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HOW TARGET SHAREHOLDERS BENEFIT FROM VALUE REDUCING DEFENSIVE STRATEGIES IN TAKEOVERS*

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Abstract

We establish that, after a tender offer has been observed, target shareholders can be made better off by the use of defensive strategies that reduce the value of an existing bidder and, thus, make it more profitable for potential bidders to compete for the target. The existing bidder is not eliminated from the contest and may still win, though for lower profits. When we permit resistance strategies to adversely affect the probability of observing tender offers by reducing the expected gains of opening bidders, target shareholders can still benefit from their use. We identify the necessary characteristics that make these defensive strategies effective and show that many real-life defenses possess similar properties.

INTRODUCTION

Defensive strategies have been used frequently in takeover battles for a number of years, yet they remain controversial. Proponents maintain that resistance strategies increase the ability of target management to extract a higher price for the target shares, while opponents hold that resistance reduces the probability of takeover and, thus, leads to management entrenchment.[1] Jensen and Ruback (1983) reviews existing empirical studies and concludes that the results with respect to the effect of defensive strategies on target value are inconclusive.

This paper concentrates on a class of value reducing defensive strategies, VRDS, and investigates their role in increasing the ability of targets to capture a greater portion of the synergy gains generated. As the name suggests, these strategies operate through reducing the value of an acquisition for some bidders thus making the takeover more difficult for them. Some well known members of this class are lock-ups, litigation, greenmail and the more recent poison pills like flip-over rights.[2]

Our model builds on Fishman (1985), Giammarino and Heinkel (1986) and Shleifer and Vishny (1986). A bidder investigates a target and discovers synergy gains from acquiring it. These synergy gains are his private information and independent of the synergy gains of other bidders. If his synergy gains are high, we show that in equilibrium (using Kreps (1984) intuitive criterion), he will deter competition from other potential bidders by making a pre-emptive bid (see also Fishman (1985)). However, if by using VRDS the target can reduce the value of the opening bidder, it becomes profitable for more potential bidders to enter and compete in an English auction as now they have to pay a reduced amount on winning. We show that even though the use of VRDS by the target leads to a lower opening bid by the first bidder, the increase in competition dominates and the overall result is that target shareholders benefit from VRDS. We also show that in many situations VRDS work only as threats and just the ability to use them changes the equilibrium payoffs in favor of target shareholders.

We also investigate the effect of VRDS on the probability of observing tender offers. Easterbrook and Fischel (1981), and Baron (1986) claim that management resistance reduces the probability of observing tender offers as the gains from tender offers are reduced. Further, that the reduction in the probability of observing a tender offer dominates the gains from the increased competition after a tender offer has been made. Surprisingly, we find that the reduction in the probability of observing tender offers occurs only under limited conditions. The reason being that VRDS hurt the high value bidders more than the low value bidders but since the high value bidders have strong incentives to make a tender offer, they enter anyway. Even in cases where the probability of tender offers is reduced, the target is not necessarily worse off and we identify the conditions under which this is so. In this respect, our paper supports Gilson's (1982) claim that resistance is good for target shareholders.

The idea that VRDS increase competition is similar to the effect of greenmail in Shleifer and Vishny (1986). Indeed, greenmail is a special type of VRDS and, in their model, is used to eliminate a low value bidder to promote competition from high value bidders. We show that competition can be increased without eliminating an existing bidder, and even if the existing bidder has a high value and can signal that information to the market. In fact, it is possible for the existing bidder to win even after the target imposes a VRDS against him.

Baron (1986) shows that target shareholders are better off when target management is not permitted to resist. In his model, the target manager possesses private information about the true value of the firm and by eliminating existing bidders signals about this value to the market. Therefore, the purpose of resistance in his model is to signal, and not to increase competition. This leads to the differences in the conclusions of the two models.

Our model differs from Giammarino and Heinkel (1986) as we do not assume common value synergies or that bidders have different information sets. Also, bidders are not restricted in the number of times they can bid. However, we support several of their conclusions including the result that even though target shareholders are better off in expectation, resistance may not always be followed by a higher bid.

To be effective, VRDS must possess the following characteristics. They have to be discriminatory so that they reduce the value of some bidders and not of others. When used they must be non-redeemable, otherwise the target has an incentive to redeem them once competition has developed, causing enforceability problems and thus destroying their effectiveness.[3,4] This provides us with a benchmark to test the effectiveness of existing defensive strategies.

The paper is organized as follows. In Section-1 we provide an example about how VRDS work in a simple full information setting. We introduce asymmetry of information about synergy values in Section-2 and solve for the equilibrium payoffs to the target without VRDS. In Section-3, we permit the target to use VRDS and show that the resulting new payoffs are higher in expectation. We introduce cost of entry for the first bidder in Section-4, and analyze its effect on the equilibrium. In Section-5 we discuss some real-life defensive strategies and this is followed by the conclusion.

Section 1: The Role of VRDS: An Example

To capture the main intuition about the nature of the problem and how it is resolved through VRDS, we start with a simple model which assumes full information.

Consider a target that has a tender offer outstanding on it from a bidder who can generate synergy gains of R_1 by acquiring it. Suppose another bidder with synergy gains of $R_2 < R_1$ is also interested in taking the target over, but must incur a cost, c, of entering the bidding process.[5] If competition occurs, the outcome is determined according to an English auction such that the highest value acquirer buys the target for the value of the second highest bidder. Since $R_1 > R_2$, bidder-2 realizes that if he bids he will bear the cost of bidding without any chance to win. Therefore, bidder-2 does not bid and bidder-1 wins for his opening bid of $w(R_1)$. Anticipating this reaction by bidder-2, bidder-1 bids $w(R_1)$ equal to the existing market price (or an infinitesimal premium over it). This is enough to win, since target shareholders cannot do better. So the target is bought for a zero premium.

We now define VRDS and show how they resolve this problem for the target.

Definition: A VRDS of size p against a known bidder is one which reduces his synergy value by p. It is non-redeemable and discriminatory in the sense that it can reduce the value of one bidder more than the value of another.[6]

This definition encompasses many defensive strategies like litigation, lock-ups, poison pills, greenmail etc. We show that such VRDS are effective in making acquiring firms compete against each other and achieve the English auction result for the target.

Consider the same one period game as before. The only difference is that the target management is now able to put a VRDS, p, against bidder-1 and reduce his synergy gains to below R_2, while those of bidder-2 are not affected. The sequence of events is as follows. After bidder-1 bids $w(R_1)$, the synergy gains of bidder-2, R_2, become public knowledge. At this point, bidder-1 can raise his bid and the target either sells at the new bid or imposes a VRDS against bidder-1.[7,8] In the event the target adopts a VRDS, bidder-2 can enter the bidding and competition ensues, resulting in the final bid being min $\langle R_2, R_1 - p\rangle$.[9]

We can now state the main result of this section.

Proposition-1: Whenever the target management can threaten to adopt a discriminatory and non-redeemable VRDS, the outcome is that the higher value bidder wins for the value of the lower bidder less his entry costs.

Proof: After observing R_2, bidder-1 has to choose between staying with his original bid, $w(R_1)$, or raising it. If $w(R_1) > R_2 - c$, he just stays with $w(R_1)$ and wins as the target does not gain by using a VRDS. If $w(R_1) < R_2 - c$ and bidder-1 stays with $w(R_1)$, the target uses VRDS and reduces the value of bidder-1 to below $R_2 - c$. Thus bidder-2 wins for a bid above $w(R_1)$ and the resulting payoff to bidder-1 is zero. If bidder-1 raises his bid to a value below $R_2 - c$, the target still adopts a VRDS as above and bidder-1 loses. Therefore, bidder-1's optimal strategy is to bid $R_2 - c$ which results in a payoff to him equal to $R_1 - R_2 + c > 0$ as the target does not use VRDS against this bid.

Q.E.D.

The intuition behind the result is that bidder-1 must bid the value of bidder-2 if he does not wish to be eliminated via a VRDS. Since we assume that the value of bidder-2 is known, bidder-1 bids that value to prevent the target from using VRDS. Consequently, in the complete information case, VRDS are not observed in equilibrium as the highest value bidder bids high enough to prevent them. As such they work only by being credible threats.[10]

However to be credible, VRDS must be non-redeemable. If bidder-1 can pressure the target into withdrawing the VRDS, he will not take the threat seriously as he can negotiate with the target after bidder-2 bids, prevent the target from triggering the VRDS, and outbid bidder-2. Knowing this, bidder-2 will not compete, thus making the VRDS ineffective.[11]

Section 2: Incomplete Information without VRDS

We now relax the assumption that bidders' synergies are common knowledge and assume that each bidder's synergies are known only to himself and can be one of two types: low or high. We denote bidder-1s of type low and high by 1_L and 1_H respectively, and bidder-2s by 2_L and 2_H. The probabilities of the types are r and q respectively (r + q = 1), and are common knowledge. After bidder-1 makes a bid, bidder-2 has to incur a cost, c, to participate.[12] Once he incurs the cost, he participates in an English auction against bidder-1. This cost provides bidder-1 with an incentive to bid high in some situations in an attempt to prevent bidder-2 from entering the auction and we analyze below the bidding strategies that will be adopted in equilibrium by the different types of bidder-1.

Some of the outcomes are simple and can be discussed right away. In the case where $c > H - L$, irrespective of his type, bidder-2 does not find it profitable to compete. This is because even when his type is H, and bidder-1 is of type L (which is the most favorable case for bidder-2) he does not recover his participation costs, c, as he wins for a bid of at least L and makes profits of $H - L - c < 0$. Therefore bidder-1 does not need to bid anything over the existing market price of target shares to prevent competition. In this scenario VRDS can create competition by decreasing the value of bidder-1 so that bidder-2 can expect to win for a smaller bid, and make positive profits. Since the winning bid is now higher than the market price, the target is better off. Thus, we need to analyze only the case

(1) $$c < H - L.$$

We can focus the analysis even further. If $r(H - L) < c$, then 2_H does not compete in the event he is unable to infer bidder-1's true type from the opening bid, i.e., in a pooling equilibrium. This is because, ignoring c, 2_H makes gains of H - L only if bidder-1 is of type L and nothing otherwise, and, thus, his expected gains are $r(H - L)$. In this scenario, it is easy to show that VRDS improve target payoffs (see Appendix-1). Consequently, for the remainder of the paper we concentrate on the scenario where

(2) $$r(H - L) > c.$$

In addition we make an assumption that

(3) $$c < L.$$

Assumption (3) is not restrictive because we can extend the model to include more types of bidder-2s and consider only those with synergy greater than c.

If bidder-1 is of type L, he will bid w(L) which is between 0 and L, and if he is of type H, he will bid w(H) between 0 and H. Bidder-2 observes the bid and tries to infer bidder-1's type. There are many possible sequential equilibria in this case. However, using Kreps (1984), we can show that no pooling equilibrium is possible in this scenario.

Lemma-1: If condition (2) holds, no pooling equilibrium with a "sensible" belief system about off-equilibrium bids exists.

Proof: Any pooling equilibrium can exist only for a bid between 0 and L. Consider a pooling bid below qL. From the above discussion, whenever $r(H - L) > c$, 2_H enters for any pooling equilibrium, while 2_L does not. Therefore, the best strategy for 1_L is to bid zero. Thus, the only possible pooling is a bid of zero. This is an equilibrium if bidder-2 believes that any deviation from this equilibrium is done by l_L. This belief system is not sensible in the sense of Kreps (1984) intuitive criterion, as l_H can deviate in such a way that l_L will not find profitable to mimic. To show this, consider a bid of qL + e. l_L prefers to bid zero in preference to this bid even if bidder-2 will infer his type to be H upon bidding this bid. This is because a bid of zero yields rL for l_L, while bidding qL + e yields rL - e. However, if bidder-2 considers qL + e to be bid by l_H, l_H finds it profitable to bid it (for small enough e) as his expected gains from a bid of zero, rH, are smaller than from a bid of qL + e, i.e., H - qL - e. Therefore no pooling bid below qL exists.

Given this discussion, it is also clear that no pooling equilibria above qL exists, as l_L prefers to bid zero.

Q.E.D.

If a separating equilibrium exists then it must be the case that l_L bids zero, as he does not have to bid higher to signal his type. In order for l_L not to have an incentive to mimic the high type, l_H must bid high enough such that the L type prefers to stay with a bid of zero. For this the following condition must hold:

(4) $$L(1 - q) \geq L - w(H) \Rightarrow w(H) \geq qL,$$

where L(1 - q) is the expected gain of the low type when he bids zero, while L - w(H) represent his profits when he imitates the high type and prevents competition. This leads to the following proposition.

<u>Proposition-2</u>. The unique equilibrium, with sensible beliefs, is the following separating equilibrium:

l_L bids zero

l_H bids qL

2_L does not enter

2_H competes if the first bid is below qL, and does not compete if the first bid is qL or higher.

<u>Proof</u>: A separating equilibrium where 1_H bids higher than qL, qL + e, can exist if bidder-2 interprets every bid below qL + e as a bid made by the low type. However, such a belief system is unreasonable in the sense that 1_L is worse off bidding above qL even if he is taken to be of type H. Therefore, again using Kreps (1984) criterion, we assume that if bidder-2 observes a bid above qL he believes that it has been made by 1_H, and if he observes a bid below qL he believes that with a high enough probability he faces 1_L. This gives a unique equilibrium where 1_H bids qL and 1_L bids zero. For this equilibrium to hold, it remains to be shown that bidding qL and revealing himself to be of type H is preferable to 1_H to bidding zero. If w(H) = 0, 2_H competes, and 1_H makes expected profits of (H - 0)(1 - q) = H - qH which are less than his profits under separation, H - qL.

Q.E.D.

In the above equilibrium, the target's expected return is qL. If a bid of zero is observed, then 2_H enters and bids L. This happens with probability rq. If a bid of qL is observed, no competition develops and bidder-1 wins for sure. This happens with a probability q. Thus, the target's expected return is $rqL + q^2L = qL$.

<u>Section 3: The Equilibrium with VRDS</u>

We next analyze the effect of VRDS on the target's payoff. The target can use a VRDS, p, to reduce the value of bidder-1 by that amount, thus giving bidder-2 an opportunity to win and make positive profits. This changes the game as follows. After bidder-1 bids, and before bidder-2 responds, the target gets to decide the amount of VRDS. Bidder-2 has to choose a response from each information set which now also includes the amount of VRDS.[13]

The new game has a different set of equilibria. We first demonstrate why bidder-1 will not separate himself by bidding qL, as in the previous game. In equilibrium, the target puts the minimal amount of VRDS needed, as it moves before bidder-2.[14] Consider 1_H bidding qL as before. Whereas previously he prevents any competition and thus wins for sure, now he loses if the target adopts a VRDS of size c or higher against him and bidder-2 is of type H. A VRDS of size c reduces bidder-1's value to H - c, and 2_H can make positive profits by winning with the final bid of H - c. By adopting VRDS the target does not lose, because 1_H bids qL and the target is always assured of that amount.[15]

In order to analyze the new equilibrium, the following result is important.

Lemma-2: In equilibrium both types of bidder-1 make an opening bid of zero.

Proof: If 1_H separates himself he must bid at least H - c, otherwise the target can put a VRDS of size c and induce 2_H to enter. 1_H's payoff in this event is c. If he bids 0 his expected payoff is rH as he wins if bidder-2 is of type L. Since rH > c by assumption (2), 1_H will not separate himself and we get a pooling equilibrium. Since any pooling equilibrium results in 2_H entering, the optimal opening bid for 1_H is zero irrespective of bidder-2's beliefs. Therefore a pooling of zero is the unique equilibrium.

Q.E.D.

We now analyze the target's optimal behavior. We have already shown that whenever 1_H reveals himself (by making an off-equilibrium move), the target's best response is to employ p = c. However, when 1_H does not separate himself, two scenarios are possible.

(i) the target adopts $p = 0$.

(ii) the target adopts $p = \frac{c}{r}$.

The reason why these are the only possible cases is that, under a pooling equilibrium, 2_H enters when $p = 0$. Thus, the target does not use $p > 0$ unless it wants to induce 2_L also to enter. The minimum VRDS that makes entry profitable for 2_L is $\frac{c}{r}$ as long as $\frac{c}{r} < L$. This is so, as 2_L wins only if he faces 1_L (which occurs with probability r) for a bid of $L - \frac{c}{r}$, giving him expected gains of c. We later establish the conditions under which the target prefers the one over the other.

We have not specified a belief system for the target and bidder-2 if they observe an off-equilibrium bid. However, it is clear from the above analysis that any off-equilibrium move by bidder-1 will be followed by $p = c$ if it is believed that he is 1_H, and by $p = 0$ or $\frac{c}{r}$ if the bid does not reveal his type.

The fact that only a pooling equilibrium exists is in contrast with the non-VRDS case where we have a separating equilibrium. Thus, in some cases the target may actually lose when it has the opportunity to implement VRDS. For example, in the event 1_H faces 2_L, the target eventually gets a zero premium over the existing market price if it is able to implement a VRDS, and gets qL if it cannot. However, the following proposition shows that, on average, target shareholders are better off with VRDS.

<u>Proposition-3</u>

Target shareholders do better whenever the target can adopt VRDS.

<u>Proof</u>: The payoffs to the target in the cases of VRDS and no-VRDS are summarized in Table-1. The payoffs in the VRDS cases are based on a pooling of zero, when the target adopts a VRDS of zero. The result in the event the target uses a VRDS of $\frac{c}{r}$ are derived from this case and described in Table 2.

Table 1

Bidders' Types	Probability	Payoff to Target with no VRDS	Payoff to Target with VRDS
$(1_H, 2_H)$	q^2	qL	H
$(1_H, 2_L)$	qr	qL	0
$(1_L, 2_H)$	rq	L	L
$(1_L, 2_L)$	r^2	0	0

The payoffs to the target without VRDS are explained in Section 2. The explanation for the target's payoffs in the pooling of zero, with VRDS, is as follows. If both bidders are of type H, $(1_H, 2_H)$, competition develops and the highest bid is H. If the bidders are 1_L and 2_H, competition develops with the final bid of L. If bidder-2 is of type L, no competition develops. The expected return to the target with VRDS is $q^2H + qrL$, and the expected return when it is not permitted to adopt VRDS is $q^3L + q^2rL + qrL = q^2L + qrL$. The equality follows from the fact that $q + r = 1$, and thus $q^3L + q^2rL = q^2L$. Since $H > L$, it is obvious that the payoffs with VRDS are higher.

Q.E.D.

The above proposition shows that just the threat of adopting VRDS is enough for the target to get better payoffs. We now show that scenario (ii) in which $p = \frac{c}{r}$, yields higher returns for the target in some situations.[16, 17, 18]

When 2_L enters he faces 1_L with probability r and wins with a bid of $L - \frac{c}{r}$. Assume that this inequality holds, then 2_L's expected return is equal to c and he enters. The comparison in target payoffs when $p = 0$ and when $p = \frac{c}{r}$ is given below.

Table 2

Types	Probability	Target Payoffs Under Non triggering ($p = 0$)	Target Payoffs Under Triggering ($p = \frac{c}{r}$)
$(1_H, 2_H)$	q^2	H	$H - \frac{c}{r}$
$(1_H, 2_L)$	qr	0	L
$(1_L, 2_H)$	rq	L	$L - \frac{c}{r}$
$(1_L, 2_L)$	r^2	0	$L - \frac{c}{r}$

The payoffs under 'non-triggering' are the same as in Table-1. The payoffs under 'triggering' are explained below. When the bidders are $(1_H, 2_H)$, triggering the VRDS reduces the value of 1_H to $H - \frac{c}{r}$ which is the final bid for 2_H, who wins. For $(1_H, 2_L)$, the triggering will still leave the value of 1_H above L as assumption (2) implies $H - \frac{c}{r} > L$. Consequently 1_H will win for a bid of L. The last two payoffs are derived in a similar fashion.

We can now show that under some situations triggering the VRDS will yield higher payoffs to the target. The necessary condition is:

$$q^2H + qrL \leq q^2(H - \frac{c}{r}) + qrL + r(L - \frac{c}{r}).$$

which reduces to

$$0 \leq rL - (q^2 + r)\frac{c}{r}. \tag{5}$$

As $L > c$, for high enough r, (5) holds. Thus, in this case the target will trigger VRDS of size $\frac{c}{r}$. This occurs, because with a high r competition is unlikely to occur unless the large VRDS are triggered to induce 2_L to compete.

The significance of the above result is that VRDS are effective as both credible threats and when actually used. Thus, any empirical test of the effectiveness of VRDS should not be based on just observed VRDS, as their benefits may be capitalized even when they are not observed. In order to measure the true effect, this aspect must also be taken into consideration.

Section 4: The Usefulness of VRDS When Bidder-1 Has Entry Costs

So far we have assumed that bidder-1 always makes a bid on the target even when the target has recourse to VRDS. However, if bidder-1 also faces participation costs, the presence of VRDS may prevent him from making an opening bid in circumstances where he would have otherwise bid. In this case, the target shareholders may be worse off with VRDS, although, as shown above, after an opening bid they always gain with them. Easterbrook and Fischel (1981), and Baron (1986) argue that the loss of possible tender offers dominates and, therefore, target shareholders are worse off with defensive strategies. On the other hand, Gilson (1982) argues that the additional competition generated through defensive strategies after a tender offer, dominates the negative effect of the loss in potential tender offers. We extend our model to deal with these issues by considering the entry decision of bidder-1. We show that, under most reasonable conditions, the target is better off with defensive strategies.

To analyze the decision of bidder-1 to enter, we assume that his participation costs are the same as those of bidder-2. We now investigate the equilibrium in which VRDS work only as threats, i.e., $p = 0$. This may be an equilibrium if inequality-5 is reversed and if both types of bidder-1 find it profitable to enter. Under the assumption that both enter, the expected gains for 1_H and 1_L are $rH - c$ and $rL - c$ respectively, as either one of them gains only if he faces 2_L. By assumption (2), $rH > c$, thus 1_H always enters. However, 1_L enters only when $rL > c$. Thus, if $rL < c$ the nature of the equilibrium changes, and it turns out that the only candidate for an equilibrium in pure strategies is

(6) 1_H enters with a bid of zero, 1_L does not enter. The target employs $p = c$, whenever entry occurs. 2_H enters if $p \geq c$, while 2_L enters if $p \geq c + (H - L)$ and does not enter otherwise. Given entry, the target and bidder-2 assign a probability equal to 1 that the bidder is 1_H.

The above strategies and beliefs constitute an equilibrium provided that 1_L has no incentive to enter even if he is believed to be 1_H. As $rL < c$, his gain upon entrance is $r(L - c) - c < 0$, and the equilibrium is supported.

In order to compare the payoffs to the target under this equilibrium to the payoffs without VRDS, we analyze the equilibrium without VRDS under the assumption $rL < c$. Note that the equilibrium described in Section-2 is no longer an equilibrium as it yields a payoff of $rL - c < 0$ to 1_L. It turns out that the unique equilibrium with sensible beliefs is for 1_H to enter with a bid of $L - c$, 1_L not to enter, and the beliefs of bidder-2 to be that any bid below $L - c$ is made by 1_L and any bid above $L - c$ is made by 1_H. The reason for this is that if we replace $L - c$ with a lower bid, 1_L has the incentive to enter, while higher bids are ruled out by Kreps (1984) criterion.

Thus, in this case, the probability of obtaining a tender offer does not decrease when the target can resist through VRDS. Also, the probability does not decrease when $rL > c$ and inequality (5) is reversed, as in this case the equilibrium described in Section-3 is applicable to this game as both 1_H and 1_L enter. Proposition-4, shows that the target shareholders are better off.

Proposition-4: Even when it is costly for bidder-1 to make a tender offer, whenever $rL < c$ or inequality (5) does not hold, the target shareholders are better off with VRDS.

Proof: When $rL \geq c$ and inequality (5) does not hold, then the equilibrium is as described in Section-3, and proposition-3 shows that target shareholders are better off. When $rL < c$, equilibrium (6) holds giving the target a payoff equal to $q^2(H - c)$, as it gets $H - c$ only when both bidders are of type H and nothing otherwise. Without VRDS, the target obtains a positive bid of $L - c$ if bidder-1 is of type H and nothing otherwise as 1_L does not bid. Therefore it's expected profits (net of c) are $q(L - c)$. Since, $rL - c < 0$, $L - c < L - rL = qL$. Therefore $q(L - c) < q^2L$, and by our assumption, $q^2(H - c) > q^2L$. Therefore, target shareholders are better off with VRDS.

Q.E.D.

The result of proposition-4 follows from the fact that VRDS do not reduce the probability of observing a tender offer. The intuition is as follows. Since the L type does not attempt to deter entry even without VRDS, he is unaffected in the VRDS scenario and will enter if it is profitable for him to enter when there are no VRDS. The H type is affected as he can no longer deter entry and faces the same competition as an L type. However, since his profits are higher than the L type he still makes a tender offer. Thus the probability of seeing a tender offer is not affected.

The above intuition seems to hold even for more general cases. For example, if there are more types of bidders and the lower types do not pre-empt, they will not be affected by VRDS and the entry decision will not change, (see Fishman (1985), which considers a continuum of types and shows that the low types do not pre-empt). The only possible way that competition will be affected in this scenario is if the target uses a VRDS against the low type even when he does not pre-empt, so as to increase competition from the low types of bidder-2. This is one of the possibilities analyzed below.

Competition will be affected, however, if $rL > c$ and if inequality-5 holds. As discussed in Section-3, if this inequality holds and both types of bidder-1 enter, then the target prefers to put the higher VRDS equal to $\frac{c}{r}$. However, this no longer constitutes an equilibrium as, in the event the target uses the VRDS equal to $\frac{c}{r}$, 1_L does not enter as he always loses. If 1_L does not enter, the optimal amount of VRDS is no longer $\frac{c}{r}$ and the equilibrium unravels.

It turns out, that two scenarios are possible. In the first scenario, only 1_H enters and the equilibrium is similar to (6). In the second scenario, the only possible equilibrium is with mixed strategies. We summarize these scenarios in proposition-5.

Proposition-5: Suppose $rL > c$ and (5) holds. Then,

(i) If $r(L - c) < c$, the unique sensible equilibrium is as described in (6), and if $q(H - c) > L$, the target shareholders are better off with VRDS.

(ii) If $r(L - c) > c$, then there exists an equilibrium only with mixed strategies, and the target shareholders are better off with VRDS.

Proof:

(i) Assume the strategies are as in (6). This constitutes an equilibrium if 1_L does not find it profitable to enter. If he enters his payoffs are $r(L - c) - c$, as he wins only if he faces 2_L and gets a payoff of $L - c$ in that event. Therefore, by the assumption of the proposition he does not enter and the equilibrium is sustained.

The target payoffs with VRDS are $q^2(H - c)$ (see proposition-4) and without VRDS are qL. Thus, whenever $q(H - c) > L$, the target is better off with VRDS.

(ii) See Appendix-2.

Q.E.D.

The first scenario is the only one in which there is a meaningful trade-off between the gains from VRDS due to increased competition and the costs imposed through a reduction in the probability of observing a tender offer. The probability is reduced as l_L does not make a tender offer with VRDS while he would have made one otherwise. Whether or not the shareholders are better off depends on the parameters of the model. The target's payoffs under VRDS are $q^2(H - c)$, and without VRDS are qL. Thus, the target is better off when $q(H - c) > L$. The intuition being that the higher the q, the less is the reduction in the probability of observing a tender offer and the higher the probability of the ensuing competition.

Section 5: VRDS Versus Real-life Defensive Strategies

VRDS resemble a number of actually observed defensive strategies. Poison pills appear to be the closest to our description of VRDS. By poison pills we mean the introduction of a value-reducing strategy into the bylaws of a target, the issuing of flip-over rights to existing shareholders, etc.[19] Poison pills are attractive as defensive strategies because the target can use them without knowing the identity of potential bidders who may compete, thus eliminating the need for expensive negotiations with them. However, not all of them are discriminatory or non-redeemable. For example, flip-over rights appear to be non-discriminatory while their non-redeemability is questionable. This casts doubts on their effectiveness as VRDS.

Another type of VRDS are lock-ups. For example, the target may sell a specific asset at below market price to a second bidder conditional on his making an agreed-upon bid. This reduces the value of the target for the first bidder and gives the second bidder an incentive to compete (see Berkovitch and

Khanna 1986). This type of VRDS may require expensive negotiations between the target and another bidder but is effective in that it is both discriminatory and non-redeemable. In addition, the target can better control the amount of reduction in the value of the firm.

Greenmail also falls in the category of VRDS. It has been shown by Shleifer and Vishney (1986) and Berkovitch and Khanna (1985), that under some conditions paying of greenmail to eliminate a low value bidder is profitable for target shareholders as doing so may increase competition. Like poison pills, greenmail is also attractive because it does not require that the target know the identity of potential bidders. However, it may be the case that the amount of greenmail necessary is higher than the amount of value-reduction needed to enhance competition through poison pills. This is so as greenmail requires the payment of the expected gains to the bidder, while that may not be necessary with poison pills.

Litigation effectively works as a VRDS. For example, the target may acquire another asset to increase the probability of anti-trust suits against a specific bidder (see Baron 1986). More generally, litigation may reduce the value of the bidder taken to court by a greater amount than that of other bidders. However, the target has less control over the extent of value reduction. Litigation may also result in some reduction in value to all bidders, thus reducing the gains to the target from being acquired when compared to other VRDS.

We observe that different VRDS have different characteristics and different strengths and weaknesses. As such the choice of a particular VRDS appears to be situation-specific with the target choosing the one most suited to existing conditions. Since no particular VRDS strictly dominates the others, it is not surprising that they all coexist.

Conclusion

We look at a class of resistance strategies that works by reducing the value of synergy gains for some bidders and show that these strategies improve target shareholder welfare. Also, when these defensive strategies are permitted, the reduction in the probability of seeing tender offers is small and occurs only under very restricted conditions. Overall the target shareholders are still better off.

Though our model is structured, we believe that the main conclusions will hold under more general conditions. The restriction to two bidders and two types is only for tractability. The cost of entering the competition, such as investigating the target, raising the required funds, legal advice etc., though non-trivial are probably relatively small compared to the average synergy gains. Also, it can be shown that the assumption that bidders know their types before incurring the entry costs as against learning their types after paying the cost, does not alter the main conclusions. Thus, our restrictions on the cost appear reasonable.

Our assumption of no agency problems between the target manager and shareholders may, however, appear to be somewhat restrictive. Management can exploit VRDS or other defensive strategies for entrenchment purposes. Nevertheless because VRDS can be easily observed and monitored, the extent to which the manager can misuse them is probably limited. Moreover, if they have no positive role, then they can be effectively banned by shareholders. In light of this, even if they are somewhat abused, our results suggest that the overall effect should be beneficial to target shareholders.

Footnotes

1. Another role for resistance in protecting target shareholders is discussed in Bradley, Desai and Kim (1987). They show that self-tender offers can prevent value-reducing two tier tender offers.

2. A detailed description of these strategies is given in Section-5.

3. If the second bidder suspects that the target will withdraw the VRDS once he bids, he will not compete at all.

4. Real-life VRDS may distinguish between the adoption of a VRDS and its triggering. Adoption occurs whenever a target management introduces them into the firm's charter. At this point it is still a threat. Triggering takes place when some pre-specified exogenous event occurs, causing the management to take action to reduce the value of some bidder or bidders. This action is usually irreversible. Note, however, that for non-redeemable VRDS there is no difference between adoption and triggering. Consequently we use the terms interchangeably in the text.

5. In Section-4 we also consider the entry costs of bidder-1.

6. In this paper, we use the term 'discriminatory' to mean that VRDS can affect the value of one bidder without reducing the value of another. It can be seen that the analysis will go through when VRDS reduces the value of all bidders, as long as the existing bidder suffers the greatest reduction. Such a situation may occur in the case of litigation where the synergies of all bidders are reduced by the cost of litigation to the target. However, the defending bidder incurs additional costs.

7. Whenever bidder-1 does not raise his bid, the new bid is equal to $w(R_1)$.

8. For ease of analysis we assume that the target manager, who perfectly represents shareholders in our model, decides whether the shareholders will tender their shares or not.

9. The target adopts VRDS that do not reduce bidder-1's value to below his bid as otherwise bidder-1 may withdraw his bid. Also see footnotes 13 and 15.

10. The target making a side-payment to bidder-2 on the condition that the latter competes, is a special case of VRDS. Our analysis suggests that these side-payments are most effective when they are of a certain amount since, just the threat of making them is enough. The possibility of exclusion from further competition makes bidder-1 bid R_2.

11. Another mechanism that may enable the target to get close to the competitive result is for the target to buy bidder-2. This enables it to capitalize the synergy gains with bidder-2 net of any premium that it may have to pay bidder-2 for this deal.

12. At this point we do not explicitly introduce the participation cost of bidder-1 in the model. In this respect this section, like Fishman 1985, concentrates on the game that takes place subsequent to bidder-1's opening bid.

13. There is a question as to whether bidder-1 will change his opening bid after the target adopts a VRDS. We assume, for the model, that bidder-1 stays with the opening bid as long as he makes positive gains. It turns out that all of our results go through even if we permit him to change his bid. The main reason is that the equilibrium is a pooling of zero and he cannot lower his bid any further. Also see footnote 15.

14. Our results are not sensitive to the order of moves. Even if bidder-2 is allowed to move both before and after the target, the results are not affected as he will not reveal his identity by moving first.

15. To show that this result is not altered if bidder-1 is permitted to lower his bid, note that his best new bid is that of zero. Given this bid of zero, target's expected payoff is q(H - c) which is larger than qL. Thus the target is better off using VRDS even in this case.

16. As discussed previously, in the scenarios where c is relatively large, VRDS will be observed.

17. Since we are looking at only non-redeemable VRDS, adoption implies triggering.

18. The analysis here changes when we introduce entry costs for bidder-1. We deal with this extension in Section-4.

19. Flip-over rights are given to existing target shareholders and become active (are triggered) when an acquirer takes control of the target. The triggered rights now permit the target shareholders to buy the acquirers' stock at much below market price, thus decreasing the value of the acquisition to the acquirer. After being triggered they become non-redeemable. However, before they are triggered, these rights can usually be redeemed for a very small cost by the target management.

Appendix-1.

We show that VRDS improve target shareholder welfare in the event $r(H - L) < c$. Without VRDS, there is a continuum of pooling equilibria where both 1_L and 1_H bid as follows:

1_L and 1_H bid $w \quad [0,qL)$,

and the belief system is that any bid below w is made by 1_L.

2_H enters whenever he sees a bid below w.

From the target's point of view, the best equilibrium in this set is when $w = qL$. Thus we compare this equilibrium to the equilibrium with VRDS. With VRDS, there is a unique equilibrium as follows:

Both 1_L and 1_H make an opening bid of zero.

The target employs as VRDS, $p = c - r(H - L)$ whenever it cannot identify the type of bidder-1, and $p = c$ if it identifies 1_H.

2_H enters if $p \geq c - r(H - L)$ in the event the opening bid is pooling, and enters if $p \geq c$ if he identifies 1_H.

2_L enters only in a pooling equilibrium with $p \geq \frac{c}{r}$

Note that the reasonable beliefs are that an opening bid equal to or above qL is made by 1_H. Thus, the above is an equilibrium if 1_H does not find it optimal to bid qL. His expected gains from bidding qL are $r(H - qL - c)$, while his expected gains from bidding zero are $r(H - c + r\ (H - L))$, which are higher. Thus the equilibrium is sustained.

Proposition-A1.

Whenever $r(H - L) < c$, target shareholders are better off with VRDS.

<u>Proof</u>. Without VRDS, the best scenario for the target is a pooling of qL yielding payoffs of qL. With VRDS, the expected payoff to the target is $q^2(H - c + r(H - L)) + rq(L - c + r(H - L))$. The first term represents the target's payoff when bidders are types $(1_H, 2_H)$ and 2_H wins for a bid of $H - p = H - c + r(H - L)$. The second term is the target's payoff when the bidders' type is $(1_H, 2_H)$.

Now,

$$q(H - c + r(H - L)) + r(L - c + r(H - L)) = L - c + r(H - L) + q(H - L)$$
$$= L - c + (H - L) > L \qquad \text{as } H - L > c.$$

Therefore VRDS always improve target payoffs.

Q.E.D.

Appendix-2

Equilibrium when $r(L - c) > c$ and inequality (5) holds. We have shown that whenever (5) holds, and if both types of bidder-1 enter, the target implements VRDS of size $\frac{c}{r}$. We have shown that when we consider the entry decision of bidder-1, this is not an equilibrium. Whenever $r(L - c) < c$, the equilibrium with pure strategies results in only 1_H entering and the target imposing a VRDS of size c. For $r(L - c) > c$, this cannot be an equilibrium as 1_L now finds it profitable to mimic 1_H and bid zero. It turns out that in this scenario, an equilibrium with pure strategies does not exist. Next, we derive an equilibrium with mixed strategies with VRDS and show that the resulting payoff with VRDS is higher than without.

In this equilibrium 1_H always enters and 1_L enters only with probability. Let n denote the probability that 1_L enters. It can be verified that the equilibrium opening bid is a pooling of zero. Given the opening bid, the probability that the bidder is of type H and L are as follows:

$$\text{(A1)} \qquad \begin{aligned} \Pr(H \mid \text{Tender offer}) &= \frac{q}{q + nr} = q' \\ \Pr(L \mid \text{Tender offer}) &= \frac{nr}{q + rn} = r' \end{aligned}$$

In equilibrium the target should be indifferent between using VRDS of zero or VRDS of $\frac{c}{r'}$. Therefore we have the following condition

$$\text{(A2)} \qquad q'qH + qr'L = q'q(H - \frac{c}{r'}) + q'rL + r'(L - \frac{c}{r'})$$

A2 is written under the assumption that $H - \frac{c}{r'} > L$ and $L > \frac{c}{r'}$. Relaxing these assumptions does not affect the final conclusions. A2 can be rewritten as

(A3) $$r'L(q - 1) = (\frac{-q'q}{r'} - 1)c + q'rL$$

Using A1, we can rewrite A3 as follows:

$$\frac{nr}{q + nr} L(q - 1) = (\frac{-q^2}{nr} - 1)c + \frac{qr}{q + nr} L$$

$$=> (\frac{nrq - nr - qr}{q + nr})L = (\frac{-q^2 - nr}{nr})c$$

using q = 1 - r, nrq - nr - qr is equal to r(-nr - q) which yields

$$-rL = (\frac{-q^2 - nr}{nr})c$$

Solving for n yields

$$n = \frac{q^2c}{r(rL - c)} > 0.$$

If 1_L enters with probability, it must be the case that he is indifferent between entering and not. Let m be the probability that the target will use a VRDS of $\frac{c}{r'}$, then 1_L plays a mixed strategy if

(A4) $$0 = (1 - m)rL - c$$

$$=> m = 1 - \frac{c}{rL}$$

We can now state the following result.

Proposition-A2: Target shareholders are better off under the above mixed strategies equilibrium.

Proof: Since the target is indifferent between using VRDS of $\frac{c}{r'}$ and 0, it is sufficient to look at the payoffs the target obtains by employing VRDS of $\frac{c}{r'}$. We must consider the payoffs for the target before it knows whether bidder-1 will make a bid or not. Note that the probability of facing 1_H remains q, and thus, the payoffs to the target are as follows:

$$\text{(A5)} \qquad q^2(H - \frac{c}{r'}) + qrL + nr(L - \frac{c}{r'})$$

$$> q^2L + qrL + nr\,(L - \frac{c}{r'}) = qL + nr(L - \frac{c}{r'}), \text{ since } H - \frac{c}{r'} > L$$

$$> qL.$$

But qL is the payoff for the target under no VRDS.

Q.E.D.

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