

Pre-Tender Offer Share Acquisition Strategy in Takeovers

Bhagwan Chowdhry and Narasimhan Jegadeesh*

Abstract

This paper models the strategic pre-tender offer share acquisition problem faced by potential bidders in takeovers. The model provides a rational explanation for the seemingly anomalous empirical evidence that the information about the impending tender offers is not fully conveyed through the potential bidders' pre-tender offer trades and for the evidence that a large fraction of bidders do not hold any target shares prior to launching the tender offers. Additional testable implications are also provided.

I. Introduction

Extensive research effort has been devoted to understanding various aspects of the contest for corporate control; however, little, if any, attention has been paid to examining how bidders strategically decide on the extent of open market purchase of target shares prior to tender offers. This is particularly surprising in light of the fact that important papers by Grossman and Hart (1980) and Shleifer and Vishny (1986) (SV hereafter) identify gains on the pre-tender offer shareholdings as a major source of profit for bidders in acquisition ventures. Under the Williams Act, the potential bidder is required to file schedule 13-D with the Securities and Exchanges Commission (SEC) disclosing his holdings and intentions within 10 days after purchasing 5 percent of target shares. Prior to filing the 13-D statement, however, the bidder has monopolistic access to the information concerning the impending tender offer. The intuition provided by Kyle's (1985) analysis of a monopolistically informed trader suggests that during the preannouncement period, the potential bidder should intensely purchase the target shares in the open market until the prices are driven up to the expected post-announcement price. It has been found empirically, however, that not only does the stock price appreciate significantly on announcement of the tender offer, but also that the initial foothold of the bidders at the time of the tender offers shows striking cross-sectional variation.

*Anderson Graduate School of Management, University of California, Los Angeles, Los Angeles, CA 90024, and College of Commerce and Business Administration, University of Illinois at Urbana-Champaign, Champaign, IL 61820, respectively. The authors thank Michael Brennan, David Hirshleifer, **JFQA** Editor Jonathan **Karpoff**, and **JFQA** Referee Robert Hansen for many helpful comments and suggestions.

For instance, Poulsen and Jarrell (1986) report initial footholds of anywhere from zero to nearly 50 percent. Furthermore, in about 40 percent of the tender offers, the bidder holds no target shares prior to the tender offer. Viewed within the context of existing theory, these empirical observations seem to suggest that the bidders follow suboptimal pre-tender offer share purchase strategies.

We model the strategic pre-tender offer share acquisition decision problem faced by bidders in takeovers. Our model builds upon the model of takeover proposed by Grossman and Hart and its later extensions by SV and Hirshleifer and Titman (1990) (HT hereafter). In Grossman and Hart's model, the target shares are held by atomistic shareholders. Each shareholder rationally perceives that his tendering decision in response to a tender offer will not affect the outcome of the offer and, therefore, does not tender his shares unless the bid premium is at least as high as the expected value of gains from the takeover. As a consequence, any tender offer with a premium less than the expected synergistic gains would fail. This tendency of the atomistic shareholders to free ride effectively prevents the bidder from profiting on shares acquired through a tender offer. In our model, the target shares are held by atomistic shareholders so that the bidders are exposed to the free-rider problem. Also, as in SV and HT, the bidder's potential synergistic gain is his private information. Further, we allow for failed tender offers in equilibrium as in HT. The crucial difference in our model is that we allow the size of the bidder's pre-tender offer foothold to be endogenously determined while it is an exogenous parameter in previous literature.

We characterize the unique equilibrium in our setting that satisfies the Cho-Kreps (1987) Intuitive Criterion. In this separating equilibrium, the size of the bidder's holding of target shares fully reveals his private information about potential synergistic gains. The size of the foothold is positively related to the value of these gains. The intuition behind our result is as follows. The low valuation bidder incurs the cost of not acquiring as many shares in the open market at the pre-tender offer price as the high valuation bidder in order to credibly separate himself from the latter. The separation allows him to bid a lower amount in his tender offer than he otherwise would have to, in the presence of the free-rider problem. The high valuation bidder does not have an incentive to mimic the low valuation bidder because, for him, the benefit of a low bid is offset by the cost of mimicking, which has two components. First, to mimic a low bidder type, the high valuation bidder would have to forego the opportunity of acquiring a large foothold at the lower pre-tender offer price. Second, a low bid has a lower probability of success, which hurts the high valuation bidder more since he has more to gain from a successful takeover. The combined cost makes it optimal for the high valuation bidder to follow a separating strategy in equilibrium.¹

We extend our analysis and allow the bidder the potential of diluting minority interest in the event of a successful takeover. In this extended setting, there are two

¹In a paper with a different focus, HT obtain a separating equilibrium in which the bid by itself serves as a signal of the bidder type. They suggest that an endogenously determined mixed strategy followed by the atomistic target shareholders could generate a particular probability schedule for tender offer success that would make it optimal for the bidder to offer a premium equal to the value of the synergy. However, their equilibrium requires that the independent actions of atomistic shareholders generate a specific probability schedule for tender offer success and it is not clear how this could be achieved.

possible equilibria. One of the equilibria is the separating equilibrium discussed above. The other is a partial pooling equilibrium where some of the low bidder types make a pooling bid with zero foothold and the high bidder types follow a separating strategy. Further, we show that no pooling equilibrium where the bidder has a positive foothold is viable. In the partial pooling equilibrium, there is a mass of bidder types who do not hold target shares prior to the tender offer and this result is consistent with the empirical evidence.

The theory developed here provides a rational explanation for the puzzling empirical evidence discussed at the outset and it has other testable implications as well. First, we predict that the size of the pre-tender offer shareholding will be positively related to the value of synergistic gains. Secondly, it is predicted that higher initial shareholding will be associated with higher probability of tender offer success.

The rest of the paper is organized as follows. In the next section, we develop a model and characterize the equilibrium. Section III discusses the empirical implications and relates them to the evidence in the existing literature. Section IV concludes the paper.

II. The Model

In our model, there are two firms, the bidder and the target. The number of outstanding target shares is normalized to one. A majority of the voting shares of the target are held by atomistic shareholders. The bidder observes a level of synergy $Z \in [0, \bar{Z}]$, which he can realize only if he acquires control of the target. The level of synergy Z characterizes the bidder type and Z is not common knowledge. To obtain control of the target, the bidder must acquire at least 50 percent of the target shares. In his attempt to acquire a controlling interest, the bidder can secretly purchase up to α_{\max} shares in the open market, where $\alpha_{\max} < 0.5$. The actual number of shares $\alpha \in [0, \alpha_{\max}]$ that the bidder acquires in the open market is determined endogenously. To consummate the takeover, the bidder must acquire the balance $(0.5 - \alpha)$ through a tender offer.²

The sequence of events unfolds in our model as follows. The bidder observes Z and strategically decides on the extent of open market purchase α . We assume that the bidder can purchase shares in the open market at the original price, which we normalize to zero.³ He then launches a conditional tender offer for the balance, $(0.5 - \alpha)$ shares, required to obtain control of the target at the bid price B . At the time of launching the tender offer, the bidder's shareholding α becomes public information. The strategy of the bidder is summarized by $(\alpha(Z), B(Z))$. In response

²The assumption $\alpha_{\max} < 0.5$ is necessary for purchase through tender offer to make any economic sense. In our model, we assume that this restriction is imposed by the bidder's liquidity constraint. For instance, due to problems posed by moral hazard, financial institutions or investors would not be willing to lend money to the bidder in the absence of adequate collateral. However, adequate funds to finance a tender offer, in the event of success, can be obtained by putting up the target's assets as collateral.

³In general, pre-tender offer share purchases lead to a run-up in the target share price. A formal analysis incorporating this feature involves modeling market microstructure considerations of trading, which is beyond the scope of this paper. The central implications from our analysis, however, are likely to carry over to a more general setting.

to the tender offer, each atomistic shareholder strategically arrives at the tendering decision. Assuming no dilution of the minority shareholders,⁴ the risk-neutral⁵ shareholders would rationally tender their shares only if the bid is at least as large as the expected synergy level, conditional on observing the initial footholdings α and the bid B . Therefore, for a tender offer to be successful, the following restriction, which we refer to as the free-rider condition, has to be satisfied,

$$(1) \quad B \geq E[Z|\alpha, B].$$

If the bidder and the atomistic shareholders were the only players in the takeover game, we would never observe any unsuccessful takeover attempts. One of the important reasons why we do observe failed takeover attempts, we argue, is because in practice, in addition to the bidder and the target shareholders, the target management also plays an important role in determining the success of a tender offer. For instance, Walkling and Long (1984) report that only 37 percent of the tender offers that are resisted by the target management are successful while 88 percent of unresisted offers are successful. They also find evidence that suggests the target managements act in their own self-interest in resisting tender offers. To incorporate these features in our model, we assume that the target is controlled by the management, which holds minority shares β and derives benefit C from control, which would be forfeited if the tender offer is consummated. The distribution from which C is drawn is common knowledge, but the actual realization is known only to the target management; it is the bidder's uncertainty about the actual realization of C that results in failed takeover attempts.

Now, even if the bid in a tender offer satisfies the free-rider condition, the target managers would oppose the offer if the value of the benefits they derive from control exceeds the potential gains on their shareholdings, i.e., if $C > \beta B$.⁶ If the target management chooses to resist the offer, then it unilaterally undertakes certain defensive actions to deter takeover. Examples of such unilateral defensive strategies open to the target management are litigation, capital restructuring, and incorporation of poison pill provisions.⁷ For analytic simplicity, we assume that if the target management chooses to resist a tender offer then the offer will fail⁸ with certainty.⁹

⁴We later extend the analysis and allow for dilution.

⁵Risk neutrality of shareholders is not crucial to the analysis.

⁶This assumes we are in an equilibrium where $B = E[Z|\alpha, B]$, which does obtain in our model.

⁷Several papers describe defensive actions observed in practice. Wier (1983) reports instances where anti-trust suits have been successfully used by target managements to thwart takeovers. Harris and Raviv (1988) demonstrate how capital structure decisions can be used to foil takeover attempts under certain conditions. Dann and DeAngelo (1988) document empirical evidence of defensive capital restructuring. Kamma, Weinthrop, and Wier (1988) discuss the poison pill provisions introduced by UNOCAL that effectively thwarted the tender offer launched by Mesa Partners II for UNOCAL shares. Malatesta and Walkling (1988) discuss some other forms of poison pill securities.

⁸Failure of a tender offer could result either from the bidder's withdrawal of the offer in the face of costly defensive actions or from an inadequate number of shares being tendered by the target shareholders, perhaps due to the disincentives to tendering provided by the provisions of poison pill securities. Such failures are commonly observed in practice. For instance, Asquith (1983) reports that in his sample of 302 takeover attempts, 211 were successful and the remaining 91 bids were unsuccessful and were not followed by any subsequent bid in the next 12 months.

⁹For our results to hold, we only require that there be a positive probability of tender offer failure if the target management chooses to undertake defensive actions. To see this, let π be the probability that

Therefore, the tender offer would be successful only if the free-rider condition is satisfied and if the target management does not resist. The potential actions of the target management in response to a tender offer would depend on the relation between the benefits of control C and the target management's potential capital gains from the tender offer, βB . Let $P(B)$ denote the probability that the value of control, C , is less than βB .

Let the value function $V(B, \alpha; Z)$ be the expected value of the conditional tender offer, at bid price B , to bidder type Z , who has acquired α shares in the open market, ignoring the free-rider Condition (1). The value function, thus defined, is¹⁰

$$(2) \quad V(B, \alpha; Z) = P(B)[0.5Z - B(0.5 - \alpha)].$$

The risk-neutral bidder strategically chooses α and the bid premium B to maximize the value function subject to the constraint imposed by the free-rider condition. Formally stated, the bidder's problem is

$$(3) \quad \max_{\alpha, B} V(B, \alpha; Z) \quad \text{such that} \quad B \geq E[Z|\alpha, B].$$

Let $\alpha^*(Z)$ and $B^*(Z)$ be the solution to the bidder's maximization problem.

The solution to the above problem clearly depends on the specification of the exogenous parameters. For instance, if the distribution of C is degenerate and the only value C could take is \bar{Z}/β , then any bid less than \bar{Z} would always fail and a bid at \bar{Z} would always be successful and, consequently, only the latter bid would be observed. In this case, the free-rider problem and informational asymmetry have no role to play in determining the equilibrium outcome. These issues become important only when the exogenous parameters satisfy certain relatively mild restrictions. We impose these restrictions, which ensure that the free-rider problem is always costly to the bidder and thereby influences the equilibrium outcome. Formally stated, these restrictions are as follows.

Assumption 1. The cumulative distribution of C is continuous.

This assumption implies that $P(B)$ is *strictly* increasing in B .¹¹

Assumption 2. $1/P(B)$ is convex in B .¹²

a bid will succeed conditional on managerial resistance. If $P(B)$ is the probability that the management will not resist, then the unconditional probability of tender offer success is $F(B) \equiv P(B)(1 - \pi) + \pi$. If $\pi < 1$, then all our results will go through with $P(B)$ replaced by $F(B)$ in our subsequent analysis.

¹⁰One might consider a more general formulation in which the managers are less likely to resist when the bidder's initial foothold is high. Our main results continue to hold under this generalization but the solution procedure becomes cumbersome. The probability of success, in that case, depends both on the size of the bid, B , as well as the initial foothold, α . This generalization does not, however, alter the basic intuition behind our results (i.e., Lemmas 1 and 2 continue to hold) although it is not possible to obtain an explicit solution in this setting.

¹¹Since $P(B) \equiv \text{Prob}[\beta B > C]$, $P(B)$ is nondecreasing in B . Continuity of the distribution of C guarantees that $P(B)$ is increasing in B .

¹²Assumption 2 is weaker than the more common assumption of logconcavity of $P(B)$. This assumption is satisfied if $P(B)$ is distributed cumulative Beta, Dirichlet, Exponential, F, Gamma, Wishart, or Weibull, for most (and sometimes all) parameter values. We are grateful to Barry Nalebuff for pointing this out and enabling us to relax our previous assumption.

Assumption 2 guarantees that there is a unique value of the bid, $\hat{B}(Z, \alpha)$, that maximizes the value function $V(B, \alpha; Z)$, since any value of B that satisfies the first order condition for an optimum also satisfies the second order condition for a maximum. Thus, there are no local minima, which implies that a local maximum is also the global maximum.

Assumption 3. The constraint imposed by the free-rider condition is binding for any bidder type whose initial foothold is α_{\max} . Formally,

$$(4) \quad Z > \hat{B}(Z, \alpha_{\max}), \quad \forall Z \in [0, \bar{Z}].$$

To arrive at the restriction on the exogenous parameters imposed by this assumption, note that $\hat{B}(Z, \alpha)$ is increasing in α since

$$\frac{\partial}{\partial \alpha} \left[\frac{\partial}{\partial B} V(B, \alpha; Z) \right] = P'(B)B + P(B) > 0.$$

This implies that the free-rider condition is binding at *all* levels of initial foothold, i.e., if the inequality (4) is satisfied, then

$$(5) \quad Z > \hat{B}(Z, \alpha), \quad \forall \alpha.$$

Since $V(B, \alpha; Z)$ has no local minima in B , we have

$$(6) \quad \frac{\partial}{\partial B} V(B, \alpha; Z) < 0, \quad \forall B > \hat{B}(Z, \alpha).$$

Differentiating (2) with respect to B and rearranging the terms, we get the following restriction on the exogenous parameters, which is imposed by the above assumption,¹³

$$(7) \quad \frac{ZP'(Z)}{P(Z)} < \frac{(0.5 - \alpha_{\max})}{\alpha_{\max}}, \quad \forall Z \in [0, \bar{Z}].$$

Thus, Assumption 3 imposes a restriction on the probability schedule that the elasticity of an increase in the probability of success caused by an increased bid is not too high. It ensures that there *is* a net benefit associated with the ability to bid lower, at least in some neighborhood around the true level of synergy Z .

Assumption 3 essentially implies that, in the absence of the free-rider constraint, all bidder types would prefer to bid less than their synergy level Z and would prefer to bid as low as $\hat{B}(Z, \alpha)$. Therefore, in the presence of the free-rider problem, the constraint in the bidder's objective Function (3) becomes binding. We thereby ensure that both the free-rider problem and the informational asymmetry in our model influence the equilibrium outcome in a nontrivial manner.

We now establish two results that will be useful in the equilibrium analysis.

Lemma 1. In the absence of the free-rider Constraint (1), the value of bidding high is increasing in the bidder's type Z , that is,

$$\frac{\partial}{\partial Z} [V(B', \alpha; Z) - V(B, \alpha; Z)] > 0, \quad \forall B < B'.$$

¹³It can be shown that Condition (4) not only implies Condition (7) but is also implied by it.

Proof. By directly substituting Expression (2) for the value function and taking the derivative with respect to Z , we get

$$\frac{\partial}{\partial Z} [V(B', \alpha; Z) - V(B, \alpha; Z)] = 0.5 [P(B') - P(B)] > 0, \quad \forall B < B'. \quad \square$$

The intuition behind this result is as follows. For any given level of initial foothold α , the benefit derived from bidding low is the same for the bidder regardless of his valuation to the extent that a low bid reduces the cost of purchasing the shares tendered. However, bidding low also reduces the probability of success. A reduced probability of success hurts the bidder more if his valuation is high since he has more to gain from the success of the offer precisely because his valuation is higher. Therefore, the net benefit of bidding lower is higher for the lower valuation bidder.

Lemma 2. In the absence of the free-rider Constraint (1), for any given bid, the cost of choosing a lower level of initial foothold as opposed to a higher level is identical for the bidder regardless of his type Z .

Proof.

$$(8) \quad \frac{\partial}{\partial \alpha} V(B, \alpha; Z) = BP(B) > 0. \quad \square$$

The intuition for this result is straightforward. The cost of choosing a lower level of initial foothold is that the bidder could have acquired additional shares in the open market at a smaller price on average than having to pay B later, with probability $P(B)$, once the tender offer is made. For any given bid B , this expected loss does not depend on the type Z of the bidder.

A. Pooling Equilibrium

We first show that there can be no pooling equilibrium. Let us suppose that there is some range $[Z_l, Z_h]$ in which the bidder types optimally pool in equilibrium. Let Z_m denote $E[Z|Z \in [Z_l, Z_h]]$. All bidder types in the pool must bid at least Z_m or else the free-rider Condition (1) would be violated and the shareholders would refuse to tender. Since the bidder prefers to bid low rather than high (Condition (6)), he would bid exactly Z_m .

Any bidder with valuation greater than Z_m prefers to stay in the pool rather than pay his true valuation. Any bidder with valuation less than Z_m , however, pays more than his valuation and, therefore, has an incentive to defect from the pooling strategy if, by doing so, he could convince the target shareholders that he indeed has a low valuation. For this to be credible, he must choose a strategy that no high valuation bidder type in the pool would mimic.

Let α_m denote the level of initial foothold chosen by the pool. Let us now consider a bid $Z' < Z_m$. It is easy to see that there must exist an $0 \leq \alpha' < \alpha_m$ such that $V(Z', \alpha'; Z') = V(Z_m, \alpha_m; Z')$. If the bidder's valuation were $Z''' \in (Z', Z_h]$, he would strictly *not* have preferred this out-of-equilibrium move to the equilibrium outcome even if the shareholders believed that the out-of-equilibrium move had been made by the lowest type. On the other hand, if his valuation were $Z'' \in [Z_l, Z')$, then he would have strictly preferred this out-of-equilibrium move even if

the shareholders believed that the out-of-equilibrium move came from the highest possible type who would find the deviation superior to his equilibrium move, that is the bidder indexed by type Z' . The intuition is straightforward. The cost of moving to a lower α' is the same for all types (Lemma 2) whereas the benefit of bidding low Z' is higher for lower types (Lemma 1). Since the bidder indexed by Z' is indifferent, all lower types are better off and all higher types are worse off. That breaks the pooling equilibrium since the bidder with $Z'' \in [Z_l, Z')$ could make an out-of-equilibrium move (Z', α') because, by doing so, he can communicate credibly that his valuation is indeed in $[Z_l, Z')$ and that makes him strictly better off.¹⁴ This argument can be extended directly to show that any outcome where bidders in disjoint intervals are pooled will also not survive the Cho-Kreps Intuitive Criterion.¹⁵

So, we have shown the following proposition.

Proposition 1. No pooling equilibrium with a continuum of bidder types survives the Cho-Kreps Intuitive Criterion.

B. Separating Equilibrium

We now show that there exists a unique separating equilibrium that survives the Cho-Kreps Intuitive Criterion.

Let $\alpha(Z)$ denote the foothold acquired by the bidder if his valuation is Z . Now consider the bidder type with valuation $Z - \epsilon$ for any $\epsilon > 0$. The bidder type $Z - \epsilon$ could separate himself from type Z by choosing a level of foothold $\alpha(Z - \epsilon)$ such that type Z has no incentive to mimic type $Z - \epsilon$. This nonmimicry condition can be expressed as¹⁶

$$(9) \quad V(Z - \epsilon, \alpha(Z - \epsilon); Z) = V(Z, \alpha(Z); Z).$$

In other words, type $Z - \epsilon$ chooses a level of foothold $\alpha(Z - \epsilon)$ low enough such that the benefit to type Z of being able to bid low by mimicking type $Z - \epsilon$ is exactly offset by the cost of being forced to acquire a lower level of foothold.¹⁷ From Lemma 2, this cost of having to choose a lower foothold is identical for bidder type $Z - \epsilon$, but the benefit from being able to bid low, from Lemma 1, is higher for type $Z - \epsilon$. Therefore, $V(Z - \epsilon, \alpha(Z - \epsilon); Z - \epsilon) > V(Z, \alpha(Z); Z - \epsilon)$. In other words, type $Z - \epsilon$ is strictly better off by not mimicking the strategy of type Z .

¹⁴To see that $\alpha' \geq 0$, note that $V(Z_m, \alpha_m; Z') \geq 0$ since Z' is in the pool. Therefore, by construction, $V(Z', \alpha'; Z') \geq 0$, which in turn implies that $\alpha' \geq 0$.

¹⁵The argument we have outlined shows that no pooling equilibrium with a foothold $\alpha > 0$ survives. It is easy to see that no pooling equilibrium with $\alpha = 0$ is feasible either. The reason is that all types in the pool with $Z < E[Z|\alpha = 0]$ are better off not bidding at all since, with zero foothold, their expected profits would be negative if they were to bid more than their valuation.

¹⁶Recall that, given Assumption 3, the free-rider condition is binding as an equality and, hence, in the equilibrium, $V(B(Z), \alpha(Z); Z) = V(Z, \alpha(Z); Z)$.

¹⁷From (6), we know that the value function is decreasing in the bid and, from (8), we know that it is increasing in the level of foothold. Therefore, it follows that

$$\alpha(Z - \epsilon) < \alpha(Z), \quad \forall \epsilon > 0.$$

It is conceivable that type $Z - \epsilon$ could choose a level of foothold that is even lower than $\alpha(Z - \epsilon)$ and still be able to separate himself from type Z . However, it is not in the bidder's interest to follow that strategy since it is costly to forego the opportunity to buy target shares at the original smaller price (from (8)). Therefore, the nonmimicry must be satisfied as an equality at equilibrium. This ensures that the separating equilibrium that we characterize is unique.

To obtain the signaling schedule with a continuum of types, $\alpha^*(Z)$, we let $\epsilon \rightarrow 0$ in (9) and impose the boundary condition that the highest type \bar{Z} chooses the maximum possible foothold α_{\max} , since it is costly to choose any level smaller than that. The signaling schedule $\alpha^*(Z)$ satisfies the following differential equation,¹⁸

$$(10) \quad [ZP(Z)]\alpha'^*(Z) + [P(Z) + ZP'(Z)]\alpha^*(Z) = 0.5P(Z),$$

with $\alpha^*(\bar{Z}) = \alpha_{\max}$. The following function is the solution to the above differential equation,

$$\alpha^*(Z) = \frac{0.5}{ZP(Z)} \left[G(Z) - G(\bar{Z}) + \frac{\alpha_{\max} \bar{Z} P(\bar{Z})}{0.5} \right],$$

where $G(Z) \equiv \int^Z P(s)ds$. All bidder types with synergy levels less than $\alpha^{*-1}(0)$ are excluded from the bidding game since these bidder types cannot credibly separate themselves from the higher bidder types.

We now show that the separating equilibrium described above survives the Cho-Kreps Intuitive Criterion. We show that for some out-of-equilibrium beliefs of the investors, all out-of-equilibrium offers lead to rejection by the shareholders. In particular, the shareholders believe that if an out-of-equilibrium offer is made, it is made by the highest valuation bidder who could potentially find that offer superior to his equilibrium strategy.

Consider the bidder with valuation Z' . Suppose he chooses an out-of-equilibrium level of foothold $\hat{\alpha} \neq \alpha^*(Z')$. Let $\hat{\alpha} = \alpha^*(\hat{Z})$. The way the separating signaling schedule was constructed, for him to prefer this out-of-equilibrium offer, he must be able to bid less than \hat{Z} . If the shareholders were to accept this offer, then the bidder with valuation \hat{Z} also has an incentive to mimic this strategy because he also prefers to bid a lower amount. Under the specified out-of-equilibrium beliefs of the target shareholders then, the offer would be rejected since the shareholders, because of the free-rider problem, refuse to tender shares unless the offer is at least as great as \hat{Z} . Therefore, all out-of-equilibrium offers under these beliefs of the shareholders are rejected.

Therefore, the following proposition holds.

Proposition 2. The separating equilibrium with a continuum of bidder types described above is the unique equilibrium that survives the Cho-Kreps Intuitive Criterion.

¹⁸Conditions (6) and (8) ensure that $\alpha^{*'}(Z) > 0$.

C. Equilibrium with Dilution

In this section, we allow the bidder to dilute the minority interest on successful acquisition of controlling shareholdings.¹⁹ Let D denote the amount the bidder can potentially expropriate from the minority shareholders. We assume that D is common knowledge. A target shareholder rationally tenders his shares in response to a tender offer if $B \geq E(Z|\alpha, B) - D$. The bidder's objective function now incorporates the effect of possible dilution and is specified formally as $\max_{\alpha, B} V(B, \alpha; Z) = P(B)[0.5Z - B(0.5 - \alpha) + D]$, such that $B \geq E[Z|\alpha, B] - D$.

It can be easily verified that Lemmas 1 and 2 continue to hold. We still maintain the free-rider assumption, i.e., the assumption that the free-rider problem is costly to all bidders. The restriction on the exogenous parameters imposed by the free-rider assumption now takes on a slightly modified form as below,

$$\frac{(Z - D)P'(Z - D)}{P(Z - D)} < \frac{0.5 - \alpha_{\max}}{\alpha_{\max}}.$$

In this setting, there are two possible equilibria. A separating equilibrium that is qualitatively similar to the one characterized earlier continues to hold. The only difference here is that a bidder type Z bids $(Z - D)$ at equilibrium. However, now a partial pooling equilibrium where the high bidder types follow a separating strategy and the low bidder types acquire a zero foothold and make a pooling bid is also feasible. The partial pooling equilibrium is characterized below.

Let Z_c denote the bidder type who is just indifferent between acquiring a positive foothold $\alpha^*(Z_c)$ given by the separating equilibrium and acquiring no foothold and pooling with the lower types. Z_c solves the following equation,

$$(11) \quad V(Z_c - D, \alpha^*(Z_c); Z_c) = V(Z_p - D, 0; Z_c),$$

where Z_p denotes the mean value of synergy for all types that make nonnegative profits by staying in this pool, i.e., $Z_p = E[Z|\underline{Z} \leq Z \leq Z_c]$, where \underline{Z} is determined by $V(Z_p - D, 0; \underline{Z}) = 0$.

In this partial pooling equilibrium, all bidder types higher than Z_c follow the separating strategy described earlier, but all bidder types in the range $[\underline{Z}, Z_c]$ form a pool with zero foothold. This pool cannot be broken by arguments used earlier in Section I.A. Recall that to be able to break the pool, the bidder types with synergy $Z < Z_p$ must be able to choose a *lower* level of foothold to separate themselves, which is not possible here since all bidder types in the pool acquire a *zero* foothold. Further, under the out-of-equilibrium belief underlying Proposition 2,²⁰ it can be shown that the pool cannot be broken by a defection where some bidder type in the pool defects with a higher foothold. A partial or complete pooling equilibrium with any *positive* level of foothold, however, would *not* survive the Cho-Kreps Intuitive Criterion.

¹⁹These results will also obtain when the bidder is allowed to launch a front-loaded two-tier tender offer since such an offer is equivalent to the potential dilution of minority interest from an analytic perspective (see Spatt (1989)).

²⁰The out-of-equilibrium belief is that all out-of-equilibrium moves are made by the highest bidder type who finds the defection superior to the equilibrium bid.

It is worth noting that all bidder types in the pool have higher gains in the partial pooling equilibrium than in the separating equilibrium, i.e., $V(Z_p - D, 0; Z) > V(Z - D, \alpha^*(Z); Z)$, $\forall Z \in [Z, Z_c)$. To see this, note that Z_c chose not to mimic the separating equilibrium strategy of the bidder type $Z' < Z_c$, which implies that $V(Z_c - D, \alpha^*(Z_c); Z_c) > V(Z' - D, \alpha^*(Z'); Z_c)$. Therefore, using (11), we get $V(Z_p - D, 0; Z_c) - V(Z' - D, \alpha^*(Z'); Z_c) > 0$, and using Lemma 1, we get $V(Z_p - D, 0; Z') - V(Z' - D, \alpha^*(Z'); Z') > 0$, $Z_p \leq Z' < Z_c$. This implies that all bidder types in the pool with valuation at least as high as Z_p have higher gains in the partial pooling than in the separating equilibrium. Now, for the type $Z' = Z_p$, the above implies that $V(Z_p - D, 0; Z_p) - V(Z_p - D, \alpha^*(Z_p); Z_p) > 0$, which means that $\alpha^*(Z_p) < 0$. This implies that all types $Z' \leq Z_p$ in the pool are excluded from the bidding game in the separating equilibrium and, therefore, these types also have higher gains in the partial pooling equilibrium.

III. Related Empirical Evidence

In our model, all bidder types other than \bar{Z} do not acquire as many shares as they could in the open market, prior to the tender offer, even when the open market prices are lower than their planned bid price. They hold back on their open market purchases in order to credibly signal their types and bid a lower amount in the tender offer. This feature of the equilibrium gives rise to cross-sectional dispersion in the level of bidders' footholds.

Furthermore, we show that when the bidder has the potential to dilute minority interest or, equivalently, when the bidder is allowed to make a two-tier offer, a partial pooling equilibrium may obtain. We also show that the bidder types in the pool have zero foothold at equilibrium and a pool at no other level of foothold is viable. This result is consistent with the empirical evidence that a mass of bidders do not own target shares prior to the tender offer. An interesting prediction that emerges from this is that tender offers where the bidder does not already have a foothold are either i) part of a front-loaded two-tier offer, or ii) are offers for less than 100 percent of the outstanding shares so that there is some minority interest left to dilute.²¹

The next implication of our analysis is that the size of the bidder's foothold is positively related to the level of potential synergy and to the tender offer premium. This prediction provides an interesting contrast with the prediction that obtains when α is exogenously specified. Shleifer and Vishny (1986), for example, specify bidders' footholds exogenously and their results suggest that the tender offer premium will be inversely related to the pre-tender offer holdings.²² Mikkelsen and Ruback (1985) report results that support our prediction. They perform their study on a sample of "acquiring" firms that filed schedule 13-D with the SEC, disclosing their holdings of 5 percent or more shares of the "target" and their intentions. They examine the target stock returns through various intermediate events until one of their "outcomes" materializes or until the end of their sample period, in the case of no outcome on a subsample of firms that made no tender offer

²¹We are grateful to JFQA Referee Robert Hansen for pointing this out to us.

²²The focus of Shleifer and Vishny is quite different from ours and, hence, they do not endogenize α .

either on or before the filing date. One of their intermediate events is “the acquirer increasing the size of his holdings of target shares.” Within the context of our model, this event occurs when the acquirer revises upward his assessment of the value of the synergistic opportunity. This event is accompanied by a positive return of 1.07 percent (*t*-statistic of 6.26) on the shares of the target.²³ Franks (1978) reports that, in the months when tender offers are announced, the targets where the bidders have a positive foothold stake experience higher abnormal returns, on average, than the targets where the bidders do not have any prebid foothold stake. This evidence is consistent with the implications of the partial pooling equilibrium where the low types pool with a zero foothold and separate themselves from the high types who acquire positive footholds.

Our model also predicts that the size of the bidders’ pre-tender offer shareholding will be positively related to the probability of success. Using a logistic model, Walkling (1985) reports evidence of such a relation.

IV. Conclusion

A number of important papers, in particular those by Grossman and Hart (1981) and Shleifer and Vishny (1986), have recognized that the gains made on the shares acquired prior to the tender offer announcement are a major source of profit to bidders in acquisition ventures. The important question of how the bidders strategically decide on the extent of the open market purchase prior to making the tender offers had remained unanswered. This paper addresses this question.

We characterize the bidder’s optimal pre-tender offer share acquisition strategy. We are able to provide a rational explanation for the empirical evidence, which suggests that the bidders, who are in sole possession of the information about the impending tender offers, do not seem to behave in a manner predicted by Kyle’s model of monopolistic insider trading. In our model, the low bidder types optimally hold back on their open market purchases even when the open market prices are lower than their planned bid prices, in order to credibly signal their types and bid a lower amount in the tender offers.

We also show that when there is a potential for dilution, a partial pooling equilibrium may obtain and all the bidder types in the pool hold no target shares prior to the tender offer. Furthermore, we demonstrate that there will be no pooling equilibrium where the bidders have a positive level of foothold. The implication of the partial pooling equilibrium is consistent with the empirical evidence that a mass of bidders does not acquire any target shares prior to the tender offer. Additionally, we predict that the size of the bidder’s foothold will be positively correlated with the value of potential synergistic gains and also with the probability of tender offer success. These predictions also appear to be consistent with many of the available empirical results.

²³See Mikkelsen and Ruback (1985), Table 6, p. 539.

References

- Asquith, P. "Merger Bids, Uncertainty and Stockholder Returns." *Journal of Financial Economics*, 11 (April 1983), 51–83.
- Cho, I., and D. Kreps. "Signalling Games and Stable Equilibria." *Quarterly Journal of Economics*, CII (May 1987) 179–221.
- Dann, L. Y., and H. DeAngelo. "Corporate Financial Policy and Corporate Control: A Study of Defensive Adjustments in Asset and Ownership Structure." *Journal of Financial Economics*, 20 (Jan.–March 1988), 87–127.
- Franks, J. "Insider Information and the Efficiency of the Acquisitions Market." *Journal of Banking and Finance*, 2 (Dec. 1978), 379–393.
- Grossman, S. J., and O. D. Hart. "Takeover Bids, the Free-Rider Problem and the Theory of the Corporation." *Bell Journal of Economics*, 11 (Spring 1980), 42–64.
- Harris, M., and A. Raviv. "Corporate Control Contests and Capital Structure." *Journal of Financial Economics*, 20 (Jan.–March 1988), 55–86.
- Hirshleifer, D., and S. Titman. "Share Tendering Strategies and the Success of Hostile Takeover Bids." *Journal of Political Economy*, 98 (April 1990), 295–324.
- Jarrell, G., and M. Bradley. "The Effects of Federal and State Regulations on Cash Tender Offers." *Journal of Law and Economics*, 23 (Oct. 1980), 371–407.
- Jarrell, G., and R. Comment. "Two-Tier and Negotiated Tender Offers: The Imprisonment of the Free-Riding Shareholder." *Journal of Financial Economics*, 19 (Dec. 1987), 283–310.
- Kamma, S.; J. Weinthrop; and P. Wier. "Investors' Perceptions of the Delaware Supreme Court Decision in UNOCAL vs. Mesa." *Journal of Financial Economics*, 20 (Jan.–March 1988), 419–430.
- Kyle, A. S. "Continuous Auctions and Insider Trading." *Econometrica*, 53 (Nov. 1985), 1315–1335.
- Malatesta, P. H., and R. Walkling. "Poison Pill Securities: Stockholder Wealth, Profitability and Ownership Structure." *Journal of Financial Economics*, 20 (Jan.–March 1988), 347–376.
- Mikkelsen, W., and R. Ruback. "An Empirical Analysis of Interfirm Equity Investment Process." *Journal of Financial Economics*, 14 (Dec. 1985), 523–553.
- Poulsen, A., and G. Jarrell. "Stock Trading before the Announcement of Tender Offers: Insider Trading or Market Anticipation." Unpubl. Working Paper, Univ. of Georgia (1986).
- Shleifer, A., and R. W. Vishny. "Large Shareholders and Corporate Control." *Journal of Political Economy*, 94 (June 1986), 481–499.
- Spatt, C. S. "Strategic Analyses of Takeover Bids." In *Financial Markets and Incomplete Information*, Vol. 1 (Theory), S. Bhattacharya and G. Constantinides, eds. Totowa, NJ: Rowman and Littlefield (1989).
- Walkling, R. "Predicting Tender Offer Success: A Logistic Analysis." *Journal of Financial and Quantitative Analysis*, 20 (Dec. 1985), 461–478.
- Walkling, R., and M. S. Long. "Agency Theory, Managerial Welfare and Takeover Bid Resistance." *Rand Journal of Economics*, 15 (Spring 1984), 54–68.
- Wier, P. "The Costs of Anti-Merger Law Suits: Evidence from the Stock Market." *Journal of Financial Economics*, 11 (April 1983), 207–224.