# TENDER OFFERS AND LEVERAGE*

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This paper examines the role of leverage in tender offers for widely held firms. We show that a leveraged "bootstrap acquisition" can implement an outcome that—from an economic perspective—is quite similar to the outcome implemented by the Grossman-Hart dilution mechanism. To raise the funds for the takeover, the raider initially sets up a new acquisition subsidiary that issues debt backed by the target's assets and future cash flows. In the first step of the acquisition, the raider acquires a majority of the target's stock through a tender offer. In a second step, the target is merged with the raider's indebted acquisition subsidiary. The fact that the acquisition subsidiary is indebted lowers the combined firm's share value and thus the incentives for target shareholders to hold out in the tender offer. This allows the raider to lower the bid price, make a profit, and overcome the free-rider problem.

"What this all comes down to is simply withdrawing the warm blood of equity and replacing it with the cold water of debt."

*Fred Hartley, CEO of Unocal.*[1]

## I. INTRODUCTION

The 1980s marked a dramatic change in corporate governance. Buyout firms like Kohlberg, Kravis, Roberts, & Co and corporate raiders like Carl Icahn, T. Boone Pickens, and Ronald Perelman challenged some of the nation's largest companies.

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1. When faced with a hostile takeover bid by T. Boone Pickens (quoted in Wasserstein [2000, p. 168]).



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Bruck [1998] argues: "No prey was too large and no predator too inconsequential—so long as Milken could tap into his magic pools of capital. Overnight, all the rules of survival in the corporate jungle had been rewritten" [p. 14].

The ownership of target firms was often dispersed. To gain control of the target, the raider would typically make a tender offer. One of the characteristic features of the 1980s takeover wave is that tender offers were highly leveraged (e.g., Holmström and Kaplan [2001]). As the raider often had no, or only few, assets of his own, the assets and cash flows of the target firm served as security for his debt. This is commonly known as "*bootstrap acquisition,*" as it enables "the buyer to 'bootstrap' the acquisition of a business and pay off the indebtness with money earned in the acquired company's operations" [Crawford 1987, p. 1].

Compared with its empirical relevance, the role of leverage in tender offers has received little attention in the literature. Beginning with Grossman and Hart [1980], many papers analyze tender offers in which target shareholders are nonpivotal, leading to the well-known free-rider problem (e.g., Shleifer and Vishny [1986], Stulz [1988], Grossman and Hart [1988], Hirshleifer and Titman [1990], Burkart, Gromb, and Panunzi [1998]). All these papers *assume,* however, that the raider finances his bid with cash out of his own pocket. Hence, the role of leverage remains largely unexplored.[2]

An important implication of the free-rider problem is that the tender offer bid price must reflect all future value improvements associated with the takeover. If not, an individual shareholder would rather not tender and capture these gains via the appreciation in the posttakeover share value. But if the raider must cede all takeover gains to target shareholders, the takeover becomes unprofitable for him and will not take place. This is potentially a severe problem, as it casts doubt on the efficiency of the market for corporate control.

Grossman and Hart [1980] show that the free-rider problem can be solved if the raider can dilute the value of minority shares after he assumes control. Dilution lowers the value of minority shares and thus the incentives for target shareholders to become minority shareholders in the raider-controlled firm. The raider

2. On the other hand, papers that consider debt financing—either as a means of payment (e.g., Fishman [1989]) or as a commitment device to deter entry by rival bidders [Chowdhry and Nanda 1993]—do not consider the free-rider problem that is potentially relevant for widely held firms.

can consequently offer a lower bid price in the tender offer, which implies that the takeover may now be profitable. Examples of dilution are the sale of target assets to another company owned by the raider at an artificially low price or the issuance of additional shares exclusively to the raider.

This paper shows that a bootstrap acquisition can implement an outcome that—from an economic perspective—is quite similar to the outcome implemented by the Grossman-Hart dilution mechanism. Unlike dilution, however, the mechanism analyzed here is (i) consistent with the law and legal practice in the United States, and (ii) has been widely used, especially during the 1980s takeover wave.

The main argument is as follows. To raise the funds for the takeover, the raider sets up a new acquisition subsidiary that issues debt backed by the assets and future cash flows of the target firm. In the first step of the transaction, the raider acquires a majority of the target's stock through a public tender offer. In a second step, the target is merged with the raider's acquisition subsidiary. The fact that the acquisition subsidiary is indebted reduces the value of the surviving firm's equity and thus—similar to the Grossman-Hart dilution mechanism—the incentives for target shareholders to hold out in the tender offer.

The following bargaining analogy might help. Suppose that the raider and the target shareholders could bargain over the takeover gains. The Grossman-Hart assumption that target shareholders are nonpivotal implies that they have full bargaining power. Hence, they can extract the full takeover gains, which implies that the takeover is unprofitable for the raider. In contrast, under the mechanism analyzed here the raider pledges—and thus effectively "sells"—some of these gains ex ante to a third party, namely, debt-holders, as security for his debt. While the raider cannot change bargaining powers, he has de facto shrunk the "size of the pie" over which he and the shareholders subsequently bargain. Debt-holders, in turn, are willing to pay the raider the expected value of the pledged cash flows upfront, which allows the raider to make a profit.

This argument is similar to the use of debt as a commitment device in the union bargaining literature [Bronars and Deere 1991; Perotti and Spier 1993; Dasgupta and Sengupta 1993]. There, a firm borrows against its future profits and pays out the proceeds to its shareholders, with the consequence that it need not share these profits in the future bargaining with unions.[3] Bronars and Deere summarize this idea as follows [p. 231]: "A union can extract no more than the present value of future net cash flows at the time of unionization. By issuing debt instead of equity, firms are obligated to repay a portion of future revenues to creditors. Hence, these obligations limit the revenues that a union can extract without driving the firm into bankruptcy."

There is only little empirical work on the relation between the acquirer's leverage and the takeover outcome. While Maloney, McCormick, and Mitchell [1993] find a positive relation between bidders' leverage ratios and bidder returns, and Lang, Stulz, and Walkling [1991] find a negative relation between bidders' leverage ratios and target shareholders' returns, both studies consider bidders' preexisting leverage, not the incremental debt raised to finance the acquisition, which is the focus of this paper.

Finally, while our argument suggests that debt financing can lubricate a takeover deal in a Grossman-Hart type setting, it does not imply that the amount of debt needed to accomplish this goal must be large. In fact, given that the only problem in a Grossman-Hart type setting is that the raider cannot recoup his transaction cost, a minimal amount of debt equal to the raider's transaction cost might be sufficient to ensure that the takeover takes place. Indeed, if debt is costly and the raider's profit is limited due to bidding competition, it is precisely this minimal amount of debt that is optimal. Hence, while our model provides a role for debt in takeovers, it cannot explain LBO-style debt levels (also see the Conclusion).

The rest of this paper is organized as follows. Section II shows how a typical bootstrap acquisition is organized. Section III illustrates our main argument with a simple numerical example. Section IV provides a discussion of the legal foundations of the takeover mechanism analyzed in this paper, with a focus on the remedies that are available to minority shareholders to challenge the second-step merger. Section V considers going-private transactions and freezeouts and examines what role, if any, leverage might play in such a context. Section VI considers a more general model with a continuum of shareholders and uncertainty. It ex-

3. There is one fundamental difference: in the union bargaining literature, a firm borrows against its own future cash flows, while under the mechanism considered here, the raider borrows against the assets and future cash flows of the target firm.

amines the role of bankruptcy costs as well as defensive leveraged recapitalizations and asset sales by the target management. Section VII concludes.

## II. Bootstrap Acquisitions

Takeovers of publicly held firms are frequently accomplished in two steps. In the first step, the raider acquires a majority of the target's voting stock through a public tender offer. In the second step, the target is merged with the raider's wholly owned acquisition subsidiary. Many acquisitions by corporate raiders in the 1980s used this two-step format, but also acquisitions where the acquirer is a large, publicly held company such as, e.g., the Time-Warner acquisition in 1989.[4] This section illustrates how a two-step acquisition format may allow the raider to pledge the assets and future cash flows of the target firm as collateral for his acquisition debt. As noted in the Introduction, this is commonly known as "bootstrap acquisition."

A typical bootstrap acquisition might work as follows. To provide a vehicle with limited liability, the raider organizes a new, assetless acquisition subsidiary (often called "shell company"). The acquisition subsidiary then obtains a loan commitment from lenders by pledging the assets and future cash flows of the target firm as security for its debt.[5] To provide the lenders with a legal recourse to the pledged assets, the loan agreement stipulates that the acquisition subsidiary is later merged with the target firm [Reisman 1981; Garfinkel 1991]. If a majority of the target shareholders tenders, the acquisition subsidiary draws on the loan facility and acquires the tendered shares. At this point, these shares constitute the only security for the acquisition subsidiary's debt. The cash from the acquisition loan is *not* added to the target firm's assets. It is paid out directly to the target's

4. In the Time-Warner acquisition, Time initially acquired 100 million shares of Warner stock in a cash tender offer, which provided Time with a 53.9 percent controlling interest in Warner. In a second step, Warner was merged into a wholly owned acquisition subsidiary of Time, TW Sub, Inc. Warner minority shareholders received common stock of Time, which subsequently changed its name to Time-Warner. For details, see *Paramount Communications, Inc. v. Time, Inc.* [C.A. No. 10670 (Del. Ch. 1989); aff'd in 571 A.2d 1140 (Del. 1989)].

5. "The lender is willing to look initially to the future cash flow and earnings of the acquired enterprise as the source of funds from which its loans will be repaid and to the assets of the acquired entity as collateral for such loans. The seller receives most or all of the purchase price in cash and the acquisition loans become direct liabilities of the new enterprise" [Reisman 1981, p. 313].

shareholders in exchange for their shares as well as to the raider to cover expenses and management fees: "In fact, at no time does the target actually have the funds" [Silverman 1999, p. 523].

In a second step, the target company is merged with the raider's acquisition subsidiary. All existing shares are canceled as a matter of law. In exchange for their shares, minority shareholders receive shares or other securities issued by the surviving firm. Alternatively, if the raider wants to take the firm private, the minority may be cashed out. The legal aspects of this merger are discussed in Section IV. By virtue of the merger, the acquisition subsidiary's debt is assumed by the surviving firm, which implies that it is now formally secured by the previously pledged assets and cash flows.[6] Arguably, "the target company has incurred an obligation and received no benefit, because the funds have passed, in essence, directly from the lender to the shareholders" [Garfinkel 1991, p. 58]. After the merger, the raider implements his business plan, which often involves a partial sale or restructuring of the target company.

## III. Numerical Example

### *III.A. The Model*

Consider a widely held firm (the "target") facing a raider. The target has assets worth $A = 50$, no debt, and hence equity worth $A = 50$. If the raider gains control, he can improve the value of the target's assets by $v = 100$. The control majority is 50 percent.

To gain control, the raider must make a tender offer to the target's shareholders.[7] Following Grossman and Hart [1980], we assume that an individual target shareholder is so small that he ignores any strategic effects of his tender decision on the outcome of the tender offer. In our general model with a continuum of shareholders, this follows naturally from the fact that shareholders are nonatomic. In this section, by contrast, we assume that there are 100 target shareholders with one share each. To rule

6. "The liabilities of the subsidiary, evidenced largely by the borrowing and debt securities issued by the subsidiary, are then assumed by and become the obligations of the resulting company" [Frome and Getzoff 1981, p. 523]. As a result, "the acquired company usually becomes highly indebted or leveraged, displaying a dramatic increase in debt on its balance sheet" [Schwartz 1986, p. 491].

7. We restrict ourselves to tender offers. Bebchuk and Hart [2001] consider combinations of tender offers and proxy contests.

out strategic effects, we must consequently *assume* that no individual shareholder perceives himself as pivotal.

The sequence of events is as follows. At $t = 0$ the raider makes a take-it-or-leave-it, conditional, unrestricted cash tender offer. The offer is conditional on acquiring at least 50 percent of the target's voting stock and unrestricted in the sense that the raider is willing to purchase all shares above this threshold. The offer price per share is denoted by $B$.

At $t = 1$ the target shareholders noncooperatively decide whether to tender their shares. We use the Pareto-dominance criterion to select among multiple equilibrium outcomes.[8] The fraction of tendered shares is denoted by $\beta$. If $\beta < 0.5$, the takeover fails. Conversely, if $\beta \geq 0.5$, the takeover succeeds, tendering shareholders receive $B$, and the raider incurs a private cost of $c = 10$ representing administrative and other expenses.

### *III.B. The Free-Rider Problem*

Given that $v > c$, the takeover is socially efficient. And yet, Grossman and Hart [1980] show that it may fail due to the free-riding behavior of target shareholders. Suppose that the tender offer is financed with cash out of the raider's pocket, and consider the tender decision of an individual shareholder. If he does not tender and the takeover succeeds, he ends up with a minority share worth $(A + v)/100 = 1.5$. To make him indifferent between tendering and not tendering, the raider must consequently offer him $B = 1.5$ in the tender offer. But in this case, the raider makes no profit: he pays $\beta 150$ for the tendered shares and receives shares worth $\beta 150$. In fact, as he incurs additional expenses of $c = 10$, he makes a loss.

Grossman and Hart also provide a solution to the free-rider problem. Suppose that the raider, after gaining control, can dilute the value of the firm's equity by $D = 80$, e.g., by selling assets to another firm he owns at below the market price. The value of a minority share in the raider-controlled firm is now $(A + v - D)/100 = 0.7$, which implies that the raider must only offer $B = 0.7$ in the tender offer. Overall, the raider makes a profit of

8. This is a standard way of ruling out "unreasonable" Nash equilibria (see Grossman and Hart [1980]). For instance, no matter how high the raider's offer price $B$ is, there always exists a Nash equilibrium where nobody tenders: if nobody else tenders, an individual shareholder is indifferent between tendering and not tendering, for the takeover fails irrespective of what he does. This equilibrium outcome is ruled out by Pareto dominance.

$-\beta 100B + \beta 70 + 80 - 10 = 70$, implying that the takeover will take place. The only "problem" with this solution is that it is unlawful (e.g., Amihud, Kahan, and Sundaram [2004]; see also Section IV). In what follows, we show that the raider can accomplish what is essentially the same outcome in a legally admissible way by undertaking a bootstrap acquisition.

### *III.C. Bootstrap Acquisitions*

In the remainder of this example, we consider bootstrap acquisitions of the sort described in Section II. To keep the analysis as close as possible to the original Grossman-Hart framework, we assume that a nontendering shareholder who originally holds one share in the target firm continues to hold one share in the surviving firm. That is, nontendering shareholders de facto hold on to their shares. We consider the other case where nontendering shareholders are cashed out in the merger in Section V.

In the United States the legal system protects minority shareholders against unfair treatment by controlling shareholders. We discuss the various remedies that are available to minority shareholders to challenge the fairness of the merger in Section IV. Given our assumption that minority shareholders can de facto hold on to their shares, this translates into the requirement that the value of their holdings must not fall as a consequence of the merger. In our analysis we refer to this requirement as "legal constraint."

### *III.D. The Basic Argument*

Let $D$ denote the amount of debt issued by the raider's acquisition subsidiary. To illustrate our basic argument, consider an arbitrary debt level of, say, $D = 80$.[9] The posttakeover value of a minority share is then $(A + v - D)/100 = 0.7$. To make target shareholders indifferent between tendering and not tendering, the raider must consequently offer $B = 0.7$ in the tender offer.[10] The unique equilibrium outcome is then that a fraction

9. Target shareholders must have rational expectations about both $v$ and $D$. In practice, they can infer this information from the "Offer to Purchase," which is mailed directly to all shareholders. It contains, among other things, "3. The source and amounts of the funds being used for the offer. 4. The purpose of the offer, including any plans to acquire control, liquidate, sell the assets or merge the target, or to make other major changes in the business or corporate structure of the target" [Wasserstein 2000, p. 714].

10. This is in contrast to a "two-tiered tender offer" where target shareholders receive more in the front end than in the back end of the transaction. In a

$\beta \geq 0.5$ of the target shareholders tenders, while the raider's profit is[11]

$$\Pi = D - \beta 100B - c + \beta(A + v - D). \tag{1}$$

The raider obtains $D$ from the debt issue, pays cash of $\beta 100B + c$ to tendering shareholders and to cover his administrative expenses, respectively, and ends up with a fraction $\beta$ of the surviving firm's equity, which is worth $A + v - D$. Given that $D = 80$ and $B = 0.7$, this implies that he makes a profit of 70, which in turn implies that the takeover will take place.

Minority shareholders end up with either cash of $B = 0.7$ (if they tender) or shares worth $(A + v - D)/100 = 0.7$ (if they do not tender). Compared with the pretakeover share value of $A/100 = 0.5$, this implies that they earn a profit—or takeover premium—of 0.2 per share. Given that there are 100 shares, the total takeover premium is 20. Together with the raider's profit of 70, this adds up to the overall efficiency gain of $v - c = 90$.

This example nicely illustrates the economic equivalence of debt and dilution. In our dilution example above, dilution lowers the value of minority shares by 0.8 per share. Similarly, in our bootstrap acquisition, the acquisition subsidiary's indebtness lowers the value of the surviving firm's equity—and thus the value of minority shares—by 0.8 per share. As the optimal solution is to equate the tender offer bid price with the value of minority shares, the raider makes a profit of 0.8 per share in both ends of the transaction, implying that his total profit (after subtracting administrative expenses) is $(0.8)100 - c = 70$.

In a certain sense, a tender offer can be viewed as a bargain-

standard Grossman-Hart type setting, two-tiered offers are suboptimal as the raider only leaves money on the table by offering more in the front end. In practice, two-tiered offers were made to pressure target shareholders to tender as quickly as possible. This allowed the raider to acquire the target within a short time—often within a weekend (also known as "Saturday Night Special")—thereby leaving rival bidders no chance to make a competing bid. Two-tiered tender offers became virtually extinct in the mid-1980s following the introduction of new SEC rules, notably Rule 13e-3, fair price corporate charter provisions, and changes in state takeover legislation. For a discussion of two-tiered tender offers, see Prentice [1989].

11. There cannot exist an equilibrium where $B = 0.7$ but $\beta < 0.5$: by raising his offer to $B' = B + \varepsilon > 0.7$, the raider can ensure that $\beta = 1$. There also cannot exist an equilibrium where $B > 0.7$: by lowering his offer to $B' = B - \varepsilon > 0.7$, the raider saves money while leaving $\beta = 1$ unchanged. Finally, there cannot exist an equilibrium where $B < 0.7$ and $\beta \geq 0.5$, for any individual shareholder would then be better off not tendering. Hence, the unique (Pareto-undominated) equilibrium outcome has $B = 0.7$ and $\beta \geq 0.5$.

ing game where the raider and the target shareholders bargain over the raider's value improvement. Let $\alpha$ and $1 - \alpha$ denote the raider's and shareholders' respective bargaining powers. In the Grossman-Hart type setting with nonpivotal shareholders, the raider's bargaining power is $\alpha = 0$.[12] While pledging $D = 80$ to a third party (namely, debt-holders) does not change his bargaining power, it reduces the "size of the pie" over which he and the shareholders subsequently bargain. Instead of the full $v = 100$, they bargain only over $100 - D = 20$. In a competitive capital market, the debt-holders are willing to pay the raider the full $D = 80$ upfront (absent any uncertainty, that is). The raider's profit, after subtracting administrative expenses, is consequently $\alpha(v - D) + D = 70$, while the target shareholders' combined profit is $(1 - \alpha)(v - D) = 20$.

### *III.E. Equity Financing*

Equity financing has no effect on the raider's profit. Under equity financing, the acquisition subsidiary sells a fraction of its equity to outside investors. All that changes is that the fraction $\beta$ of the target's equity that is acquired by the acquisition subsidiary is now jointly owned by the raider and the outside investors. We can simply replace "raider" by "investor group," and everything remains the same. Since equity financing is "neutral" with respect to profits, the raider can always issue equity at a fair price to cover any remaining financing needs. This greatly simplifies our analysis, as it implies that we can safely focus on the optimal amount of debt, even when this amount is insufficient to pay for the tendered shares and administrative expenses.

### *III.F. Budget Balancing*

Suppose that we introduce a "budget-balancing" constraint of the sort

$$D = \beta 100 B + c, \tag{2}$$

which stipulates that the amount of debt issued must exactly equal the amount needed to pay for the tendered shares and administrative expenses. In conjunction with the optimality (or "free-rider") condition $B = (A + v - D)/100$, this yields an

12. If there are finitely many shareholders, there is a positive probability that any individual shareholder is pivotal, implying that $\alpha \in (0,1)$ [Bagnoli and Lipman 1988; Holmström and Nalebuff 1992]. Our argument holds as long as $\alpha < 1$, which implies that it extends to settings with pivotal shareholders.

equation system with unique solution $D = [\beta(A + v) + c]/(1 + \beta) = 80$ and $B = (A + v - c)/(1 + \beta)100 = 0.7$, just like in subsection III.D.[13] The raider's profit is also the same, namely, $\Pi = 70$.

Accordingly, even if we impose a restriction that the raider can issue debt only to the extent that it is needed to pay for tendered shares and administrative expenses, the takeover will take place. Evidently, without this restriction the raider's profit may be greater. Indeed, we show next that if the raider can choose $D$ freely subject only to the legal constraint and the constraint that the debt-holders break even, he may issue additional debt to pay himself an upfront fee, thereby raising his overall profit above 70.

### *III.G. Optimal Debt Level*

Inserting the free-rider condition $B = (A + v - D)/100$ in the raider's profit function (1), we obtain $\Pi = D - c$. By inspection, the optimal solution is given by the binding legal constraint, implying that $D = v = 100$. (Since $D < A + v$, debt-holders break even under this solution.) The raider consequently makes a profit of $\Pi = 90$, which implies that he appropriates the full efficiency gain. Target shareholders, on the other hand, are just as well off as before.

This admittedly extreme result is driven by the absence of bidding competition and costs of debt financing. It is nonetheless insightful, however, as it illustrates that—if the raider is able to do so—he might want to raise more debt than what is needed to pay for the tendered shares and administrative expenses. Under the optimal solution, the raider issues $D = 100$ but needs only $\beta 100B + c = 50\beta + 10 \leq 60$ to pay for the tendered shares and expenses. The acquisition subsidiary consequently has leftover funds of $D - 10 - 50\beta = 90 - 50\beta$, which it can pay to the raider as an upfront "management fee."[14]

13. Note that $D$ and $B$ now endogenously depend on $\beta$. The unique equilibrium value of $\beta$ is $\beta = 1$. While target shareholders are (again) indifferent between tendering and not tendering, the raider's profit function (1) is now—unlike subsection III.D—strictly increasing in $\beta$. (To see this, insert $D = [\beta(A + v) + c]/(1 + \beta) = 80$ in (1), and note that $B = (A + v - D)/100$ by optimality.) As the raider can always ensure that $\beta = 1$ by offering $B = (A + v - D)/100 + \varepsilon$, a subgame in which $\beta < 1$ cannot be part of an overall equilibrium.

14. As we pointed out in Section II, the cash from the acquisition loan is fully disbursed, either to the target shareholders or to the raider. Any remaining cash kept in the acquisition subsidiary would only increase the value of the combined firm's assets, thereby raising the equilibrium bid price $B$.

In practice, raiders indeed pay themselves generous upfront fees. In the Revco transaction in 1986, for example, upfront fees paid to the acquirer group amounted to \$54.4 million. This is considerably more than the value of the acquirer group's common stock, which was only \$35 million [Wruck 1997]. Similarly, in the RJR Nabisco takeover by KKR in 1989, upfront fees to the acquirer group amounted to \$780 million [Burrough and Helyar 1990]. Further evidence on the magnitude of upfront fees is found in Kaplan and Stein [1993].

While upfront fees appear to arise naturally from the raider's optimization calculus, our basic argument that efficient takeovers may take place does not depend on upfront fees. As we showed above, if we introduce a "budget-balancing" constraint, upfront fees are ruled out by assumption. And yet, the takeover will take place. Rather, this section is meant to illustrate why raiders might pay themselves generous fees even if this implies that they must raise more debt than needed, thereby reducing the value of their own posttakeover shareholdings.

### *III.H. Bidding Competition*

Bidding competition shifts profits from the raider to the target shareholders, thereby raising the takeover premium. It does not, however, affect our basic argument that efficient takeovers may take place. Suppose that there are two identical raiders, both with a value improvement of $v = 100$ and administrative expenses of $c = 10$. Under perfect (Bertrand) competition, the two raiders compete up to the point where their profits become zero, implying that $D = c = 10$ and $B = (A + v - c)/100 = 1.4$. While the (winning) raider makes zero profits, he is at least able to recoup his transaction cost, which implies that the takeover will take place. By contrast, in the original Grossman-Hart setting without dilution, the raider must bid at least 1.5 per share to induce tendering—with or without bidding competition—implying that the takeover is unprofitable.

The fact that the raider makes zero profits is, of course, an artifact of our assumption that the two raiders are identical. If one raider creates value of $v_1 = 100$ while the other creates value of, say, $v_2 = 80$, the winning bidder (raider 1) sets $B_1 = (A + v_2 - c)/100 = 1.2$ and $D_1 = v_1 - v_2 + c = 30$, which yields a profit of $\Pi_1 = v_1 - v_2 = 20$. Target shareholders then obtain a takeover premium of $(v_2 - c)/100 = 0.7$ per share, or 70 in total. Again, the two profits add up to the overall efficiency gain of 90.

### III.I. Welfare and Policy Implications

In the above examples we have abstracted from any costs of debt financing. Our general model in Section VI, by contrast, has risky debt and bankruptcy costs, which yields interesting welfare results. We can illustrate these results in a simple way by assuming that a promise to repay an amount $D$ permits the raider to raise funds equal to $D - D^2/K$, where $D^2/K$ represents a deadweight bankruptcy cost. Observe that the marginal bankruptcy cost is increasing in $D$: each additional unit of debt increases the probability of bankruptcy, which imposes bankruptcy costs on all inframarginal units.

Modifying (1) accordingly and inserting $B = (A + v - D)/100$, the raider's profit function simplifies to

$$\Pi = D - (D^2/K) - c. \tag{3}$$

Since debt is costly, the optimal debt level may now be lower than under the proposed solution in subsection III.G. (It cannot be higher due to the legal constraint.) In fact, it is easy to see that the optimal solution is now $D = \min\{v, K/2\}$.

The "socially optimal debt level" $D_s$ is the smallest value of $D$ at which the raider's profit is zero. That is, under the socially optimal debt level the proceeds from the debt issue are just sufficient to pay for the raider's administrative expenses of $c = 10$. In this case, the takeover just takes place while bankruptcy costs are minimized. From (3), we have that $D_s = K/2(1 - \sqrt{1 - 40/K})$. As we noted earlier, any resulting financing gap can be easily filled by issuing additional equity.

If bankruptcy costs are prohibitively high ($K < 40$), the takeover is unprofitable. By contrast, if $K = 40$, the optimal debt level is $D = D_s = 20$, the raider just breaks even, and social and private optimality coincide. Finally, if $K > 40$, the raider's privately optimal debt level exceeds the socially optimal level. This is because the raider trades off higher bankruptcy costs against a smaller takeover premium. From a social welfare perspective, the takeover premium is merely a wealth transfer between the raider and the target shareholders, however.

This yields the following policy implications.

(i) Imposing a cap on the raider's leverage can improve welfare. If $K = 45$, for instance, a cap of $D_s = 15$ implements the social optimum, while without this cap the raider would choose $D = 22.5$. Having said this, we want to emphasize that in our model the only benefit of debt is that it mitigates the free-rider problem. If there are additional benefits, the socially optimal cap may be higher, or there may be no optimal cap at all.

(ii) Rules encouraging bidding competition, such as the various SEC amendments to the Williams Act of 1968, can improve welfare. Bidding competition puts an upper bound on the raider's profit and thus on the use of costly debt to appropriate takeover gains. For instance, if $K = 45$, a monopolistic raider who creates value of $v = 100$ would set $D = 22.5$. On the other hand, if there are two identical raiders, each creating value of $v = 100$, the unique equilibrium outcome has $D = D_s = 15$ and $B = (A + v - c - D^2/K)/100 = 1.35$. In this case, bidding competition implements the social optimum: the winning bidder makes zero profits, while the target shareholders obtain a takeover premium of 0.85 per share.

## IV. Legal Foundations

This section discusses the legal foundations of the takeover mechanism analyzed in this paper. The acquisition is accomplished in two steps. In the first step, the raider makes a tender offer for the target's shares conditional on obtaining a majority voting control. In the second step, the raider effects a merger between the target and his indebted acquisition subsidiary. Subsequently, he implements his value improvement. There is no going private or freezeout: nontendering shareholders de facto hold on to their shares and become minority shareholders in the surviving firm, just like in the original Grossman-Hart setting.[15] We conclude with a discussion of why this takeover mechanism—while economically similar to the Grossman-Hart dilution mechanism—is consistent with the law, while dilution is not. We limit our discussion to Delaware law, where more than half of the Fortune 500 firms are incorporated.

Under Delaware law, the raider can effect a merger between the target and his acquisition subsidiary against the will of the target's minority shareholders if he holds 50 percent or more of the target's voting stock. As the merger requires approval by a

15. On going-private transactions and freezeouts, see Section V.

simple majority, the raider can simply vote his own shares in favor of the merger.[16]

The fact that nontendering shareholders retain their proportionate equity ownership does not automatically imply that the merger is fair. The law provides minority shareholders with two basic remedies to challenge the fairness of a merger: they can seek a judicial appraisal of their shares, and they can sue the raider for breach of fiduciary duty.

APPRAISAL REMEDY. In an appraisal action the court determines the fair value of minority shares independently of the raider's offer. The Delaware appraisal statute denies minority shareholders any share in the postmerger gains by stipulating that their shares be evaluated "exclusive of any element of value arising from the accomplishment or expectation of the merger."[17] Accordingly, an appraisal action has a limited objective, namely, "to compensate stockholders for what is taken from them" [Campbell 1999, p. 119], i.e., to ensure that they obtain the equivalent of the premerger share value.[18] In our model, the postmerger share value is never lower, but typically, strictly higher than the premerger share value.

If minority shareholders are not cashed out but instead become shareholders in the surviving firm, Delaware law does not generally provide for appraisal rights.[19] And yet, the appraisal remedy remains relevant since its measure of recovery, the premerger share value, constitutes a lower bound in the determination of fair price in a breach of fiduciary duty suit.[20]

16. Del. Gen. Corp. L. §251.

17. Del. Gen. Corp. L. §262(h). In an appraisal proceeding, the court determines the *intrinsic* value of the target's stock. Simply using the stock's market price is inappropriate as this would naturally also incorporate elements of value arising from the expectation of the merger [Bebchuk and Kahan 2000].

18. "Most commentators have construed Delaware's appraisal statute as excluding from the minority shareholder's remedy any value created by the proposed merger" [Hechler 1997, p. 342]. In *Cede & Co. v. Technicolor, Inc.* [684 A.2d 289 (Del. 1996)], the Supreme Court argued that value created by the acquirer's business plan must be included if the acquirer begins to implement his plan prior to the second-step merger. Commentators view this decision as specific to the case and argue that acquirers can avoid this problem by simply waiting with the implementation of their business plan (e.g., Mahoney and Weinstein [1999]). In our model, we have assumed what appears to be the norm in practice, namely, that the raider implements his business plan after the merger.

19. Del. Gen. Corp. L. §262(b).

20. See, e.g., *Bershad v. Curtiss-Wright Corp.* [535 A.2d 840 (Del. 1987)]. Similarly, Coates [1999, p. 1261] argues that "Delaware courts look to appraisal cases for guidance in deciding whether a given price is fair, even when a merger does not trigger appraisal rights."

SUIT FOR BREACH OF FIDUCIARY DUTY. As a controlling shareholder, the raider owes a fiduciary duty to the minority shareholders. Unlike an appraisal, which is a statutory remedy, the concept of fiduciary duty has developed through the case law. In *Weinberger,* the Supreme Court held that a self-dealing transaction in which a breach of fiduciary duty is alleged must meet the stringent "entire (or intrinsic) fairness" standard of review.[21] Since *Weinberger,* entire fairness has remained the exclusive standard in parent-subsidiary mergers, which implies that it is also the relevant standard in our case [Thompson 1995].

"Entire fairness" has two components: "fair dealing," which is concerned with procedural fairness, and "fair price." Unlike an appraisal action, which is a "creature of statute," an "action for breach of fiduciary duty is a creature of equity."[22] This difference in objectives translates into a difference in the available measure of recovery: in a breach of fiduciary duty suit, the court may award "rescissory damages" [*Weinberger* supra, p. 714].

The term "rescissory damages" is defined in *Lynch:* "The proper measure of damages should be the equivalent value of the stock [. . .] at the time of judgement."[23] As the "time of judgement" is after the merger, this implies that the court may compensate shareholders with the equivalent of the *postmerger* share value. This view is generally shared by commentators: "The court therefore fashioned a 'monetary equivalent' of rescission, awarding damages equal to the value of the plaintiff's shares measured at the time of judgment. This gave the plaintiff the same increment in value as the shareholders who had continued their participation in the enterprise and would differ from appraisal awards, which measured the value of the shares as of the date of the merger" [Burgman and Cox 1984, p. 610]. Similarly: "Under an entire fairness test the court [. . .] may award damages that reflect a post-merger appreciation of the stock" [Resnick 2003, p. 260].

In our model, a nontendering shareholder who holds one

21. *Weinberger v. UOP, Inc.* [457 A.2d 701 (Del. 1983)].
22. Vice Chancellor Jack B. Jacobs in: *Andra v. Blount* [772 A.2d 183 (Del. Ch. 2000), p. 192].
23. *Lynch v. Vickers Energy Corp.* [429 A.2d (Del. 1981), p. 501]. When mentioning rescissory damages as the appropriate remedy, the court in *Weinberger* explicitly referred to *Lynch.*

share in the target firm continues to hold one share in the surviving firm. His incremental gain is thus precisely what he could expect under the rescission remedy in a breach of fiduciary duty suit.

Let us summarize. The posttakeover value of a minority share in our model either equals or exceeds the consideration a minority shareholder can expect under the appraisal remedy or rescission remedy in a suit for breach of fiduciary duty. A minority shareholder therefore has, prima facie, no reason to challenge the merger. The requirement that minority shareholders must receive at least the premerger share value also implies that, in order to make a profit, the raider *must* create additional value. Hence, using a bootstrap acquisition does not allow the raider to acquire target shares for less than their pretakeover value; it merely allows him to appropriate some of the value he creates after the takeover.

From an economic perspective, the takeover mechanism considered here is similar to the dilution mechanism in Grossman and Hart [1980]. And yet, the law treats the two mechanisms differently. A controlling shareholder who sells assets to another company he owns at below the market price, issues shares exclusively to himself, or borrows against the firm's assets and uses the proceeds for personal consumption, violates his duty of loyalty or his fiduciary duty vis-à-vis minority shareholders or both.[24] This is true even if he creates value, as is assumed in the Grossman-Hart type literature. Under the relevant law, value creation and dilution are regarded as two separate actions that are evaluated independently of each other. In the case of a merger, by contrast, the law adopts a "before-after perspective" by drawing the line on the date of the merger. Either minority shareholders do not benefit at all from the raider's value improvement, or if rescissory damages are awarded, they might benefit from an appreciation in the postmerger share value. By definition, the postmerger share value is an aggregate measure reflecting all postmerger elements (here: value creation and debt) combined.

The fact that Delaware law treats economically equivalent methods of extracting private benefits differently has been noted before (e.g., Gilson and Gordon [2003]). This is related to Dela-

24. The controlling shareholder's actions are in conflict with Del. Gen. Corp. L. §144, *Sinclair Oil Corp. v. Levien* [280 A.2d 717 (Del. 1971)], or *Weinberger* [supra]. See Siegel [1999] for details.

ware's "doctrine of independent legal significance": "Under this rule, a transaction effectuated under one statutory section and providing one set of powers and rights is evaluated solely under that section, regardless of the fact that the transaction may be the economic equivalent of one that could have been accomplished under another section with a different set of powers and rights" [Mitchell 1992, p. 612]. This inherent conflict between different sections of the law is not viewed as a problem, though. Rather, it is viewed as a way to let "corporate participants choose among different statutory alternatives for dealing with precisely the same functional activity" [Gilson 2001, p. 509].

## V. Going-Private Transactions and Freezeouts

To stay as close as possible to the original Grossman-Hart framework, we have assumed that nontendering target shareholders can de facto hold on to their shares, thus becoming minority shareholders in the surviving firm. To mitigate the free-rider problem, the raider must consequently lower the post-merger share value—similar to the Grossman-Hart dilution mechanism. Alternatively, the raider might decide to take the firm private. In this case, nontendering shareholders do not become shareholders in the surviving firm but are cashed out in what is known as a "freezeout merger."

Given that minority shareholders can be cashed out, is there any role for leverage? To answer this question, consider again our numerical example. Let $P$ denote the per-share price offered to minority shareholders in the freezeout, and recall that $A/100 = 0.5$ is the premerger share value. To protect minority shareholders from being cashed out at an unfair price, the law provides them both with appraisal rights and the right to sue the raider for breach of fiduciary duty. Both remedies have been discussed in Section IV.

If the following "freezeout condition" holds, the first best can be easily attained.

Freezeout Condition. If the freezeout is on the same terms as the preceding tender offer, and if minority shareholders receive at least the premerger share value, then a breach of fiduciary duty suit provides no effective recourse against the freezeout.[25]

The freezeout condition states that—provided the raider sets $P = B \geq A/100$—he can fully insulate the freezeout merger against any legal challenges. This is irrespective of the fact that the actual postmerger share value may be much higher than $P$. If this is true, the raider can set $P = B = A/100 = 0.5$ and extract the full efficiency gains (see Amihud, Kahan, and Sundaram [2004]). Moreover, since the first best can be attained, it is unnecessary to additionally lower the postmerger share value, e.g., through leverage or dilution. More generally, *any* method of mitigating the free-rider problem previously suggested in the literature becomes redundant.[26]

While this first-best result is intriguing, it is also fragile. Precisely: it requires that the freezeout condition holds with *certainty*. But there is no passage in the Delaware statute that provides for such a condition at all. In fact, breaches of fiduciary duty are governed by case law, not by statutory law.[27] If the freezeout condition does not hold with certainty, however, the argument crumbles. In fact, freezeouts may then become *completely ineffective* in overcoming—or even only mitigating—the free-rider problem.[28]

To see this, suppose that the freezeout condition only holds with probability $1 - \varepsilon$. With an arbitrarily small probability $\varepsilon > 0$, however, the court rules that the raider has violated his fidu-

25. Note that this condition does not mention the appraisal remedy. As we argued in Section IV, the appraisal remedy's limited objective is to ensure that minority shareholders receive the premerger share value.

26. Amihud, Kahan, and Sundaram [2004, p. 1334] conclude: "It has been shown in the literature that such factors as large shareholdings, asymmetric information and risk-arbitrage can resolve the free-rider problem [. . .] We find that none of these factors has now [i.e., when freezeouts are introduced] an impact."

27. There is, to our knowledge, also no Delaware case that would uphold this freezeout condition. Still, one might argue that the court might interpret the fact that a majority of the target shareholders tendered on the same terms as the freezeout as (indirect) approval of the freezeout. This notion has been rejected in *In Re Pure Resources, Inc. Shareholders Litigation* [C.A. No. 19876 (Del. Ch. 2002)] and *In Re Emerging Communications, Inc. Shareholders Litigation* [C.A. No. 16415 (Del. Ch. 2004)]. Effectively, the court ruled that only a vote on the freezeout itself can establish such approval, not a tender by a majority in the preceding tender offer.

28. This does not mean that going private has no value. There are many other, good arguments why controlling shareholders might want to go private; see Fama and Jensen [1983].

ciary duty despite offering $P = B = A/100 = 0.5$. As discussed at length in Section IV, the measure of recovery in this case is rescissory damages, which implies that minority shareholders will receive the monetary equivalent of the postmerger share value. In the absence of leverage, this postmerger share value is $(A + v)/100 = 1.5$.

To induce target shareholders to tender, the bid price in the tender offer must equal or exceed the expected value from not tendering; i.e., $B \geq (1 - \varepsilon)P + \varepsilon 1.5$. As coercive two-tiered offers of the sort $B > P$ can be safely ruled out (see subsection III.D as well as Amihud, Kahan, and Sundaram [2004, footnote 9]), this immediately implies that—to induce target shareholders to tender—the raider must offer $P \geq B \geq 1.5$. Indeed, the raider's optimal offer in this situation is $P = B = 1.5$.

To summarize, if the freezeout condition holds with certainty, the raider can offer $P = B = 0.5$ and attain the first best. On the other hand, if the freezeout condition holds only with probability $1 - \varepsilon$, it is a strictly dominant strategy for target shareholders not to tender if $P = B = 0.5$. With probability $1 - \varepsilon$ they will receive $P$, and thus the same value as in the tender offer, while with probability $\varepsilon$ they will obtain a strictly higher value, namely, the postmerger share value $(A + v)/100 = 1.5$. To induce tendering, the raider must consequently offer the full postmerger share value both in the tender offer and the freezeout merger. But this implies that he makes no profit, and the free-rider problem is back in full force.

It is now a small step to argue that in such a situation, leverage might be useful. While the raider must still offer the full postmerger share value in both the tender offer and the freezeout merger, this postmerger share value is lower when the acquisition is leveraged (see Section III). Accordingly, the raider can offer both a lower bid price $B$ and a lower freezeout price $P$. Given that the argument is analogous to that in Section III, it is straightforward to repeat our previous analysis for the going-private case. The qualitative results are all the same; the only difference is that minority shareholders are cashed out, and that the raider eventually holds 100 percent of the target's shares instead of only a fraction $\beta$.

As an illustration, consider the case examined in subsection III.D, where $D = 80$. The analogue of the raider's profit function (1) for the going-private case is

$$\Pi = D - \beta 100B - (1 - \beta)100P + (A + v - D) - c.$$

The raider obtains $D$ from the debt issue and pays cash of $\beta 100B$ to tendering shareholders, $(1 - \beta)100P$ to nontendering shareholders in the freezeout, and $c$ to cover administrative expenses. In return, he ends up with 100 percent of the surviving firm's equity, which is worth $A + v - D$. By our above argument, the raider's optimal offer is $P = B = (A + v - D)/100 = 0.7$. Given that $D = 80$, this implies that he makes a profit of 70, just like in subsection III.D.

## VI. General Model

### VI.A. Extension of the Basic Model

This section generalizes our numerical example in Section III to a continuum of shareholders and stochastic takeover gains. It analyzes, among other things, the role of bankruptcy costs for the takeover outcome and the welfare of target shareholders, and the use of defensive leveraged recapitalizations and asset sales by the target management as a way to impair the raider's borrowing capacity.

The structure of the model and timing of events is the same as in Section III. Rather than assuming that $v$ is deterministic, however, we now assume that the raider's value improvement is randomly distributed over $[0,\bar{v}]$ with density $f(v)$ and cumulative density $F(v)$. For analytical convenience, we assume that $f(v)/[1 - F(v)]$ is nondecreasing in $v$.[29]

For most of our analysis, the target's preexisting assets play no particular role. They become important only when we consider defensive leveraged recapitalizations and asset sales. Until then, let us set $A = 0$ for simplicity. The value of $v$ is realized at $t = 2$. If $v \geq D$, debt-holders receive the nominal debt value $D$. In contrast, if $v < D$, debt-holders receive only $(1 - k)v$, where $k \in (0, 1)$ indicates that a fixed fraction of the asset value is lost in bankruptcy. Our qualitative results are the same with fixed bankruptcy costs.

In our numerical example in Section III, we assumed that there are 100 target shareholders with one share each. In this

29. This is known as Monotone Hazard Rate Property. It is implied by, and hence is weaker than, the Monotone Likelihood Ratio Property, which is satisfied by many standard distributions [Milgrom 1981].

section we directly follow Grossman and Hart [1980] by assuming that target shareholders are nonatomic, which naturally implies that no individual shareholder is pivotal. This requires a slight change in notation. The relevant unit of measurement is now no longer an individual share but the target firm's total equity. If we denote the tender offer bid price by $b$, this implies that the raider pays a total of $\beta b$ for the tendered shares.

### *VI.B. Bankruptcy Costs*

We first examine the implications of bankruptcy costs for the welfare of target shareholders and the efficiency of the takeover market. Analogous to (1), we can express the raider's profit as

$$\Pi = (1 - k)\int_0^D vf(v)\,dv + D\int_D^{\bar{v}} f(v)\,dv - \beta b - c + \beta\int_D^{\bar{v}} (v - D)f(v)\,dv. \tag{4}$$

The raider obtains $(1 - k)\int_0^D vf(v)\,dv + D\int_D^{\bar{v}} f(v)\,dv$ from the debt issue, pays cash of $\beta b + c$ to tendering shareholders and to cover administrative expenses, respectively, and ends up with a fraction $\beta$ of the surviving firm's equity, which is worth $\int_D^{\bar{v}} (v - D)f(v)\,dv$.

By optimality, the raider sets

$$b = \int_D^{\bar{v}} (v - D)f(v)\,dv, \tag{5}$$

which implies that (4) simplifies to

$$\Pi = \int_0^{\bar{v}} vf(v)\,dv - c - \int_D^{\bar{v}} (v - D)f(v)\,dv - k\int_0^D vf(v)\,dv. \tag{6}$$

The first two terms represent the expected takeover gains, the third term represents the takeover premium accruing to the target's shareholders, and the last term denotes the expected bankruptcy costs. The raider thus faces a simple trade-off. On the one hand, an increase in $D$ reduces the takeover premium. On the other hand, it increases expected bankruptcy costs.

Maximizing (6) with respect to $D$, we obtain

$$1 - F(D) = kDf(D), \tag{7}$$

where the optimal debt level is unique and satisfies $D \in (0, \bar{v})$.[30] The first-order condition (7) has a natural interpretation: the left-hand side depicts the marginal reduction in the takeover premium when $D$ is increased by one unit, while the right-hand side depicts the corresponding marginal increase in expected bankruptcy costs.

We can now discuss the implications of the optimal solution.

(i) It immediately follows from (6) that there exists a critical value $\bar{c}$ such that the raider's profit is positive at the optimal solution if and only if $c < \bar{c}$. The takeover consequently takes place if and only if the expected takeover gains are sufficiently large.

(ii) In Section III we defined the socially optimal debt level $D_s$ as the smallest value of $D$ at which the raider's profit is zero. On the other hand, we just showed that—*if* the takeover takes place—the raider's profit is generally *strictly* positive, except in the nongeneric case $c = \bar{c}$. By continuity of $\Pi_D$ and $\Pi_{D=0} < 0$, this implies that, generically, the raider's privately optimal debt level exceeds the socially optimal debt level. The intuition is straightforward. In (6) the raider minimizes the sum of the takeover premium and expected bankruptcy costs. He consequently takes on additional debt as long as the marginal reduction in the takeover premium exceeds the marginal increase in expected bankruptcy costs. Since the takeover premium is a pure wealth transfer from the raider to the target shareholders, however, this implies that the raider's privately optimal debt level lies above the social optimum.

Points (i) and (ii) are summarized in the following proposition.

PROPOSITION 1. The takeover takes place if and only if the expected takeover gains are sufficiently large. As the takeover premium is a pure wealth transfer between the raider and

30. The fact that $D \in (0, \bar{v})$ is obvious. Uniqueness follows from continuity and the assumption that $f(D)/[1 - F(D)]$ is nondecreasing.

target shareholders, the raider takes on too much debt relative to the social optimum.

(iii) Differentiating (5) with respect to $k$, we obtain

$$\frac{db}{dk} = -\frac{dD}{dk}[1 - F(D)] = \frac{D[1 - F(D)]}{f(D) + k[f'(D)D + f(D)]} > 0,$$

where $-f(D) - k[f'(D)D + f(D)] < 0$ is the second-order condition for a maximum. *If* the takeover takes place, target shareholders are thus better off in regimes with high bankruptcy costs: when bankruptcy costs are high, the raider takes on less debt, which implies a higher takeover premium.

(iv) By (6) and the envelope theorem, the raider's profit at the optimal solution is decreasing in $k$. Hence, if bankruptcy costs are excessive, the takeover does not take place. Precisely, there exists a critical value $\bar{k} = \bar{k}(c)$ given by

(8)

$$\Pi = (1 - \bar{k}) \int_0^{D(\bar{k})} vf(v)\, dv + D(\bar{k}) \int_{D(\bar{k})}^{\bar{v}} f(v)\, dv - c = 0,$$

such that the takeover takes place if and only if $k \leq \bar{k}(c)$. If $c$ is small, we have $\bar{k}(c) = 1$. For all other values of $c$, it holds that $\bar{k}(c) < 1$, where differentiating (8) with respect to $c$ yields $d\bar{k}/dc < 0$.

Points (iii) and (iv) are summarized in the following proposition.

PROPOSITION 2. If the expected takeover gains are sufficiently large, target shareholders unambiguously benefit from an increase in bankruptcy costs: it raises the takeover premium without affecting the takeover likelihood. Otherwise, target shareholders benefit from an increase in bankruptcy costs only if those remain below a critical threshold, which is increasing in the size of the expected takeover gains.

### *VI.C. Defensive Leveraged Recapitalizations and Asset Sales*

Let us finally examine the relation between the target's preexisting net worth and the raider's borrowing capacity. As the target management can manipulate the target's net worth (e.g., by selling assets or undertaking a leveraged recapitalization), this analysis sheds light on the target management's ability to ward off a hostile takeover.

For the purpose of the analysis, we now reintroduce $A > 0$ to denote the target's preexisting assets. Precisely: we assume that $A$ is randomly distributed over $[0,\bar{A}]$ with density $h(A)$ and cumulative density $H(A)$. This provides us with a richer framework in which not only the raider's acquisition debt, but also the target's preexisting debt is risky.

We model the raider's value improvement as a first-order stochastic dominance (FOSD) shift in the probability distribution associated with $A$. The new density and cumulative density functions if the raider implements his value improvement are $g(A)$ and $G(A)$, respectively, where $G(A)$ dominates $H(A)$ in the sense of FOSD. Among other things, this implies that the expected value of the assets in place improves under the raider. Analogous to our earlier assumption regarding $F(v)$, we assume that $g(A)/[1 - G(A)]$ is nondecreasing in $A$.

Denote the target's preexisting debt by $D_t$ and the raider's acquisition debt by $D_r$. To bias our model as much as possible against the possibility that the takeover succeeds, we assume that $D_t$ is senior with respect to $D_r$. If the raider could additionally dilute the target's preexisting debt, this alone might be sufficient to ensure that he makes a profit.[31]

The expected takeover gains can be written as

$$\begin{aligned}(9)\quad & \int_0^{\bar{A}} A[g(A) - h(A)]\,dA + k\int_0^{D_t} A[h(A) - g(A)]\,dA - c \\ &= (1-k)\int_0^{D_t} A[g(A) - h(A)]\,dA + D_t\int_{D_t}^{\bar{A}} [g(A) - h(A)]\,dA \\ &\qquad + \int_{D_t}^{\bar{A}} (A - D_t)[g(A) - h(A)]\,dA - c.\end{aligned}$$

The first row decomposes the expected takeover gains into three

31. Empirically, it appears that the expropriation of target debt-holders is a second-order effect. Wealth losses incurred by target debt-holders are either statistically insignificant or negligible (e.g., Asquith and Wizman [1990] and Warga and Welch [1993]). One reason is that target debt-holders are typically protected by covenants.

parts: (i) the expected change in the value of the target's assets, (ii) the change in expected bankruptcy costs accruing to the target's existing debt-holders, and (iii) the raider's administrative expenses. Since the target's preexisting debt is senior, the target's debt-holders can appropriate a fraction of the expected takeover gains due to the coinsurance effect associated with the FOSD shift. This windfall profit is depicted in the second row.[32] The third row depicts the remaining gains that can potentially be split between the raider and the target shareholders. We shall refer to these as "appropriable takeover gains."

The optimal solution subject to the legal constraint is to offer

$$(10)\quad b = \int_{D_t+D_r}^{\bar{A}} (A - D_t - D_r)g(A)\, dA \geq \int_{D_t}^{\bar{A}} (A - D_t)h(A)\, dA.$$

Hence, at the optimal solution, the tender offer bid price equals the posttakeover share value, where the latter equals or exceeds the pretakeover share value. Going through the same steps as previously, we can rewrite the raider's profit as

$$(11)\quad \Pi = \int_{D_t}^{\bar{A}} (A - D_t)[g(A) - h(A)]\, dA - c$$

$$- k \int_{D_t}^{D_r+D_t} (V - D_t)g(A)\, dA$$

$$- \left[\int_{D_t+D_r}^{\bar{A}} (A - D_t - D_r)g(A)\, dA - \int_{D_t}^{\bar{A}} (A - D_t)h(A)\, dA\right].$$

The first row depicts the appropriable takeover gains, the second row depicts the increase in expected bankruptcy costs, and the third row represents the takeover premium accruing to the target's shareholders. By inspection, the appropriable takeover gains are decreasing in $D_t$. This is the windfall profit accruing to the target's debt-holders mentioned above. What is not immedi-

32. We can rewrite the second row in (9) as

$$(1 - k) \int_0^{D_t} [H(A) - G(A)]\, dA + D_t k[H(D_t) - G(D_t)] > 0,$$

where the sign follows from FOSD.

ately obvious is whether the sum of the three terms in (11)—and hence the raider's overall profit—is decreasing in $D_t$. In the Appendix we show that this is indeed the case. The intuition is straightforward: an increase in the target's preexisting debt limits the raider's ability to pledge target assets as collateral, and therefore his ability to borrow, which in turn lowers his profit. This is summarized in the following proposition.

PROPOSITION 3. An increase in the target's preexisting leverage reduces the raider's profit and thus the likelihood that the takeover takes place.

Proposition 3 is consistent with empirical evidence by Palepu [1986], Billet [1996], and Safieddine and Titman [1999], who all find a significant negative relation between target leverage and takeover likelihood. The argument that an increase in the target's leverage may act as a takeover deterrent is not new; it has been made previously by, e.g., Israel [1991], Stulz [1988], Harris and Raviv [1988], and Zwiebel [1996]. All these papers *assume,* however, that the takeover is financed with cash out of the raider's pocket. The postulated link between target leverage and takeover likelihood in these papers is consequently different from ours. On the other hand, our argument appears to be well-known among practitioners: "The assumption of additional debt reduces the target company's debt capacity, posing an impediment to using the target's surplus debt capacity to fund the acquisition of control" [Wasserstein 2000, p. 831].

An alternative way to impair the raider's borrowing capacity is to sell off target assets.[33] Suppose that the remaining target assets have value $\max\{0, A - S\}$, where $S = \bar{A}$ if all assets have been sold and $S = 0$ if none have been sold. For simplicity, let us assume that the density and cumulative density functions remain $h(A)$, $g(A)$, $H(A)$, and $G(A)$, respectively, with support $[0,\bar{A}]$. If we set $S = D_t$, this model is isomorphic to the one above. In particular, the raider can only improve those assets that have not already been sold, which implies that the appropriable takeover gains shrink to $\int_S^{\bar{A}} (A - S)[g(A) - h(A)]\, dA - c$, just like above.

PROPOSITION 4. A defensive sale of target assets has the same effect as an increase in the target's preexisting leverage.

33. This includes, as a special case, a reduction in the target's cash balance, e.g., through a cash dividend or a share repurchase.

There exist numerous examples where firms disposed of cash or assets when faced with a hostile takeover threat. For instance, in the 1982 takeover fight for Marathon Oil, Marathon granted U.S. Steel the right to buy Marathon's interest in the Yates oil field—one of Marathon's "crown jewels"—at a bargain price of $2.8 billion if a third party acquires more than 50 percent of Marathon's stock. Likewise, oil companies such as Phillips or Unocal undertook substantial defensive restructurings involving increases in cash dividends and share repurchases in the range of 25 to 53 percent [Wasserstein 2000].

## VII. Concluding Remarks

The takeover market is widely believed to play an important role in corporate governance. And yet, Grossman and Hart [1980] show that efficient takeovers may not take place due to the free-riding behavior of target shareholders. This paper shows that a bootstrap acquisition consisting of a front-end tender offer and a back-end merger between the target and the raider's indebted acquisition subsidiary may allow the raider to appropriate some of the value he creates after the takeover, thus mitigating the free-rider problem. While economically identical to the dilution mechanism proposed by Grossman and Hart, this mechanism is (i) consistent with the law and legal practice in the United States, and (ii) widely used, especially in the 1980s takeover wave. In a sense, it may be the best known "legal form of dilution."

As we emphasized in the Introduction, our argument—while providing a positive role for debt in takeovers—does not imply that the amount of debt needed to overcome the free-rider problem must necessarily be large. Hence, it cannot explain LBO-style debt levels. To rationalize such debt levels, one has to resort to other arguments, such as tax benefits [Kaplan 1989] or managerial incentives [Jensen 1986]. Incidentally, Jensen's free-cash-flow argument—while consistent with a high debt-equity ratio—does not require that the takeover itself is leveraged; increasing leverage shortly after the deal is closed is sufficient. Our argument, by contrast, requires that the takeover itself must be leveraged. Finally, an alternative, and potentially very interesting, explanation for the LBO wave during the 1980s is that there was a bubble in the junk bond market, so that raiders could finance their acquisitions by issuing overvalued debt. For a takeover model along these lines, see Shleifer and Vishny [2003].

Given the simplicity of our argument, it is relatively straightforward to extend our model along various dimensions. One such extension is found in Section VI; it concerns defensive leveraged recapitalizations and assets sales by the target management. A previous version of this paper [Müller and Panunzi 2003] contains two further extensions. One considers the possibility that the takeover gains endogenously depend on the raider's effort. This creates a debt overhang problem with the effect that the raider takes on less debt ex ante to provide himself with better incentives ex post. The other extension concerns toeholds. As the raider pays a takeover premium only on those shares he does not already own, the existence of a toehold reduces the benefits of leverage. As a consequence, the raider takes on less debt, which increases the takeover premium paid on those shares held by the target's shareholders.

## Appendix: Proof of Proposition 3

The proof proceeds in two steps. We first derive the raider's optimal debt level. We then show that the raider's profit at the optimal solution is decreasing in the target's preexisting debt $D_t$. Since the second term in (10) is continuous and decreasing in $D_r$, there exists a unique value $\bar{D}_r$ given by

$$\text{(12)} \quad \int_{D_t+\bar{D}_r}^{\bar{A}} (A - D_t - \bar{D}_r)g(A)\, dA = \int_{D_t}^{\bar{A}} (A - D_t)h(A)\, dA$$

such that (10) holds if and only if $D_r \leq \bar{D}_r$.

Given the legal constraint, we can consider a relaxed problem in which the raider maximizes (11) subject to $D_r \leq \bar{D}_r$. Differentiating (11) with respect to $D_r$ yields

$$\frac{\partial \Pi}{\partial D_r} = 1 - G(D_t + D_r) - kD_r g(D_t + D_r).$$

Since the right-hand side is strictly positive at $D_r = 0$, there are two potential solution candidates: a corner solution $D_r = \bar{D}_r$—in which case post- and pretakeover share value coincide—and an interior solution $D_r \in (0, \bar{D}_r)$ given by $\partial\Pi/\partial D_r = 0$.

To compute the effect of $D_t$ on the raider's profit, note that the total derivative of (11) with respect to $D_t$ at the optimal solution is

$$\frac{d\Pi}{dD_t} = \frac{\partial \Pi}{\partial D_t} + \frac{\partial \Pi}{\partial D_r}\frac{\partial D_r}{\partial D_t}, \tag{13}$$

where

$$\frac{\partial \Pi}{\partial D_t} = -kD_r g(D_t + D_r) - \int_{D_t+D_r}^{\bar{A}} g(A)\, dA < 0.$$

Consider first the corner solution candidate $D_r = \bar{D}_r$. For $\bar{D}_r$ to be a solution to the raider's maximization problem, it must be true that

$$\left.\frac{\partial \Pi}{\partial D_r}\right|_{D_r=\bar{D}_r} = 1 - G(D_t + \bar{D}_r) - k\bar{D}_r g(D_t + \bar{D}_r) \geq 0.$$

Moreover, implicit differentiation of (12) using Leibniz's rule yields

$$\frac{\partial \bar{D}_r}{\partial D_t} = \frac{G(D_t + \bar{D}_r) - H(D_t)}{1 - G(D_t + \bar{D}_r)} < 0,$$

where the sign follows from FOSD. Inserting these results in (13) yields $d\Pi/dD_t|_{D_r=D_r} < 0$.

Consider finally the interior solution candidate $D_r \in (0, \bar{D}_r)$. By the envelope theorem, it must hold that $d\Pi/dD_t = \partial\Pi/\partial D_t < 0$, which establishes the result.

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