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The Strategic Role of Debt in Takeover Contests

BHAGWAN CHOWDHRY and VIKRAM NANDA*

ABSTRACT

In a takeover contest, the presence of bidders' existing debtholders, if they can be expropriated by issuing new debt with equal or senior priority, allows bidders to commit to bid more than their valuation of the target. Such commitment can be beneficial because it deters potential entry by subsequent bidders and may allow a first bidder to acquire the target at a bargain price. The cost is that if entry by subsequent bidders does nevertheless take place, because the first bidder has committed himself to bid high premia, a bidding war ensues resulting in offers that may involve excessive premia, i.e., bids that are larger than the bidders' valuation of the target.

THE TAKEOVER WAVE of the last decade had two outstanding characteristics: the use of visibly high levels of debt to finance the acquisitions (Crabbe, Pickering, and Prowse (1990)) and bidding wars resulting in seemingly "excessive" premia that were offered to acquire the targets.¹ Roll (1986) has proposed managerial "hubris" as an explanation for excessive premia. The central argument in this paper is that a bidding firm that has debt in its capital structure would be willing to bid aggressively, if necessary, since part of the acquisition cost is borne by its existing debtholders. Financing the acquisition using debt with seniority equal to or greater than that of his existing debt raises further the maximum amount the bidder would be willing to offer. The benefit from committing to an aggressive bidding strategy is that it deters potential entry by subsequent bidders, allowing the first bidder to acquire the target at a bargain price.² A bidder can thus obtain a first mover advantage. A possible cost, however, is that if subsequent entry

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¹ See *Business Week*, May 30, 1988, "Takeovers: The prices are right—right through the roof" (pp. 82–83).

² Bradley, Desai, and Kim (1988) document empirical evidence that competition among bidding firms increases the returns to targets and decreases the returns to acquirers which suggests that being able to deter competition may be beneficial to a bidder. Moreover, Lang, Stulz, and Walkling (1991, table 6) find that target returns are negatively associated with bidder leverage, which is consistent with our story that bidders with high leverage may be able to acquire targets at more favorable prices.

by competing bidders does nevertheless take place, a bidding war ensues that may result in "excessive" bids, i.e., bids that are larger than the bidder's valuation of the target.

This strategic motive for debt financing is consistent with the observation that often, after the successful acquisition of the target, firms attempt to decrease the level of outstanding debt relatively quickly. Such actions are not, however, consistent with alternative explanations for debt financing that rely upon the long-term benefits of debt such as the tax deductibility of interest (see Leland (1989) and Kaplan (1989), for example) and other agency theoretic explanations (see Jensen (1986), for example).

In the next section, we develop a model that formalizes our argument.³ We show that bidders can and, in equilibrium, do commit to bid more than their valuation of the targets, if necessary. We then examine the implications of this equilibrium on the prices of stocks and bonds of targets and bidders during the takeover process. Section I contains the model. Section II discusses empirical implications. Section III presents some concluding remarks. Proofs are in the Appendix.

I. The Model

We consider a five-date model. There are two potential bidders whom we will label the first bidder (FB) and the second bidder (SB). On date 0, FB identifies a potential target for acquisition and learns his type. Depending on his type (which is observed only by FB), FB has priors on the probability distribution of the gains he can bring to the target. At this point FB contracts an initial level of debt. On date 1, FB can uncover the value of the gains, G_1 , he can bring to the target at an investigation cost of C_1 . He will investigate the target only if the expected benefit from launching a takeover attempt is greater than C_1 . If he does investigate, FB makes his initial cash offer for the target on date 1. The gain G_1 is now publicly observable.

SB contracts an initial level of debt on date 0. By making his bid on date 1, FB alerts SB, who discovers his type at date 2. Depending on his type (observed only by SB), SB has priors on the probability distribution of the gains, G_2 , he can bring to the target. The precise value of G_2 can be uncovered by SB at a cost of C_2 . Having observed G_1 and FB's existing level of debt, SB decides whether or not to investigate the target to determine G_2 . SB will investigate the target and enter the bidding contest if the expected benefit from doing so exceeds C_2 . G_2 now becomes publicly observable. In the event that SB decides to investigate and compete for the target, the two

³ A model that studies the role of debt in the context of product market competition between firms is by Brander and Lewis (1986). In their model, debt has the effect of leading to more aggressive output strategies on the part of the firms, and a lower expected profit than in the absence of debt. The role of debt, in their model, is examined in the context of an oligopoly modeled as a Cournot-Nash game with *simultaneous* moves. In our model, however, the arrival of bidders is *sequential*, resulting in a first mover advantage to the first bidder. Debt serves to deter potential entry and competition through the threat of an aggressive bidding strategy.

bidders engage in an English auction at date 3. The bidding process itself is assumed to be costless. In the English auction the bidder willing to bid higher acquires the target at the largest offer the other bidder is willing to make. Both bidders finance the cash offer to acquire the target by raising the entire amount required in external capital markets. This financing is needed only after resolution of the takeover contest.

At date 4 the final cash flows are realized. For simplicity, we assume that all agents are risk neutral and that there is no discounting. In the absence of a takeover, the first and the second bidders have assets in place that yield nonstochastic cash flows V_1 and V_2 respectively. Both FB and SB are fully equity financed to begin with but can refinance at date 0, paying out dividends with funds raised by selling debt. Let $Z_1^0 \in [0, V_1)$ and $Z_2^0 \in [0, V_2)$ denote the face values of the first and second bidders' debts respectively, contracted on date 0. The cash flow of the target, under current management, would be V_T at date 4. V_T is stochastic and is either V_T^H with probability π or V_T^L with probability $1 - \pi$, where $V_T^H > V_T^L$. Let $\bar{P} \equiv \pi V_T^H + (1 - \pi)V_T^L$. V_1 and V_2 are assumed to be nonstochastic only for expositional ease. What is important for the analysis is that combined cash flows of the bidder and the target be such that it is possible to expropriate the existing debtholders by issuing additional debt. Assuming that only V_T is risky captures this idea in a simple way.⁴

The role of the target company shareholders is assumed to be relatively passive.⁵ As in Fishman (1988) and Hirshleifer and P'ng (1989), we assume that the shareholders of the target company will be willing to sell their shares for any price larger than the value of the shares in the absence of a takeover, i.e., $\bar{P}$. This assumption can be justified by assuming that the acquiror has sufficient ability to dilute the value of existing equity if he were to gain control; hence, he avoids the type of free riding problem described in Grossman and Hart (1980). In the absence of competition from SB, FB would offer the target company's shareholders $\bar{P}$ —a price equal to the expected value of the cash flows in the absence of a takeover—and capture the entire gain of G_1 . It is not important that target shareholders receive no surplus in the absence of competition among bidders—what is important is that the bidder's surplus reduces if there is competition from other bidders, which is consistent with the evidence in Bradley, Desai, and Kim (1988).

The bidders are assumed to be able to borrow against the combined cash flows of the bidding and the target firm to finance the takeover. Also any new debt raised to finance the takeover is assumed to obtain the *same* priority as the existing debt. The analysis requires that the existing debt is not protected against expropriation through bond covenants that prevent the firm from

⁴ If V_1 and V_2 are risky, their correlation with V_T matters since it may affect the ability to expropriate existing debtholders. If the correlation is nonnegative, the qualitative features of the analysis are unaltered. Even if the correlation is negative, expropriation of existing debtholders may still be possible. The correlation is zero under our assumptions.

⁵ We abstract away from the analysis of defensive strategies by target shareholders. See Bagwell (1991), Israel (1991), and Stulz (1988), among others.

issuing additional debt with higher or equal priority. As we shall see, this feature provides a strategic role for financing of takeovers through debt.⁶ For simplicity, we assume that the target firm has no outstanding debt.⁷

The takeover is financed by the selling of additional debt, denoted Z_1 and Z_2 for the two bidders. For a bid to be incentive compatible, the expected value of the equity of the combined firm must be as high as the equity value of the bidding firm without the takeover. Therefore,

$$\pi[V_T^H + G_B + V_B - Z_B^0 - Z_B] + (1 - \pi)\text{Max}[0, V_T^L + G_B + V_B - Z_B^0 - Z_B] \geq V_B - Z_B^0, \quad B \in \{1, 2\}. \quad (1)$$

The first term on the left-hand side must be positive since, otherwise, the equity value of the combined firm would be zero. The amount D_B that new debtholders are willing to pay for debt with a face value Z_B is given by:

$$D_B \equiv d_B(G_B, Z_B^0, Z_B) = \pi Z_B + (1 - \pi)\text{Max}\left[Z_B, \frac{Z_B}{Z_B^0 + Z_B}(V_T^L + G_B + V_B)\right], \quad B \in \{1, 2\}. \quad (2)$$

Let $Z_B^{\max}$ be the largest face value of the new debt such that incentive compatibility condition (1) is satisfied. Substituting $Z_B = Z_B^{\max}$ in (2) gives the largest amount of funds a bidder can raise with debt financing, $D_B^{\max}$ for his bid.

$$D_B^{\max} = d_B(G_B, Z_B^0, Z_B^{\max}) \equiv d_B^{\max}(G_B, Z_B^0) \quad B \in \{1, 2\}. \quad (3)$$

We now determine conditions under which a bidder can credibly commit to an aggressive bidding strategy.

PROPOSITION 1: *The bidder can credibly commit to bid more than his valuation of the target, $\bar{P} + G_B$, if and only if $Z_B^0 > \text{Max}\{0, V_B - \pi(V_T^H - V_T^L)\}$. The largest amount that a bidder can credibly commit to bid, $D_B^{\max}$, is increasing in Z_B^0 and is bounded above by $\bar{P} + G_B + (1 - \pi)(V_T^H - V_T^L)$.*

These results follow from the fact that unless a bidder can exploit existing debtholders, he would not bid higher than his valuation. The overbidding results from the fact that for each additional dollar by which the bid is raised, the cost to the equityholders is less than a dollar since dilution because of the new debt financing reduces the value of the existing debtholders' claims. A necessary and sufficient condition for such expropriation to be possible is that it be incentive compatible for the bidder to assume sufficient new debt so as to make the total debt risky. The condition on Z_B^0 ensures this.

⁶ We are implicitly assuming that reputational and legal considerations protect the existing debtholders from other types of expropriation. For instance, the debt contracts may contain explicit covenants (Smith and Warner (1979)) that make expropriation difficult.

⁷ The target's existing debtholders could also be expropriated by the issue of debt to finance the acquisition. Though this would further raise the maximum amount a bidder would be willing to offer, this would not, however, deter subsequent bidders from entering since it allows them to bid higher as well. Thus, the qualitative features of our analysis would remain unaltered.

The intuition for the upper bound on $D_B^{\max}$ is also based on the fact that the bidder can overbid only because current debtholders can be forced to bear part of the cost of overbidding. Since the existing debtholders are not expropriated in the V_T^H state, they cannot be expropriated more than $(V_T^H - V_T^L)$ in the low state, which occurs with probability $(1 - \pi)$.

Having shown that existing debt can raise the maximum amount that bidders will be willing to pay for the target, we now analyze how potential bidders would choose the extent of debt financing at date 0. Let the gain each bidder, $B \in \{1, 2\}$, can bring to the target, G_B , be distributed over an interval $[0, H_B]$. Though a bidder must spend C_B to determine the exact value of G_B , he knows his type and the probability distribution of G_B , which depends on his type. Each bidder can be from a continuum of types indexed by t_B distributed over an interval $[0, 1]$ with a probability density function denoted $\theta_B(t_B)$. Let $p(G_B, t_B)$ denote the probability density function of G_B for a bidder of type t_B . We assume that a bidder of a higher type, i.e., with a higher t_B , has a higher probability of finding larger values of G_B . Formally, we assume that the probability distribution of G_B for higher t_B first order stochastically dominates the probability distribution of G_B for lower t_B .

If the second bidder decides not to spend C_2 and enter the bidding contest at date 2, the first bidder acquires the target at $\bar{P}$. If the second bidder does enter, the outcome of the bidding contest at date 3 will be decided as follows. If $D_1^{\max} > D_2^{\max}$, the first bidder wins the contest and pays $D_2^{\max}$ for the target. Similarly, if $D_1^{\max} < D_2^{\max}$, the second bidder wins and pays $D_1^{\max}$ for the target.

To focus on nontrivial cases, we impose a restriction that ensures that there is always some probability of the first bidder losing the bidding contest to the second bidder. From Lemma 2 the largest bid that FB can commit to making is bounded above by $\bar{P} + G_1 + (1 - \pi)(V_T^H - V_T^L)$. Also, since the second bidder can always bid his valuation $\bar{P} + G_2$, it is sufficient to assume that

$$\bar{P} + H_2 > \bar{P} + H_1 + (1 - \pi)(V_T^H - V_T^L). \quad (4)$$

Let Z_1^{0*} and Z_2^{0*} denote the optimal levels of the face values of initial debts of the two bidders, chosen at date 0. Since FB knows only his type at date 0, Z_1^{0*} can depend only on t_1 . Z_2^{0*} , however, is independent of SB's type t_2 since SB discovers his type on date 2, only after FB has made his initial bid.

Let G_2^w denote that value of G_2 such that $d_2^{\max}(G_2^w, Z_2^{0*}) = d_1^{\max}(G_1, Z_1^{0*})$. Since $d^{\max}$ is increasing in G_2 , SB wins the contest for all values of $G_2 > G_2^w$. The face value of new debt SB must contract to raise this amount, Z_2^w , is given by $d_2(G_2, Z_2^{0*}, Z_2^w) = d_1^{\max}(G_1, Z_1^{0*})$. Let us now define

$$\begin{aligned} f_B(G_B, Z_B^0, Z_B) \equiv & \pi[V_T^H + G_B + V_B - Z_B^0 - Z_B] \\ & + (1 - \pi)\text{Max}[0, V_T^L + G_B + V_B - Z_B^0 - Z_B] \\ & - (V_B - Z_B^0). \end{aligned}$$

The function $f_B(\cdot)$ denotes the slack in the incentive compatibility condition (1). For any given level of SB's gain, G_2 , the expected benefit to SB from acquiring the target at FB's maximum bid is simply equal to the slack in the incentive compatibility condition i.e., $f_2(G_2, Z_2^{0*}, Z_2^w)$. Therefore, for SB of type t_2 , the expected benefit from entering and winning the contest is given by $\int_{G_2^w}^{H_2} f_2(G_2, Z_2^{0*}, Z_2^w) p(G_2, t_2) dG_2$.

LEMMA 1: *The expected benefit from entering and winning the contest for SB is increasing in his type t_2 .*

Proof: Follows from the first order stochastic dominance and the fact that $f_2(\cdot)$ is increasing in G_2 . $\square$

Let $\hat{t}_2$ denote the type such that the expected benefit from entering and winning the contest for SB is exactly equal to the cost C_2 , i.e., let

$$\int_{G_2^w}^{H_2} f_2(G_2, Z_2^{0*}, Z_2^w) p(G_2, \hat{t}_2) dG_2 = C_2. \quad (5)$$

From Lemma 1, for any type higher than $\hat{t}_2$ the expected benefit exceeds the cost and for any type lower than $\hat{t}_2$ the expected benefit is smaller than the cost. Therefore, if the SB is of type $t_2 < \hat{t}_2$, he would choose not to enter the bidding contest. If SB is of type $t_2 > \hat{t}_2$, he would incur the investigation cost of C_2 and enter the bidding contest with FB.

The probability of SB choosing not to contest FB is equal to $\int_0^{\hat{t}_2} \theta_2(t_2) dt_2$ which is increasing in $\hat{t}_2$. The probability of entry by SB, then, is decreasing in $\hat{t}_2$.

Up to now we have considered the takeover contest, taking the levels of the initial debt Z_B^{0*} as given. Let us now examine how the choice of original debt level is determined for FB and SB in equilibrium. Since the original debtholders foresee the possibility of expropriation by the bidders in case there is a takeover contest, they take this into account by pricing the debt appropriately. The optimal level of debt, then, is one that maximizes the expected total benefit for all the claimants of the bidding firm.

For a given level of G_1 , if there is no entry by SB, FB acquires the target at $\bar{P}$ and captures the entire value of the gain G_1 . In case there is entry by SB, FB acquires the target that is worth $\bar{P} + G_1$ but pays the maximum that SB is willing to bid provided SB does not outbid him. The expected benefit for all the claimants of the first bidding firm, for a given level of G_1 , then can be written as

$$G_1 \int_0^{\hat{t}_2} \theta_2(t_2) dt_2 + \int_{\hat{t}_2}^1 \left(\int_0^{G_2^w} [\bar{P} + G_1 - d^{\max}(G_2, Z_2^{0*})] p(G_2, t_2) dG_2 \right) \theta_2(t_2) dt_2.$$

At date 0, the first bidder, given his type, decides how much debt Z_1^0 he must contract. The optimal level of $Z_1^{0*}(t_1)$ is one that maximizes the expected benefit for all the claimants of the firm, given the strategy and distribution of the types of SB. For FB of type t_1 , the expected benefit is given by the following expression.

$$\begin{aligned} & \int_0^1 \left\{ G_1 \int_0^{\hat{t}_2} \theta(t_2) dt_2 \right. \\ & \quad \left. + \int_{\hat{t}_2}^1 \left(\int_0^{G_2^w} [\bar{P} + G_1 - d^{\max}(G_2, Z_2^{0*})] p(G_2, t_2) dG_2 \right) \theta_2(t_2) dt_2 \right\} \\ & \quad \cdot p(G_1, t_1) dG_1. \end{aligned} \quad (6)$$

For FB to launch a takeover attempt, his expected benefit with the optimal level of Z_1^0 must exceed investigation cost C_1 . Let T_1 denote the set of FB types that decide to launch the takeover attempt.

The net expected benefit for all the claimants of the second bidding firm at date 0, can be expressed as follows. Recall that SB discovers his type only at date 2.

$$\begin{aligned} & \int_{t_1 \in T_1} \left[\int_{\hat{t}_2}^1 \left\{ \left(\int_{G_2^w}^{H_2} [\bar{P} + G_2 - d^{\max}(G_1, Z_1^{0*}(t_1))] \right. \right. \right. \\ & \quad \left. \left. \cdot p(G_2, t_2) dG_2 \right) - C_2 \right\} \theta_2(t_2) dt_2 \right] \theta_1(t_1) dt_1. \end{aligned} \quad (7)$$

For SB his choice of Z_2^{0*} is chosen to maximize the net expected benefit (7), taking as given FB's equilibrium strategy for choosing Z_1^{0*} .

The following two propositions characterize the nature of the equilibrium choices for initial debt.

PROPOSITION 2: *If the first bidder decides that he is going to investigate the target, the optimal level of original debt, Z_1^{0*} , is such that he commits to bid more than his valuation of the target.*

The intuition for this result is as follows. The benefit of having an initial level of debt that commits FB to an aggressive bidding strategy is that to the extent it deters potential entry by SB, it allows FB to acquire the target at a low price of $\bar{P}$. The cost is that because FB has committed himself to bid more than his valuation, if the entry by SB does take place, FB will sometimes end up paying more for the target than it is worth to him. The incremental deterrence benefit of moving from a level of original debt that does not commit FB to overbid to a level that commits him to overbid, if required, is an order of magnitude higher than the incremental cost. The reason is that a small increase in the debt level deters a small set of additional SB types but

for any type that is deterred, the benefit is large since the bidder is able to capture the entire gain. On the other hand, not only is the increase in the probability of overbidding small, as a result of a small increase in the debt level, the cost due to overbidding is also small. However, at higher levels of debt, the marginal benefit of deterrence may be outweighed by the marginal cost because of possible overbidding.

For SB, however, committing to an aggressive bidding strategy is never advantageous.

PROPOSITION 3: *The optimal level of original debt for the second bidder, Z_2^{0*} , is such that he commits not to bid more than his valuation of the target.*

The intuition for this result is straightforward. The presence of initial debt may commit SB to bid higher than his valuation of the target. The only reason to commit to bid more than the valuation of the target is to deter competing bidders from entering. Given that SB enters the takeover contest only after FB has already incurred the costs of investigating the target and entered the bidding contest, SB derives no deterrence benefit from having made such a commitment. However, since he may indeed end up acquiring the target at a price that is higher than his valuation of the target, SB will have to bear the expected cost of this commitment *ex ante*.

We now examine some comparative statics results. The first bidder's type t_1 is known to FB at date 0. The optimal level of FB's initial debt, Z_1^{0*} , therefore, is a function only of t_1 . Recall that all FB types, with some probability, can discover any value of G_1 in $[0, H_1]$. Since G_1 becomes publicly observable at date 1, $\hat{t}_2$, defined at date 1, can be expressed as a function of Z_1^{0*} and G_1 , i.e.,

$$\hat{t}_2 = \hat{t}_2(Z_1^{0*}(t_1), G_1).$$

Notice also that $\hat{t}_2$ depends on t_1 only through its effect on the equilibrium value Z_1^{0*} . We can, therefore, examine how different equilibrium values of Z_1^{0*} , that are associated with different values of the exogenous parameter t_1 , are correlated with the endogenous parameter $\hat{t}_2$, for any given value of G_1 .

PROPOSITION 4: *Given a level of G_1 , SB is more likely, at date 1, to be deterred from entering into a bidding contest with FB if FB's type is such that he had chosen a higher level of initial debt Z_1^{0*} at date 0.*

The intuition for this result is as follows. An FB of type t_1 that has a higher equilibrium value of Z_1^{0*} would be willing to bid a higher maximum amount for a given level of G_1 . For SB of any given type, this has two effects. First, for any given level of G_2 , the face value of the debt SB must contract, Z_2^w is higher. This reduces his expected benefit. Second, the critical value of G_2 above which SB wins the contest G_2^w is also higher. This also reduces his expected benefit from entering. Consequently, more types of SB are deterred from entering the bidding contest with FB.

Let P_T^C denote the expected price at date 1 at which the target gets acquired by one of the two bidders conditional on SB entering the bidding contest with FB.

$$P_T^C = \int_{\hat{t}_2}^1 \left[\int_0^{G_2^w} d^{\max}(G_2, Z_2^{0*}) p(G_2, t_2) dG_2 \right. \\ \left. + d^{\max}(G_1, Z_1^{0*}) \int_{G_2^w}^{H_2} p(G_2, t_2) dG_2 \right] \\ \cdot \frac{\theta_2(t_2)}{\int_{\hat{t}_2}^1 \theta_2(t_2) dt_2} dt_2.$$

Notice that P_T^C is defined at date 1, and is a function of Z_1^{0*} and G_1 which we can express as

$$P_T^C = P_T^C(Z_1^{0*}(t_1), G_1).$$

Notice also that P_T^C depends on t_1 only through its effect on the equilibrium value Z_1^{0*} . We can, therefore, examine how different equilibrium values of Z_1^{0*} , that are associated with different values of the exogenous parameter t_1 , are correlated with the endogenous parameter P_T^C , for any given value of G_1 .

PROPOSITION 5: *Given a level of G_1 , the expected price, P_T^C , at which the target gets acquired by one of the two bidders conditional on SB entering the bidding contest with FB is positively correlated with Z_1^{0*} .*

The intuition for the above result is as follows. An FB of type t_1 that has a higher equilibrium value of Z_1^{0*} would be willing to bid a higher maximum amount for a given level of G_1 . Moreover, it also implies that more lower types of SB are deterred from entering the bidding contest (Proposition 4). So, the SB types that do enter are those that are more likely to discover higher values of G_2 and therefore would bid higher. Therefore, conditional on the event that SB enters into a bidding contest with FB, the target gets acquired at a higher expected price.

II. Empirical Implications

The model provides several testable implications.

IMPLICATION 1: *For a given level of gain a bidder can bring to the target, the probability of the bidder facing no competition for the target is positively associated with the level of bidder's existing debt.*

This implication is from Proposition 4. A greater amount of debt represents a greater willingness to bid aggressively in the event competition for the target emerges. Fewer types of second bidders would be willing to investigate and compete against a first bidder with high existing debt.

IMPLICATION 2: The acquisition of the target by a bidder, if no competing bidders enter, leads to an increase in the prices of the bidder's stock as well as bonds.

If there is no entry by competing bidders, the first bidder is able to acquire the target at a relatively low price. This follows directly from our assumptions. But our model implies that the bondholders also escape the expropriation that might have occurred in the event of a takeover battle.

IMPLICATION 3: For a given level of gain a bidder can bring to the target, the average price at which targets get acquired, conditional on there being a takeover battle among two or more bidders, is positively associated with the first bidder's level of debt.

This implication follows from Proposition 5. A higher value of first bidder's debt not only implies that the maximum first bidder is willing to bid is higher but also that more lower types of second bidder are deterred from entering the bidding contest. So, the types of second bidder that do enter the bidding contest are those that are more likely to have higher valuation of the target. Both these effects imply that conditional on there being a bidding contest between two bidders, the average price at which the target gets acquired is higher.

IMPLICATION 4: At the announcement of entry by a competing bidder, the stock price of the first bidder falls.

This is simply an implication of our assumptions. If there is entry, the first bidder either loses the contest or pays a price that is higher than the one if there is no entry. Therefore, the price of the bidder's stock conditional on there being no entry must be higher than the stock price conditional on entry. The stock price of the bidder prior to the announcement of entry by the competing bidder being a weighted average is larger than the price conditional on entry.

IMPLICATION 5: For a given level of gain a bidder can bring to the target, at the announcement of entry by a competing bidder, the rise in the target's stock price is increasing in the first bidder's level of debt.

A first bidder with high debt is less likely to encounter competition and, hence, the announcement of entry by a competing bidder should be a greater surprise. Also, from Implication 3, if there is a takeover contest, this is more likely to result in a higher price being paid for the target.

IMPLICATION 6: The average excess returns for the bondholders of the winning firm, from the time prior to the first takeover announcement to the resolution of the takeover attempt, are smaller when there is a takeover contest than if no competing bidder enters the contest.

The winning first bidder pays more for the target, possibly at the expense of its existing bondholders, when a competing bidder enters the contest compared to the situation when no competing bidder enters.

IMPLICATION 7: *In the case of a takeover contest among two or more bidding firms, the average excess returns to bondholders of the unsuccessful bidders at the resolution of the contest are positive. At the same time, the average excess returns to the stockholders of the unsuccessful bidders are negative.*

In the event that a bidding firm withdraws from a takeover contest, its existing debt will, on average, be valued upwards, having escaped possible expropriation. Stockholders, on the other hand, lose since the very fact that they chose to make the last bid implies that they were expecting to benefit from it.

IMPLICATION 8: *Firms that are more likely to be aggressive first bidders are less likely to have debt with "event risk" clauses protecting the debtholders from expropriation in a takeover contest.⁸*

This Implication follows directly from Propositions 2 and 3. Given our assumption that it is indeed possible to issue new debt that has the same priority as the existing debt, these propositions predict that firms that are more aggressive in identifying targets and bidding for them are more likely to issue debt that is not protected against expropriation in a takeover battle.

III. Concluding Remarks

Under our assumptions, bidding always begins at the preannouncement price of the target and, since the bidding process is costless, the increments in successive bids are small. However, we often do observe first bids being made at a significant premium and increments in successive bids being substantial. These observations can be explained by the presence of bidding costs (Daniel and Hirshleifer (1991)) and asymmetric information about bidder valuation of targets (Fishman (1988)). We have abstracted away from these considerations so as to focus more sharply on the strategic aspects of the role of debt in takeover contests. We believe, however, that the qualitative nature of our results are not affected by the simplifying assumptions made in our model.

Initial investigation and identification of potential targets is possibly a very costly activity. The announcement of a takeover identifies the target and releases valuable information that was expensive to gather and on which potential competitors are able to free-ride. Naturally, this would tend to reduce the incentives potential acquirers have to engage in costly investigation of value-enhancing acquisitions. At the same time, there also exist substantial advantages of being the first bidder in a takeover situation. We have shown that by the strategic use of debt financing in takeovers, first bidders may be able to obtain substantial first mover advantage over potential competitors. We believe that this analysis should add to the extensive policy debate that has centered around the issue of facilitating competition in the takeover process.⁹

⁸ "Event risk" protection is the protection bondholders have in case of an unanticipated event that increases the risk of the firm.

⁹ See Bebchuk (1982), Easterbrook and Fischel (1981, 1982), and Hirshleifer and P'ng (1989).

Appendix

Proof of Proposition 1: We first show that

$$Z_B^{\max} + Z_B^0 > V_T^L + G_B + V_B \quad (8)$$

implies

$$\pi(V_T^H - V_T^L) > V_B - Z_B^0. \quad (9)$$

Substituting (8) in (1) we get $Z_B^{\max} = V_T^H + G_B + (1 - 1/\pi)(V_B - Z_B^0)$. Substituting this expression for $Z_B^{\max}$ back in (8) and rearranging, we get (9).

We now show that if (8) does not hold, neither does (9). If (8) is not satisfied, then

$$Z_B^{\max} \leq V_T^L + G_B + V_B - Z_B^0. \quad (10)$$

Substituting in (1) and rearranging, we get $\pi V_T^H + (1 - \pi)V_T^L + G_B = Z_B^{\max}$. Substituting in (10) and rearranging, we get $\pi(V_T^H - V_T^L) \leq V_B - Z_B^0$.

Now suppose that

$$Z_B^0 \leq \max[0, V_B - \pi(V_T^H - V_T^L)]. \quad (11)$$

This implies that $Z_B^0 > V_B - \pi(V_T^H - V_T^L)$, which is equivalent to (9) which, from Lemma 1, is equivalent to (8). Substituting (8) in (3) and rearranging, we get,

$$D_B^{\max} = \bar{P} + G_B + (1 - \pi)Z_B^0 \left[1 - \frac{V_T^L + G_B + V_B}{Z_B^0 + Z_B^{\max}} \right]. \quad (12)$$

Since $Z_B^0 > 0$ from (11) and substituting (8) in (12), we get $D_B^{\max} > \bar{P} + G_B$.

Now suppose that $Z_B^0 \leq \max[0, V_B - \pi(V_T^H - V_T^L)]$. There are two cases to consider.

Case 1: First consider $V_B - \pi(V_T^H - V_T^L) < 0$, which is equivalent to (5) since $Z_B^0 = 0$ for this case. From Lemma 1 we know (5) implies (4) which, substituting in (3) gives (12). Substituting $Z_B^0 = 0$ in (12) we get $D_B^{\max} = \bar{P} + G_B$.

Case 2: Now consider $V_B - \pi(V_T^H - V_T^L) \geq 0$, which implies $Z_B^0 \leq V_B - \pi(V_T^H - V_T^L)$. Therefore (5) is violated which, from Lemma 1, implies that (4) is violated. Therefore, $Z_B^{\max} \leq V_T^L + G_B + V_B - Z_B^0$. Substituting in (1) and rearranging, we get $D_B^{\max} = \bar{P} + G_B$.

From (12), $D_B^{\max}$ can be expressed as:

$$\begin{aligned} D_B^{\max} + G_B + (1 - \pi) \frac{Z_B^0}{Z_B^0 + Z_B^{\max}} [Z_B^0 + Z_B^{\max} - (V_T^L + G_B + V_B)] \\ = \bar{P} + G_B + (1 - \pi) \frac{Z_B^0}{Z_B^0 + Z_B^{\max}} \left[(V_T^H - V_T^L) - \frac{1}{\pi}(V_B - Z_B^0) \right] \\ < \bar{P} + G_B + (1 - \pi)(V_T^H - V_T^L). \quad \square \end{aligned}$$

Proof of Proposition 2: First notice that

$$\begin{aligned} & \frac{\partial}{\partial Z_1^{0*}} \int_{G_2^w}^{H_2} f_2(G_2, Z_2^{0*}, Z_2^w) p(G_2, t_2) dG_2 \\ &= \int_{G_2^w}^{H_2} \frac{\partial f}{\partial Z_2^w} \frac{\partial Z_2^w}{\partial Z_1^{0*}} p(G_2, t_2) dG_2 - \frac{\partial G_2^w}{\partial Z_1^{0*}} f_2(G_2^w, Z_2^{0*}, Z_2^w) \\ &\leq 0 \end{aligned}$$

since $\partial f / \partial Z_2^w \leq 0$, $\partial Z_2^w / \partial Z_1^{0*} \geq 0$ and $f_2(G_2^w, Z_2^{0*}, Z_2^w) = 0$. Since expected benefit to SB from entering the contest and $\hat{t}_2$ move in opposite directions, we get $\partial \hat{t}_2 / \partial Z_1^{0*} \geq 0$. Taking the derivative of the expression in (6) with respect to Z_1^{0*} we get

$$\begin{aligned} & \int_0^{H_1} \left\{ \theta_2(\hat{t}_2) \frac{\partial \hat{t}_2}{\partial Z_1^{0*}} \left[G_1 - \int_0^{G_2^w} [\bar{P} + G_1 - d_2^{\max}(G_2, Z_2^{0*})] p(G_2, \hat{t}_2) dG_2 \right] \right. \\ & \quad \left. + \frac{\partial G_2^w}{\partial Z_1^{0*}} \int_{\hat{t}_2}^1 [\bar{P} + G_1 - d_1^{\max}(G_1, Z_1^{0*})] p(G_2^w, t_2) \theta_2(t_2) dt_2 \right\} p(G_1, t_1) dG_1. \end{aligned}$$

The term in the first line in the above expression is positive and denotes the incremental benefit from increasing debt. The term in the second line is nonpositive and denotes the incremental cost arising from the possibility of overbidding. If Z_1^{0*} is such that FB does not overbid, the second term is zero, making the overall expression positive. $\square$

Proof of Proposition 3: Since the expected benefit to the equityholders of SB from entering the bidding contest with FB just equals the cost of investigation for SB of type $\hat{t}_2$ (from the definition of $\hat{t}_2$ in (5)), the expected benefit for all claimants of SB must be less than the cost of investigation, i.e.,

$$\left(\int_{G_2^w}^{H_2} [\bar{P} + G_2 - d_1^{\max}(G_1, Z_1^0)] p(G_2, \hat{t}_2) dG_2 \right) - C_2 < 0. \quad (13)$$

Differentiating the expression in (7) with respect to Z_2^0 , we get

$$\begin{aligned} & \int_{t_1 \in T_1} \left[- \frac{\partial \hat{t}_2}{\partial Z_2^0} \left\{ \left(\int_{G_2^w}^{H_2} [\bar{P} + G_2 - d_1^{\max}(G_1, Z_1^0)] p(G_2, \hat{t}_2) dG_2 \right) - C_2 \right\} \right. \\ & \quad \left. + \int_{\hat{t}_2}^1 - \frac{\partial G_2^w}{\partial Z_2^0} [\bar{P} + G_2^w - d_1^{\max}(G_1, Z_1^0)] p(G_2^w, t) \theta_2(t_2) dt_2 \right] \theta_1(t_1) dt_1. \end{aligned}$$

The first term in the big square brackets is negative from (13) and the fact that $\partial \hat{t}_2 / \partial Z_2^0$ can be shown to be negative. The intuition is that an increase in Z_2^0 causes more types to enter but these additional types at the margin make expected losses from the point of view of all claimants. The second term in the big square brackets is also negative if the level of debt, Z_2^0 , SB chooses is such that he commits to bid more than his valuation. The intuition is that

the critical value of G_2 , above which SB wins the contest, goes up, but at that critical value SB overbids at the margin, so overbidding costs go up. $\square$

Proof of Proposition 4: We have seen that $\hat{t}_2 = \hat{t}_2(Z_1^{0*}(t_1), G_1)$. Therefore,

$$\left. \frac{d\hat{t}_2/dt_1}{dZ_1^{0*}/dt_1} \right|_{G_1} = \frac{\partial \hat{t}_2}{\partial Z_1^{0*}}.$$

We have also seen in the proof of Proposition 2 that $\partial \hat{t}_2 / \partial Z_1^{0*} \geq 0$. $\square$

Proof of Proposition 5: We have seen that $P_T^C = P_T^C(Z_1^{0*}(t_1), G_1)$. Therefore

$$\begin{aligned} \left. \frac{dP_T^C}{dZ_1^{0*}/dt_1} \right|_{G_1} &= \frac{\partial P_T^C}{\partial Z_1^{0*}} \\ &= \frac{1}{\int_{\hat{t}_2}^1 \theta_2(t_2) dt_2} \\ &\quad \cdot \left[\int_{\hat{t}_2}^1 \left(\frac{\partial}{\partial Z_1^{0*}} d_1^{\max}(G_1, Z_1^{0*}) \int_{G_2^w}^{H_2} p(G_2, t_2) dG_2 \right) \theta_2(t_2) dt_2 \right] \\ &\quad + \frac{1}{\left(\int_{\hat{t}_2}^1 \theta_2(t_2) dt_2 \right)^2} \theta_2(\hat{t}_2) \frac{\partial \hat{t}_2}{\partial Z_1^{0*}} \\ &\quad \cdot \left[\int_{\hat{t}_2}^1 \left(\int_0^{G_2^w} d_2^{\max}(G_2, Z_2^{0*}) p(G_2, t_2) dG_2 \right. \right. \\ &\quad \left. \left. + d_1^{\max}(G_1, Z_1^{0*}) \int_{G_2^w}^{H_2} p(G_2, t_2) dG_2 \right) \theta_2(t_2) dt_2 \right. \\ &\quad \left. - \left\{ \int_0^{G_2^w} d_2^{\max}(G_2, Z_2^{0*}) p(G_2, \hat{t}_2) dG_2 \right. \right. \\ &\quad \left. \left. + d_1^{\max}(G_1, Z_1^{0*}) \int_{G_2^w}^{H_2} p(G_2, \hat{t}_2) dG_2 \right\} \int_{\hat{t}_2}^1 \theta_2(t_2) dt_2 \right] \end{aligned}$$

First notice that the term that multiplies $\partial \hat{t}_2 / \partial Z_1^{0*}$ in the second square brackets is positive. Since $(\partial / \partial Z_1^{0*}) d_1^{\max}(G_1, Z_1^{0*}) \geq 0$, and $\partial \hat{t}_2 / \partial Z_1^{0*} \geq 0$ from the proof of Proposition 2, the overall sign is positive. $\square$

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