r to buy N proportion of shares. As the raider is rational and his outside opportunity is normalized to 0, v_r should satisfy $Nk(V + a_i) + B - v_r - c_R \geq 0$. If $v_r \leq Nk(V + a_2) + B - c_R$, outsider shareholder will figure out that this offer is feasible for both the types. They will update their belief as per the Bayes rule. So

$$g(v_r) = \frac{\theta_1}{\theta_1 + \theta_2} a_1 + \frac{\theta_2}{\theta_1 + \theta_2} a_2$$

and if $v_r > Nk(V + a_2) + B - c_R$, means it is feasible only for the type 1 manager to make such an offer. Which implies $g(v_r) = a_1$.

Consider the situation at date t. Suppose a raid has occurred at date $t - i$ under one share one vote. Let I_t denote the identity of the incumbent at date t. We have to consider two cases. $I_t = a_1$ or $I_t = a_2$.

Lemma 1: If a raider has taken over the firm and she is the incumbent manager at date t

then no management turnover will take place in future. That is the incumbent management will prefer to hold on to their shares rather than submitting it to an outsider manager.

Case 1: $I_t = a_1$

Proof: Suppose at date $t+i$ ($i \geq 0$) a raider offers a price v_r to acquire 50% of the voting stock. As the management has 50% of the voting stock, the only way a takeover can happen is if she submits her shares to the raider. As she is risk neutral if she submits his shares, she will submit all of it. As we have assumed that $a_1 > a_2$, if we can show that type 1 raider cannot raid in period $t+i$ that will prove our result. Let the raider be of type 1. Suppose she offers a price v_r to acquire the firm.

We know if a manager is of type a_i, has N proportion of the shares and she remains in the firm for ever then her payoff will be

$$U = \frac{1}{1-\delta}[N(V+a)+B]$$

To acquire N shares, she pays Nv_r and c_R is the takeover cost. Here $N = \frac{1}{2}$. So because of individual rationality v_r must satisfy the following inequality as the raider's outside option has been normalized to zero.

$$\frac{1}{2}k(V+a_1)+Bk-\frac{1}{2}v_r-c_R \geq 0$$

So the maximum value of $v^* = k(V+a_1)+2(Bk-c_R)$. From A.1 $Bk > ka_1 - ka_2$, which implies $Bk > ka_1$, as $a_2 < 0$. We know from $A.2$, $ka_1 > 2c_R$. This implies $Bk > c_R$ and $\Rightarrow$ $v^* > k(V+a_1)$. This implies the price offered is more than the post takeover price of the firm. Let us assume that the raider has offered this price and the incumbent management submits their share to the raider. As there is no counter offer from the incumbent management and the takeover price offered is more than the post takeover price of the firm implies the entire outsider shareholder will submit their shares to the raider. As raider requires only 50% of the voting stock, she will accept only half of the submitted shares. The maximum payoff to

the incumbent management assuming that the raider is of type 1 will be

$$\frac{v_r}{4} + \frac{k(V + a_1)}{4}$$

If the incumbent management holds onto their shares their payoff will be

$$\frac{1}{2}k(V + a_1) + Bk$$

So the raid will take place if the payoff from submitting shares to the raider by the incumbent in a takeover raid, is greater than the payoff of holding on to the shares. This implies the following must be true.

$$\frac{v_r}{4} + \frac{k(V + a_1)}{4} > \frac{1}{2}k(V + a_1) + Bk$$

Putting $v^* = k(V + a_1) + 2(Bk - c_R)$, we get

$$0 > \ Bk + c_R$$

Because R.H.S is positive, so no raid is possible in this case.

Case 2: $I_t = a_2$

Proof: Suppose the raider is of type 1, offers a price v_r such that $v_r \geq k(V + a_1)$ and the incumbent management submits their shares to the raider. As we have discussed above, then all the outsider shareholders will do so and the payoff to the incumbent management will be given by the following expression.

$$\frac{v_r}{4} + \frac{k(V + a_1)}{4}$$

If the incumbent management holds onto their shares, their payoff is given by

$$\frac{1}{2}k(V + a_2) + Bk$$

So the raid will take place if the payoff from submitting shares to the raider by the incumbent in a takeover raid, is greater than the payoff of holding on to the shares. This implies the following must be true.

$$\frac{v_r}{4} + \frac{k(V+a_1)}{4} > \frac{1}{2}k(V+a_2) + Bk$$

After simplification we will get the condition

$$v_r > k(V+2a_2) + 4Bk - ka_1.$$

To acquire 50% of the shares, raider pays v_r per share and c_R is the takeover cost. Because of individual rationality v_r must satisfy the following inequality as the raider's outside option has been normalized to zero.

$$\frac{1}{2}k(V+a_1) + Bk - \frac{1}{2}v_r - c_R \geq 0$$

Maximum price that a type 1 raider can offer is given by $v_r = k(V+a_1) + 2(Bk - c_R)$. Putting this value of v_r in the above expression we get $a_1 - a_2 > B + \frac{c_R}{k}$. But it violates the assumption $(A.1)$, from which we know that $B > a_1 - a_2$. So no raid is possible. ■

If $a_1 - a_2 > B + c_R$, then type 1 raider can always gain control in the firm by an offer which induces the incumbent to submit her shares.

Lemma 1 proves our first claim that under one share one vote management turnover will not occur in future if a raid has taken place previously. Note that this result holds even if there are no clause of preferential treatment.

Next we will show that under what condition indeed both type of raider can takeover the firm.

Theorem 1 If there is no clause of preferential treatment as discussed earlier, under one share one vote if the expected improvement in the firm given by $k[\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2]$, (i) is less than $6c_R - 3ka_2 - 2kB$ then only type 1 raider can takeover the firm (ii) is greater than $6c_R - 3ka_2 - 2kB$ but less than $2c_R - ka_2$ then both type of raider can takeover the firm, if the shares of the initial incumbent management α lies between $50\% > \alpha > \alpha^*$. Where α^* is the solution of the following equation

$$k[\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2] = 2c_R\frac{1+\alpha}{1-\alpha} - \frac{1+\alpha}{(1-\alpha)}ka_2 - \frac{2kB\alpha}{1-\alpha}$$

(iii) is greater than $2c_R - ka_2$ then both type of raider can takeover the firm for all $\alpha < 50\%$. Under the clause of preferential treatment both type of raider can takeover the firm only if expected improvement in the firm is greater than $2c_R - ka_2$.

Proof: We have already shown that once a takeover takes place, no further management turnover is possible. Let v_r denote the price offered by the raider when the firm is under the control of the initial incumbent management. We know payoff of the type 2 raider, if she acquire 50% of the shares, is given by $\frac{1}{2}[k(V+a_2)]+Bk-c_R-\frac{1}{2}$. If $v_r \leq k(V+a_2)+2(Bk-c_R)$, outsider shareholder will figure out that this offer is feasible for both the types. So in this case outsiders will update their belief through $g(v_r)$, where it is given by the following expression.

$$g(v_r) = \frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2.$$

If $v_r > \frac{1}{2}k(V+a_2) + Bk - c_R$, then $g(v_r) = a_1$. Suppose the price offered v_r is such that $v_r \leq k(V+a_2) + 2(Bk-c_R)$, $v_r > k(V+g(v_r)$. Incumbent management offers a counter offer V_I to buy $(\frac{1}{2}-\alpha)$ proportion of shares from the outsider shareholders. Suppose all the outsider shareholder decides to submit their shares to the raider. As raider requires only 50% of the stock, so expected payoff to the shareholder is given by

$$\frac{v_r}{2} + (\frac{1}{2}-\alpha)k(V+g(v_r))$$

Suppose a shareholder holds on to her shares and others submit their shares to the raider. If a successful raid takes place, then her payoff will be

$$k(V+g(v_r)) = kV + k(\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2)$$

Let us assume every body decides to submit their shares to the incumbent management and raid fails. Only $(\frac{1}{2}-\alpha)$ of the submitted shares will be picked by the incumbent. So expected payoff to the shareholder is given by

$$(\frac{1}{2}-\alpha)V_I + \frac{kV}{2}.$$

Where V_I denotes the price offered by the incumbent management. If the incumbent management decides to submit their shares to the raider only half of it will be picked by the raider. So the maximum value of V_I^* will solve the following equation.

$$\frac{1}{2}kV + Bk - (\frac{1}{2} - \alpha)V_I^* = \frac{\alpha}{2}v_r + \frac{\alpha}{2}k(V + g(v_r))$$

Here right hand side of the equation indicates the utility of the incumbent management if they submit their shares to the raider. So the condition under which raider's offer is acceptable to the shareholders rather than an offer made by the incumbent management is given by the following inequalities.

$$v_r > k(V + g(v_r)) = kV + \frac{\theta_1}{\theta_1 + \theta_2}ka_1 + \frac{\theta_2}{\theta_1 + \theta_2}ka_2$$

$$\frac{v_r}{2} + (\frac{1}{2} - \alpha)k(V + g(v_r)) > (\frac{1}{2} - \alpha)V_I^* + \frac{kV}{2}$$

The first inequality implies price offered by the raider is greater than the expected expost return from the firm and the second one means it is profitable for the outsider shareholders to submit their shares to the raider in a takeover attempt. As we know that the maximum price that a type 2 raider can offer is $k(V + a_2) + 2(Bk - c_R)$, putting it in the first inequality we get

$$k(V + a_2) + 2(Bk - c_R) > kV + \frac{\theta_1}{\theta_1 + \theta_2}ka_1 + \frac{\theta_2}{\theta_1 + \theta_2}ka_2$$

This can be represented as

$$Bk > c_R - \frac{ka_2}{2} + \frac{\frac{\theta_1}{\theta_1+\theta_2}ka_1 + \frac{\theta_2}{\theta_1+\theta_2}ka_2}{2}$$

If

$$k[\frac{\theta_1}{\theta_1 + \theta_2}a_1 + \frac{\theta_2}{\theta_1 + \theta_2}a_2] > 2c_R - ka_2$$

then above expression can be written as

$$Bk > \frac{\theta_1}{\theta_1 + \theta_2}ka_1 + \frac{\theta_2}{\theta_1 + \theta_2}ka_2$$

Applying $A.1$, if we replace B by $a_1 - a_2$, we get

$$a_1(1 - \frac{\theta_1}{\theta_1 + \theta_2}) > a_2(1 + \frac{\theta_2}{\theta_1 + \theta_2})$$

As a_2 is negative implies that the inequality will be true.

If

$$k[\frac{\theta_1}{\theta_1 + \theta_2}a_1 + \frac{\theta_2}{\theta_1 + \theta_2}a_2] < 2c_R - ka_2$$

then above can be written as

$$Bk > 2c_R - ka_2$$

Applying $A.1$, if we replace B by $a_1 - a_2$, we get $ka_1 > 2c_R$. Which is true as per $A.2$.

Next we will explore under what condition the second inequality will be true. Putting the value of V_I^*, the first inequality boils down to

$$v_r(1 + \alpha) > kV + 2Bk - (1 - \alpha)[\frac{\theta_1}{\theta_1 + \theta_2}ka_1 + \frac{\theta_2}{\theta_1 + \theta_2}ka_2] + \alpha kV$$

So $v_1^*(1 + \alpha) = kV + 2Bk - (1 - \alpha)[\frac{\theta_1}{\theta_1+\theta_2}ka_1 + \frac{\theta_2}{\theta_1+\theta_2}ka_2] + \alpha kV$ is the minimum price that must be offered by the raider to beat the offer of the incumbent. The maximum price that a_2 raider can offer is given by $v_{a_2} = k(V + a_2) + 2(Bk - c_R)$. So we have to check whether $v_1^* < v_{a_2}$. It will occur if $k[\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2] > 2c_R\frac{1+\alpha}{1-\alpha} - \frac{1+\alpha}{(1-\alpha)}ka_2 - \frac{2kB\alpha}{1-\alpha}$. The L.H.S of the inequality denotes the expected improvement in firm value. The right hand side of the inequality is decreasing in α. Putting $\alpha = \frac{1}{2}$ we get the right hand side of the inequality is equal to $6c_R - 3ka_2 - 2kB$. So if (i) is satisfied then for all $0 < \alpha < \frac{1}{2}$, the left hand side will be less than the right hand side. So type 2 raiders will not be able to takeover the firm.

If (ii) is satisfied, as we know the R.H.S is decreasing in α, for all α lies between $50\% > \alpha > \alpha^*$. Where α^* is the solution of the following equation

$$k[\frac{\theta_1}{\theta_1 + \theta_2}a_1 + \frac{\theta_2}{\theta_1 + \theta_2}a_2] = 2c_R\frac{1 + \alpha}{1 - \alpha} - \frac{1 + \alpha}{(1 - \alpha)}ka_2 - \frac{2kB\alpha}{1 - \alpha}$$

the above inequality will hold. This implies type 2 raider can only takeover the firm if α, proportion of shares owned by the initial incumbent manager satisfies $50\% > \alpha \geq \alpha^*$.

The maximum value of the R.H.S is at $\alpha = 0$, is equal to $2c_R - ka_2$. If (iii) is satisfied then the above inequality will be true for all $\alpha < 50\%$. So type 2 raider can takeover the firm if the initial incumbent management's holding is less than 50%.

Next we will show that if outsiders share is given preference in a takeover battle then type 2 raider's can only takeover the firm if (iii) is true. As for type 2 raider, the condition

$$v_r > k(V + g(v_r)) = kV + \frac{\theta_1}{\theta_1 + \theta_2} ka_1 + \frac{\theta_2}{\theta_1 + \theta_2} ka_2$$

is always satisfied, we need to check the following inequality.

$$\frac{v_r}{2} + (\frac{1}{2} - \alpha)k(V + g(v_r)) > (\frac{1}{2} - \alpha)V_I + \frac{kV}{2}$$

When outsiders shares are given preference in a takeover contest then V_I^*, maximum price offered by the incumbent will follow

$$\frac{1}{2}kV + Bk - (\frac{1}{2} - \alpha)V_I^* = \alpha k(V + g)$$

As outsider's share is given preference, so incumbent management if they do not defend will have utility $\alpha k(V + g)$. Putting the value of V_I^* in the above inequality we get the above inequality will be satisfied if

$$k[\frac{\theta_1}{\theta_1 + \theta_2} a_1 + \frac{\theta_2}{\theta_1 + \theta_2} a_2] > 2c_R - ka_2$$

Is it possible for the type 1 raider to takeover the firm? We have already shown that the condition for successful takeover is given by

$$v_r > k(V + g(v_r)) = kV + \frac{\theta_1}{\theta_1 + \theta_2} ka_1 + \frac{\theta_2}{\theta_1 + \theta_2} ka_2$$

$$\frac{v_r}{2} + (\frac{1}{2} - \alpha)k(V + g(v_r)) > (\frac{1}{2} - \alpha)V_I + \frac{kV}{2}$$

The first condition is satisfied for type 2, so it will always hold for type 1. So we need to check the condition two only. If we can show that under preferential treatment it is always

possible for a type 1 raider to takeover the firm, will imply irrespective of this rule, it is always possible for type 1 raider to takeover the firm. Let the offer price of the type 1 raider satisfies the following condition.

$$\frac{1}{2}k(V+a_1)+Bk-c_r>\frac{v_r}{2}>\frac{1}{2}k(V+a_2)+Bk-c_r$$

This implies $g(v_r)=a_1$. Maximum price offered by the incumbent V_I^* will follow

$$\frac{1}{2}kV+Bk-(\frac{1}{2}-\alpha)V_I^*=\alpha k(V+a_1)$$

Putting the maximum value of v_r for a type 1 raider, given by $v_{a_1}=k(V+a_1)+2(Bk-c_R)$ and V_I^* in the above inequality, we get $ka_1+\alpha kB>c_R(1+\alpha)$. From $A.1$, we know $B>a_1-a_2$. As $0>a_2$, implies $kB>ka_1$. From $A.2$ we know $ka_1>2c_R$. So $ka_1>c_R$ and $\alpha kB>\alpha ka_1$, which implies $\alpha kB>\alpha ka_1>\alpha c_R$. This means type 1 raider can takeover the firm controlled by the incumbent management irrespective of the preferential rule present if incumbent's share is less than 50%. ■

The significance of the above result is that, we have shown if there is no preferential treatment for outsiders shares, inefficient raid by type 2 raider can take place even if the expected improvement in firm value by the raider is as small as $6c_R-3ka_2-2kB$. Higher the holding of the initial incumbent manager, lower will be the cut off expected improvement level, beyond which both type of raider will be able to takeover the firm. If preferential treatment of the outsiders share is allowed then this cut off pushes up to $2c_R-ka_2$. If expected improvement level is greater than $2c_R-ka_2$ then under one share one vote it is not possible to stop inefficient takeover. The perfect bayesian nash equilibrium strategy of this game is given by the belief $g(v_r)$ for the outsiders and the following strategy. Both the type of raiders, if they find out that the firm is run by the initial incumbent management will offer $v_1^*=kV+2Bk-\frac{\theta_1}{\theta_1+\theta_2}ka_1-\frac{\theta_2}{\theta_1+\theta_2}ka_2$ to acquire 50% of the voting stock. Incumbent management will not make any counter offer, outsider shareholders will submit their shares to the raider. If the firm is run by a raider who owns 50% of the voting stock, then raider

will not try to raid the firm. So we get a pooling equilibrium where both type of raider can takeover the firm and no management turnover will occur subsequently.

We will next show that preferential treatment and dilution of voting right can deter a type 2 raider if the expected improvement is greater than $2c_R + ka_2$.

4 Dilution of Voting Right

Suppose at date t, a raider offers a price v_r to buy 50% of the shares and commits to dilute her voting stake to some $\gamma < 50\%$. Which implies 50% shares held by the outsider shareholders has $(1-\gamma)$ voting right. So one outsider share has $2(1-\gamma)$ voting right. Suppose incumbent management requires d shares to retain her control. These d shares has voting right $d \times 2(1-\gamma)$. Her own shares has $\gamma\%$ voting rights. She needs $(\frac{1}{2} - \gamma)$ voting shares more to retain control. So d should satisfy the following equation

$$d \times 2(1-\gamma) = (\frac{1}{2} - \gamma)$$

$\implies d = \frac{(\frac{1}{2}-\gamma)}{2(1-\gamma)}$.

When the raider has reduced her voting stake to γ, the proportion of shares a future raider requires in order to take control is given by $e = \frac{1}{4(1-\gamma)}$. Suppose the raider requires e shares to get control. As one share of the outsider shareholder has $2(1-\gamma)$ voting right, these e shares has voting right $2e \times (1-\gamma)$. As she needs $\frac{1}{2}$ voting shares, implies

$$2e \times (1-\gamma) = \frac{1}{2}$$

$\implies e = \frac{1}{4(1-\gamma)}$.

Note that when the raider dilutes her voting stake, it will mean that the voting right of the outsider shareholders will automatically rise to $(1-\gamma) > \frac{1}{2}$. So if there is a large outsider shareholder whose proportion of share is β, then after the redistribution of vote her voting right will go up to $2\beta(1-\gamma)$. If $2\beta(1-\gamma) > \frac{1}{2}$, then this large shareholder will

become the controlling manager. So the dilution factor announced by the raider will satisfy $2\beta(1-\gamma) < \frac{1}{2}$. If this condition is violated of all $\gamma < 50\%$, then no such offer will be made by the raider.

Given that the largest outsider shareholder's share β is such that $2\beta(1-\gamma) < \frac{1}{2}$, outsiders observing raider's offer v_r and dilution factor γ, update their belief through a function $g(v_r, \gamma)$ which is given by

$g(v_r, \gamma) = a_1$ if $\gamma < \frac{1}{2}$

$g(v_r, \gamma) = a_2$ if $\gamma = \frac{1}{2}$.

The above belief implies if the firm is taken over through DVR method, then outsider shareholder will believe that the raider is of type 1. If the takeover method is 1S1V then raider is of type 2. If a takeover attempt is made in a firm which has been taken over in the past through a DVR offer, outsider shareholders will update their belief about the incumbent management in the following manner.

$g_1(v_I) = a_2$ if $\frac{1}{2}k[V + a_2] + kB - \frac{1}{2}k(V + g(v_r)) - dV_I \geq 0$

$g_1(v_I) = a_1$ if $\frac{1}{2}k[V + a_2] + kB - \frac{1}{2}k(V + g(v_r)) - dV_I < 0$

Where V_I denotes the counter offer made by the incumbent management in a takeover raid. If the firm is taken over by the DVR method, then the first set of belief implies raider is of type 1. We will show later that if type 1 raider gets control then there will be no successful raid in future. As takeover is costly no raider will make unsuccessful raid attempt in this firm. The above belief tells that if the outsider shareholders observe a takeover attempt in such firm, then they will update their belief about the type of the incumbent manager. If the incumbent's offer is feasible for both the type then they will assume incumbent is of type 2. We will show that such a situation will nor occur in the equilibrium.

Suppose in a takeover, the voting right of the new management has been reduced. Then in any future raid attempt in this firm, no raider will offer a dilution of voting right, as that will make incumbent's voting right more than 50%.

We will now demonstrate, how raider's offer price and dilution of voting share will stop

the inefficient raids.

Lemma 2: No management turnover will occur in future if a type 1 manager takeover the firm and dilutes her voting stake.

Proof: If we can show that type 1 raider cannot takeover the firm where incumbent manager is of type 1, then our proof will be done. Let v_r denotes the price offered by the raider. As raider's opportunity cost is 0, so v_r will satisfy the inequality
$ek(V + a_1) + Bk - c_R - ev_r \geq 0$. Let $\overline{v_r}$ denotes the maximum price offered by the raider. So $\overline{v_r} = k(V + a_1) + \frac{Bk - c_R}{e}$. Note that $e\overline{v_r} > ek(V + a_2) + Bk - c_R$. Here $ek(V + a_2) + Bk - c_R$ denotes the utility of the raider if she is of type 2. As agents are rational it is clear that $g(v_r) = a_1$. As $\overline{v_r} > k(V + a_1)$ and if all the shareholders submit their shares to the rival management then their payoff is given by the following.

$$ev_r + (\frac{1}{2} - e)k(V + g(v_r))$$

Maximum value of the above expression is

$$ek(V + a_1) + Bk - c_R + (\frac{1}{2} - e)k(V + a_1) = k(V + a_1) + Bk - c_R$$

If shareholders submit their shares to the incumbent management,

$$dV_I + (\frac{1}{2} - d)k(V + g_1)$$

Here V_I denotes the price offered by the incumbent management in a takeover defense. Incumbent management if they defend, their utility will be by

$$(\frac{1}{2} + d)k(V + a_1) + Bk - dV_I$$

Because of the preferential rule, outsiders shares will be picked up first in a takeover raid. This means incumbent's utility, if they do not defend will be

$$\frac{1}{2}k(V + a_1)$$

Let $\overline{V_I}$ denotes the maximum price offered by the raider. So

$$d\overline{V_I} = dk(V + a_1) + Bk$$

As $\frac{1}{2}k[V + a_2] + kB - \frac{1}{2}k(V + g(v_r)) - d\overline{V_I} < 0$, implies $g_1(v_r) = a_1$.

If shareholders submit their shares to the incumbent management, the maximum value of their payoff will be

$$dV_I + (\frac{1}{2} - d)k(V + a_1) = k(V + a_1) + Bk$$

From our assumption of $c_R > 0$, we can conclude that no raid is possible in this case as the maximum payoff of an outsider shareholder is greater if she submits shares to the incumbent management. ■

As we have shown that if type 1 raider dilutes her voting stake, no successful takeover will happen. As takeover attempt is costly for the raider no unsuccessful raid should happen. Suppose a new raider comes in a future date and finds out that the current incumbent manager is of type 2 who is pretending to be of type 1. If she made a takeover offer outsider shareholders observing this offer, should update their belief about the type of the incumbent management through $g_1(v_r)$. Next we will show that with this belief of the outsider shareholders, both type 1 and type 2 raider can takeover the firm if it has been taken over in the past through DVR method.

Lemma 3: If a type 2 manager, who takeover the firm at date t dilutes her voting stake then both type of raider can takeover the firm in future if the expected improvement by the raider is greater than $ka_2 + 2c_R$.

Proof: The firm is run by a type 2 manager who has acquired the firm in the past employing a 'dilution of voting right offer'. She now owns 50% of the dividend shares with voting right $\gamma < 50\%$. Suppose a raider appears and offers a price v_r such that $ev_r < ek(V + a_2) + Bk - c_R$ and $v_r > k(V + g(v_r))$. We have already discussed that the raider will not offer a dilution of voting rights as that will automatically make the incumbent's voting share more than

50%. As this offer is feasible for both type of manager implies $g(v_r) = \frac{\theta_1}{\theta_1+\theta_2}ka_1 + \frac{\theta_2}{\theta_1+\theta_2}ka_2$. Shareholders if they submit their shares to the raider their payoff is given by

$$ev_r + (\frac{1}{2} - e)k(V + g(v_r))$$

Suppose a particular shareholder holds on to her shares and others submit their share to the raider. As the raider can be either of type 1 or type 2, then her payoff will be

$$kV + \frac{\theta_1}{\theta_1 + \theta_2}ka_1 + \frac{\theta_2}{\theta_1 + \theta_2}ka_2$$

Shareholders if they submit their shares to the incumbent, as they update their belief conditional on the fact that a takeover attempt has been made, their payoff is given by

$$dV_I + (\frac{1}{2} - d)k(V + g_1(v_r))$$

From our previous lemma,

$$d\overline{V_I} = (\frac{1}{2} + d)k(V + a_2) + B - \frac{1}{2}k(V + g(v_r))$$

which implies $g_1(v_r) = a_2$. Maximum value of v_r is $e\overline{v_r} = ek(V + a_2) + Bk - c_R$.

Raid will take place if the following is satisfied.

$$v_r > kV + \frac{\theta_1}{\theta_1 + \theta_2}ka_1 + (1 - \frac{\theta_1}{\theta_1 + \theta_2})ka_2.....[1]$$

$$ev_r + (\frac{1}{2} - e)k(V + g(v_r)) > dV_I + (\frac{1}{2} - d)k(V + a_2).....[2]$$

and

First inequality tells price offered by the raider is more than the expected per period return after takeoverand the second one tells that payoff to the outsider shareholder will be more if they submit their share to the raider instad of the incumbent. Using $A.1$ and $A.2$ we have already shown in theorem 1 that only the second inequality is binding.

The second inequality boils down to

$$v_r > \frac{ka_2 + Bk - kg(v_r)}{e} + Vk + kg(v_r)$$

Now we have to check that such v_r exists. Putting maximum value of v_r in [1] we can see [1] $\Longrightarrow$

$$\frac{\theta_1}{\theta_1 + \theta_2} ka_1 + \frac{\theta_2}{\theta_1 + \theta_2} a_2 > ka_2 + \frac{c_R}{1 - e}$$

The R.H.S of the expression $\frac{c_R}{1-e}$ is increasing in e. We know $\frac{1}{4} \leq e < \frac{1}{2}$. So the maximum value of the R.H.S is $ka_2 + 2c_R$. ■

Theorem 2 In a takeover attempt, a type 1 raider will offer a price $k(V + 2B - a_1)$ and dilute their voting share to some $\gamma < 50\%$. Shareholders will accept this offer. Type 2 raiders will not be able to raid the firm if the expected improvement by the raider is greater than $ka_2 + 2c_R$.

Proof:

From the above two Lemmas and the belief we have specified, it becomes clear that if a manager chooses $\gamma < \frac{1}{2}$, shareholders will infer that manager is of type 1 and no further raid is possible once she take over. If they submit their shares to the raider their payoff will be

$$\frac{v_r}{2} + \frac{k(V + a_1)}{2}$$

If they submit their shares to the incumbent management their payoff will be

$$\frac{V_I}{2} + \frac{kV}{2}$$

If everybody submits their shares to the raider and a particular investor does not submit her share, her payoff will be

$$k(V + a_1)$$

Raid will take place if

$$\frac{v_r}{2} + \frac{k(V + a_1)}{2} > \frac{V_I}{2} + \frac{kV}{2}$$

and

$$v_r > k(V + a_1)$$

First inequality tells that payoff to the outsider shareholder will be more if they submit their share to the raider and the second one tells price offered by the raider is more than the expected per period return after takeover. The first inequality implies

$$v_r > k(V + 2B - a_1)$$

So the minimum price for raid

$$v_1^*(\gamma < \frac{1}{2}) = Max\left\{k(V + 2B - a_1), k(V + a_1)\right\}$$

From assumption $A.1$

$$v_1^*(\gamma < \frac{1}{2}) = k(V + 2B - a_1)$$

If the manager chooses $\gamma = \frac{1}{2}$, shareholders will infer that manager is of type 2 and no further raid is possible once she take over. If they submit their shares to the raider their payoff will be

$$\frac{v_r}{2} + \frac{k(V + a_2)}{2}$$

If they submit their shares to the incumbent their payoff will be

$$\frac{V_I}{2} + \frac{kV}{2}$$

If everybody submits their shares to the raider and a particular investor does not submit her share, her payoff will be

$$k(V + a_2)$$

Raid will take place if

$$\frac{v_r}{2} + \frac{k(V + a_2)}{2} > \frac{V_I}{2} + \frac{kV}{2}$$

and

$$v_r > k(V + a_2)$$

The first inequality implies

$$v_r > k(V + 2B - a_2)$$

So the minimum price for raid

$$v_1^*(\gamma = \frac{1}{2}) = Max\left\{k(V + 2B - a_2), k(V + a_2)\right\}$$

From assumption $A.1$ $v_1^*(\gamma = \frac{1}{2}) = k(V + 2B - a_2)$. Note that as $a_1 > 0$ a_2, implies $v_1^*(\gamma < \frac{1}{2}) < v_1^*(\gamma = \frac{1}{2})$. Next we will find out whether these strategies can be supported in equilibrium, meaning whether it is optimal for both the type to make such an offer. We have shown that type 1 manager's faces no threat from diluting their voting stock and the winning offer price under DVR is less than 1S1V. So type 1 raiders will always dilute their voting stock. So we have to check for the type 2 managers only. If a type 2 raider chooses $\gamma = \frac{1}{2}$, then their utility will be given by

$$U(a_2, \gamma = \frac{1}{2}) = \frac{1}{2}k(V + a_2) + Bk - \frac{1}{2}k(V + 2B - a_2) - c_R = ka_2 - c_R$$

As $a_2 < 0$ so she will not make a takeover attempt. She however may mimic the type 1 raider and choose $\gamma < \frac{1}{2}$. As we know, they will be raided by both type of managers in date 2. So their utility will be given by

$$U_M = \sum_{t=1}^{\infty} P_t.u_t - \frac{1}{2}v_1^*(\gamma < \frac{1}{2}) - c_R$$

As both type of raider can takeover the firm, implies $P_t = (1-\theta)^{t-1}\theta$ and $g = \frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2$ Putting the value of

$$u_t = [\left\{\frac{1}{2}(V + a_2) + B\right\}\frac{(1-\delta^t)}{1-\delta} + \frac{\delta^t}{1-\delta}\left\{\frac{1}{2}(V + g(v_r))\right\}]$$

we get

$$U_M = \frac{1}{2}k(a_1 + a_2) - c_R - \frac{\theta\delta}{1-\delta+\theta\delta}[k\frac{a_2}{2} + Bk - \frac{kg}{2}]$$

The above expression is decreasing in B. From assumption 1 we know B is greater than $a_1 - a_2$. Putting $a_1 - a_2$ instead of B we get

$$U_M < \frac{1}{2}k(a_1 + a_2) - c_R - \frac{\theta\delta}{1-\delta+\theta\delta}[ka_1 - k\frac{a_2}{2} - k\frac{\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2}{2}]$$

The above can be written as

$$k\frac{a_1}{2}[1 - \frac{2\theta\delta}{1-\delta+\theta\delta} + \frac{\theta\delta}{1-\delta+\theta\delta}\frac{\theta_1}{\theta_1+\theta_2}] + k\frac{a_2}{2}[1 + \frac{\theta\delta}{1-\delta+\theta\delta} - \frac{\theta\delta}{1-\delta+\theta\delta}\frac{\theta_1}{\theta_1+\theta_2}] - c_R$$

The coefficient of a_2 is positive and $c_R > 0$, if we can show hat the coefficient of a_1 is negative then it will imply that the above expression is negative. This follows from assumption (iii). So type 2 raider's will earn negative profit under DSV regime. In the equilibrium only type 1 raider will make winning offers.

So we get a separating perfect bayesian nash equilibrium in this game. Given the belief $g(v_r, \gamma)$ of the outsiders, the type 1 raider will offer $k(V + 2B - a_1)$ to acquire 50% of the voting stock, if the firm is run by the initial incumbent manager. Type 2 raiders will not make a takeover attempt. If the firm is run by a type 1 manager, then no further management turnover will occur.

5 One Share One vote vs Dilution of voting right

So far we have been able to show that, if the expected improvement is more than a threshold level $ka_2 + 2c_R$ then DVR mechanism can stop inefficient raid. Let us explore what happens if this condition is violated. From Lemma 3 we know, if this condition is not mate then a type 2 raider manager who has taken over the firm using DVR has no threat from a type 2 raider. So from Theorem 2 we know the expected utility of a type 2 raider who use DVR strategy will be given by

$$U_M = \frac{1}{2}k(a_1 + a_2) - c_R - \frac{\theta_1\delta}{1-\delta+\theta_1\delta}[k\frac{a_2}{2} + Bk - \frac{ka_1}{2}]$$

We replace θ by θ_1 and $g(v_r)$ by ka_1, as now only type 1 raider can takeover this firm. This expression can be negative or positive depending on the value of various parameters involved. If it is negative, then inefficient takeover will not occur. But if the probability of raid by type 1 raider is small and the value of a_2 is not a large negative number, then it is indeed possible that the type 2 raider can earn a positive profit by using DVR. Outsider shareholders will figure this out and to takeover the firm, a raider needs to offer the pooling offer price. From Theorem 1 part (iii), we know under 1S1V rule type 2 raider can make a pooling offer only if expected improvement is more than $2c_R - ka_2$. As a_2 is negative inefficient takeover will not take place. Type 1 raider will be able to take over the firm with offer which is just above the type 2 raider's maximum offer. So v_{r_1} will satisfy

$$\frac{v_{r_1}}{2} = \frac{k(V + a_2)}{2} + kB - c_R + \epsilon, \quad \epsilon > 0$$

Next let us consider the condition $B > a_1 - a_2$. From Lemma 1 case 2, we know if a firm is taken over by a type 2 raider, a type 1 raider coming on a later date can make an offer such that incumbent voluntarily submit their shares to the raider if $a_1 - a_2 > B + \frac{c_R}{k}$. So even if an inefficient takeover can occur through a pooling offer, in this case it's effect will be less severe as in future, type 1 raider can takeover the firm. If $B < a_1 - a_2 < B + \frac{c_R}{k}$, next we will show that DVR can stop inefficient raid. In Theorem 2, the expected utility of type 2 raider, if she employs DVR is given by

$$U_M = \frac{1}{2}k(a_1 + a_2) - c_R - \frac{\theta\delta}{1 - \delta + \theta\delta}[k\frac{a_2}{2} + Bk - \frac{kg}{2}]$$

The above expression is decreasing in B. As we now assume B is greater than $a_1 - a_2 - \frac{c_R}{k}$. Putting $a_1 - a_2 - \frac{c_R}{k}$ instead of B we get

$$U_M < \frac{1}{2}k(a_1 + a_2) - c_R - \frac{\theta\delta}{1 - \delta + \theta\delta}[ka_1 - k\frac{a_2}{2} - k\frac{\frac{\theta_1}{\theta_1+\theta_2}a_1 + \frac{\theta_2}{\theta_1+\theta_2}a_2}{2}] + c_R\frac{\theta\delta}{1 - \delta + \theta\delta}$$

The above can be written as

$$k\frac{a_1}{2}[1 - \frac{2\theta\delta}{1 - \delta + \theta\delta} + \frac{\theta\delta}{1 - \delta + \theta\delta}\frac{\theta_1}{\theta_1 + \theta_2}] + k\frac{a_2}{2}[1 + \frac{\theta\delta}{1 - \delta + \theta\delta} - \frac{\theta\delta}{1 - \delta + \theta\delta}\frac{\theta_1}{\theta_1 + \theta_2}] - c_R(1 - \frac{\theta\delta}{1 - \delta + \theta\delta})$$

This is clearly less than zero from Theorem 2.

So from the above discussion we can infer that if corporate charter dictates preferntial treatments to be given to the outsider shareholder in takeover and enable raiders to dilute voting right following things will occur. The expected improvement (i) is less than ka_2+2c_R, only type 1 raider can takeover the firm with a price which type 2 cannot offer, use of DVR or 1S1V will give same payoff to the type 1 raider, (ii) is geater than $ka_2 + 2c_R$, but type 1 raider's improvement is bounded ($a_1 - a_2 \geq B + \frac{c_R}{k}$), then only type 1 can takeover the firm under DVR, under 1S1V inefficient raid can occur. (iii) If $a_1 - a_2 > B + \frac{c_R}{k}$, then inefficient raid can take place under both DVR and 1S1V but in future date a type 1 raider will be able to takeover the firm. Thus DVR ensures dilution of voting right blocks inefficient raid in certain cases and where it fails to block inefficient takeover, an inefficient raider who has majority holding in the firm can be replaced by an efficient raider in future.

6 Conclusion

I have shown that if the tender process is modified slightly, allowing the raider to dilute her voting stock once she gets control, and making a change in the corporate charter, in case of a future takeover attempt, outsiders shares will be given a preferential treatment, will deter inefficient raiders to takeover the firm. In situations where this method fails, type 1 raider will be able to takeover the firm in future. I have provided an alternative method in takeover defense which screens the raider and only the efficient one will be able to takeover the firm. Also it decreases the level of 'free rider' problem as the winning offer price will be less than the winning offer price under 1S1V regime. The reason our result differs from the earlier findings is that, we have considered a dynamic framework. Which implies if voting right is diluted then there will be always a future threat of takeover. Private benefit is significant for both incumbent and raider makes the firm attractive for takeover and ensures a takeover battle. But as the cost of takeover is an increasing function of the private benefit, raider can

only recover this cost if she stays in the firm for sufficiently long periods. Also it is shown that the root of the problem is not the incomplete information about the raider type but because of significant private benefit level, incumbent management rather than defending will be tempt to gain from the premium paid in the takeover battle. We have identified under what condition dilution of voting right dominates 1S1V.

Dilution of voting right makes it costly for the inefficient type, if they loose control it will not possible for them to recover this cost. Ideally the mechanism should be such that, there is a dynamic improvement, meaning only a raider whose type is better than the incumbent management will be able to takeover the firm. To achieve this we need to introduce a cost of diluting shares depending on the level of dilution of voting right. In the current model such cost is positive for type 2 only and it does not depend on the level of dilution factor γ chosen. Future direction of research will be to extend the model in this regard and also allow for private benefit levels to be different for different raider.

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