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Article (Published version)
(Refereed)

Original citation:
Burkart, Mike, Gromb, Denis and Panunzi, Fausto (1998) *Why higher takeover premia protect minority shareholders.* Journal of Political Economy, 106 (1). pp. 172-204. ISSN 0022-3808

DOI: 10.1086/250006

Why Higher Takeover Premia Protect Minority Shareholders

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Posttakeover moral hazard by the acquirer and free-riding by the target shareholders lead the former to acquire as few shares as necessary to gain control. As moral hazard is most severe under such low ownership concentration, inefficiencies arise in successful takeovers. Moreover, share supply is shown to be upward-sloping. Rules promoting ownership concentration limit both agency costs and

This project was initiated when all three authors were at the Financial Markets Group at the London School of Economics. We have benefited from comments by Erik Berglöf, Elazar Berkovitch, Patrick Bolton, Arnoud Boot, Gilles Chemla, Jan Ericsson, Abby Innes, Ronen Israel, Kjell Nyborg, Marco Pagano, Ailsa Röell, Jean Tirole, Luigi Zingales, the editor, an anonymous referee, and seminar participants in Barcelona (Institut d'Anàlisi Econòmica), Basel, Boston University, Bologna, Chicago, the European winter meeting of the Econometric Society, the 1995 meeting of the European Summer Symposium in Financial Markets in Gerzensee, Harvard, London School of Economics, Madrid (Centro de Estudios Monetarios y Financieros), Milan (Bocconi), Massachusetts Institute of Technology, Naples, Nordic Symposium on Corporate and Institutional Finance in Sandvika 1995, Pavia, and Stockholm (Stockholm School of Economics and Institute for International Economic Studies). Financial support from Universitá Bocconi (grant Struttura della proprietá azionaria, mercato dei capitali e regolamentazione) and Bankforskningsinstitutet (Burkart) is gratefully acknowledged. All remaining errors are our own.

[*Journal of Political Economy,* 1998, vol. 106, no. 1]

the occurrence of takeovers. Furthermore, higher takeover premia induced by competition translate into higher ownership concentration and are thus beneficial. Finally, one share–one vote and simple majority are generally not optimal, and socially optimal rules need not emerge through private contracting.

I. Introduction

The separation of ownership and control has long been recognized as a crucial feature of modern corporations, and much research has focused on the conflicts of interest between shareholders and managers. Some authors point at managerial equity ownership as a way to align the parties' interests; managers with larger claims on the firm's cash flow are more prone to act in the interest of their (outside) shareholders (Jensen and Meckling 1976). Others emphasize that a well-functioning market for corporate control allows the replacement of management that does not maximize shareholders' return (Manne 1965). Additionally, the mere threat of being removed, it is argued, induces managers to act in the shareholders' interest. Most of this literature examines the takeover mechanism with regard to agency problems involving the *incumbent* management. In particular, Grossman and Hart (1980) argue that inefficient management need not be vulnerable to a takeover bid. Because of the shareholders' free-rider behavior, the outsider does not make a profit on shares acquired in a tender offer, and so too few takeovers occur.[1]

In contrast, this paper analyzes the takeover mechanism with regard to agency problems with the *new* controlling party. The central proposition is that as a result of the shareholders' free-rider behavior, outsiders find it optimal to acquire as few shares as needed to gain control. The resulting underconcentration of cash flow claims maximizes posttakeover moral hazard and the associated inefficiency.

More specifically, the model assumes that, after the takeover, the new controlling party, henceforth the bidder, can frustrate the minority shareholders of part of the (potential) improvement in share value by allocating some corporate resources to the production of private benefits. On the margin, the extraction of private benefits yields less utility gains than it costs. As the bidder owns more shares, he internalizes a larger part of this inefficiency, and moral hazard

[1] Moreover, the takeover mechanism itself has been shown to give rise to considerable agency problems, e.g., managerial entrenchment (Shleifer and Vishny 1989).

becomes less severe. Therefore, social surplus and the value of minority shares are increasing in the bidder's final holding. These results do not hinge on the chosen framework with inefficient extraction of private benefits but are general and carry over to any standard moral hazard model with costly effort.

At the tender offer stage, atomistic shareholders do not tender unless the offered price matches the posttakeover share value (Grossman and Hart 1980). This free-rider behavior has two consequences. First, the equilibrium supply of shares is increasing in the bid price. Shareholders are indifferent between tendering and retaining their shares at a low price only if they anticipate a low minority share value and hence a small fraction tendered. As the bid price increases, the minority share value that leaves shareholders indifferent also increases, and so must the anticipated fraction of shares tendered. Second, all the improvement in security benefits brought about by the bidder goes to the shareholders. The bidder is not compensated ex ante for abstaining from extracting private benefits ex post. As a result, he aims at maximizing his private gains. Since the opportunity cost of extraction increases with his final holding, the bidder's profits decrease with his final holding, provided that he has gained control. The upward-sloping supply curve allows him to make a bid low enough to attract as few shares as necessary, thereby maximizing private gains.

Both positive and normative implications can be derived. First, bidders favor gaining control by methods that do not necessitate the acquisition of large stakes. For instance, they will concentrate on acquiring equity with high rather than low voting power. Second, corporate governance rules (e.g., one share–one vote) that lead to the acquisition of larger stakes (of return rights) increase the takeover premium, the value of minority shares, and social surplus in takeovers. Similarly, a higher bid premium due to competition leads to the tender of more shares and an increase in social surplus and in the posttakeover share value. Third, a larger control majority and a higher bid price induce, however, less extraction of private gains and lower bidders' profits, thereby preventing some desirable takeovers.

Incumbent shareholders take these features into account when designing corporate decision rules. They trade off higher takeover premia and minority share value against a higher probability of takeover. For instance, if there are only two classes of equity, voting and nonvoting shares, it is shown that the one share–one vote rule need not be optimal. Instead issuing nonvoting shares may be desirable because it leads to a higher takeover probability or increases security benefits in competitive takeovers.

Finally, socially optimal rules need not emerge through private contracting for two reasons. First, in contrast to incumbent shareholders, a social planner will take into account the bidders' private benefits net of takeover costs when balancing takeover probability versus takeover gains. Hence, the social cost of deterring bidders is higher than the shareholders' deterrence cost. Second, shareholders will favor rules (e.g., restricted offers) leading to high premia in takeover contests even if they do not translate into more concentrated ownership. Shareholders will thereby emphasize the socially neutral transfer of private benefits from bidders to themselves at the expense of ex post efficiency.

The present paper is by no means the first to examine transfers of control and their regulation in terms of their private and social value. Grossman and Hart (1980) show that free-riding by target shareholders can prevent efficient transfers of corporate control. To overcome this problem, bidders should be allowed to dilute minority shares. Grossman and Hart also find a discrepancy between socially and privately optimal dilution levels. This paper extends their analysis and argues that the free-rider behavior lowers social surplus and the minority share value in takeovers that actually occur. Evaluating the one share–one vote rule, Grossman and Hart (1988) argue that the amount of shares that the controlling party needs to hold serves as a screening device in control contests. By considering a moral hazard rather than an adverse selection problem, the present paper provides new results conflicting with their conclusions.

The paper is organized as follows. Section II outlines the model. Section III shows that the optimal bid leads to an underconcentration of ownership, thereby maximizing moral hazard ex post. Section IV derives implications for several corporate governance rules in the case of a single bidder. Section V extends the analysis to bidding contests. Section VI discusses the case of value-decreasing bidders. Section VII reviews the related literature. Section VIII presents concluding remarks.

II. The Model

The model considers a widely held company facing a potential acquirer (henceforth the bidder). If the bidder gains control, he can generate a value improvement $v > 0$, relative to the share value under the current management, which is normalized to zero. In addition, the bidder is also able to divert part of the value improvement as private benefits. The company's governance rules are such that a successful takeover requires at least 50 percent of its voting rights, and all shares carry the same number of votes. Tender offers are the only admissible mode of takeover. When confronted with an offer, the incumbent management is assumed to remain passive. The sequence of events unfolds as follows.

In stage 1, the bidder makes a take-it-or-leave-it, conditional, unrestricted tender offer:[2] he submits a price b at which he has to buy all shares tendered, subject to his holding a final stake greater than or equal to 50 percent. The bidder may be endowed with an initial stake $\omega \in [0, 1/2)$, which is common knowledge.[3]

In stage 2, the firm's shareholders noncooperatively decide whether to tender (part of) their shares. Shareholders are assumed to be homogeneous and atomistic. They do not perceive themselves as pivotal for the outcome of the tender offer. Let α denote the total fraction of shares tendered.

In stage 3, if $\alpha < 1/2 - \omega$, the takeover fails. Otherwise the bidder gains control and his final holding amounts to a fraction $\beta = \alpha + \omega$. In addition to the bid price, the successful bidder has to pay a fixed cost c of administrating the takeover.[4] He then decides how to allocate corporate resources: they may be used either to generate private benefits to the bidder or to improve all shareholders' security benefits. This decision is modeled by the bidder's choice of $\phi \in [0, 1]$ such that security benefits are improved by $(1 - \phi)v$, whereas private benefits $d(\phi)v$ are realized. It is assumed that the marginal production of private benefits is less efficient than the marginal improvement of security benefits. More precisely, the following properties are assumed.

ASSUMPTION 1. The function $d(\phi)$ is twice continuously differentiable, strictly increasing, and concave on $[0, 1]$, with $d(0) = 0$, $d'(0) = 1$, and $d'(1) = 0$.

The function $d(\cdot)$ and the value improvement v are common knowledge. Whether c is known only by the bidder or is common knowledge is irrelevant at this point. Finally, the Pareto-dominance criterion is used to select among multiple equilibrium outcomes.[5]

Two features of the extraction of private gains are crucial for the

[2] Section *B* of the Appendix examines unconditional bids. Sections IV*C* and V*D* analyze restricted offers without and with bidding contests, respectively.

[3] Takeover regulations in the United States, the United Kingdom, and the European Community Directive require bidders to disclose their initial stakes.

[4] Whether the fixed cost accrues at stage 3 or 1 is irrelevant in the case of a single bidder. The latter may be interpreted either as costs incurred when searching for a target or as costs of preparing a bid.

[5] Coordination among shareholders on the Pareto-dominating equilibrium is furthered by control share acquisition laws. Adopted by more than 15 states in the United States, they require that the acquirer gains approval by a majority of all outstanding shares and by a majority of disinterested shares (Karpoff and Malatesta 1989).

results: inefficiency and uniformity. The bidder's private gains, measured in monetary terms, are, on the margin, less than the aggregated loss in security benefits incurred to extract them. Extraction of private benefits affects the value of all shares equally; that is, the bidder cannot discriminate among shares when choosing ϕ.

There are various ways in which a controlling party can employ corporate resources in a manner that primarily serves its own interest rather than that of all shareholders. A prominent example is the excessive retention of free cash flow. Furthermore, even if it is optimal that cash be reinvested within the firm, management has been known to follow non-value-maximizing investment policies such as acquisitions motivated by empire-building ambitions or the diversification of corporate activities. Distortions of the capital allocation among the firm's divisions in order to subsidize the less efficient ones can also serve the private interest of the controlling party. Finally, a more extreme example is the straight expropriation of minority shareholders by the controlling party through, for example, transactions at preferential terms.

Numerous studies document self-serving actions by controlling parties (see Shleifer and Vishny 1997). For instance, studies that examine the behavior of controlling parties threatened with the loss of their private control benefits give clear evidence of such agency problems. Moreover, the observed premium at which blocks trade relative to the posttrade share value implies that control is valued; that is, controlling parties receive benefits that do not accrue to other investors. Probably some of the most compelling evidence of self-serving behavior and its mitigation through equity ownership stems from the literature on management buyouts. Jensen (1989) argues that increased managerial ownership in leveraged buyouts provides strong incentives for managers to abstain from wasteful investments and self-serving actions.[6] Empirical studies (e.g., Kaplan 1989) document postbuyout operating improvement and value increases and attribute them to improved incentives rather than to wealth transfers.

This paper's results are not specific to the chosen framework with inefficient extraction of private benefits but would also obtain in a standard moral hazard framework with costly effort. Suppose, for example, that after the takeover the bidder chooses effort e at a cost $\psi(e)$ that increases security benefits by ev, where $\psi(e)$ is increasing

[6] According to Jensen, ''More than any other factor, these organizations' [leveraged buyout partnerships] resolution of the owner-manager conflict explains how they can motivate the same people, managing the same resources, to perform so much more effectively under private ownership than in publicly held corporate form'' (p. 65).

and convex. Then inefficient misallocation translates into inefficient shirking ($e = 1 - \phi$). Because of the free-rider problem, the bidder does not get compensated ex ante for the effort ex post and will thus acquire as few shares as necessary so as to maximize his incentive to shirk. However, in the absence of toeholds, the same free-rider problem makes private benefits necessary for tender offers to be profitable. The difference between the two formulations is that within the extraction framework, private benefits are derived at a public cost, whereas within the effort framework, public gains are generated at a private cost. Using the former avoids having to assume exogenous private benefits.

Finally, the assumption of inefficient extraction implies that firm value is increasing in the bidder's final stake. Hence, the model in effect assumes that managerial share ownership has only a positive alignment effect since it reduces agency problems. Potential negative entrenchment effects are ignored (see Mørck, Shleifer, and Vishny 1988; Stulz 1988). Such effects, however, are less likely to operate in this paper's framework because a successful bidder owns at least 50 percent of the voting rights and hence is fully entrenched.

III. Tender Offer and Ex Post Moral Hazard

This section shows that the tender offer mechanism only partially resolves the moral hazard problem inherent in the separation of ownership and control. More precisely, the shareholders' free-rider behavior results in the maximization of posttakeover moral hazard and the associated inefficiency. Additionally, some implications are derived for the supply of shares.

A. *Optimal Bid*

The tender offer game is analyzed by backward induction: the share supply function and the resulting optimal bidding strategy are derived in turn. Consider the bidder's problem at stage 3. If $\beta = \omega + \alpha < 50$ percent, the takeover failed. If $\beta \geq 50$ percent, the successful bidder pays c and chooses the allocation ϕ, maximizing his profit $\beta(1 - \phi)v + d(\phi)v - c$.

Lemma 1. The extraction of private benefits chosen by the bidder is strictly decreasing in his final holding.

The proof is given in section *A* of the Appendix. When choosing ϕ, the bidder inefficiently reduces the value of both his and the minority shares. As β increases, the bidder internalizes more of the inefficiency and extracts less private benefits. A direct consequence of the inverse relationship between ϕ and β is the positive relationship between the value of the minority shares and the bidder's final stake. Note that for the bidder's choice of ϕ, only his final holding matters; his toehold and the takeover cost are irrelevant.

Finally, denote by ϕ^{β} the allocation satisfying the bidder's first-order condition for a given β. For instance, if the bidder holds 50 percent, he will choose $\phi^{50\%}$. By assumption, $d'(0) = 1$, which implies $\phi^{100\%} = 0$. Hence, $\phi^{\beta} \in [0, \phi^{50\%}]$ for all $\beta \geq 50$ percent.

Since shareholders are atomistic, each of them accepts the offer at stage 2 if and only if $b \geq (1 - \phi)v$. This inequality will be referred to as the free-rider condition. In contrast to models in which ϕ is exogenous, there does not exist a dominant strategy. Whether the free-rider condition is satisfied for a given bid depends on the bidder's final holding, about which each shareholder needs to form an expectation, $\hat{\beta}$.

LEMMA 2. For all bids b, there exists a single Pareto-dominant rational expectations continuation equilibrium outcome. More precisely, (i) for $b < (1 - \phi^{50\%})v$, the bid fails; (ii) for $b \in [(1 - \phi^{50\%})v, v]$, the bid succeeds and a fraction $\alpha \in [1/2 - \omega, 1 - \omega]$ is tendered such that $b = (1 - \phi^{\omega+\alpha})v$; and (iii) for $b > v$, the bid succeeds and all $1 - \omega$ shares are tendered.

The proof is given in section *B* of the Appendix. The rational expectations equilibrium with $b \in [(1 - \phi^{50\%})v, v]$ requires that $\beta = \hat{\beta}$ and that shareholders are ex ante indifferent between tendering and retaining their shares. The latter condition implies that the bid has to be equal to the expected minority share value. Suppose to the contrary that either $b > (1 - \phi^{\hat{\beta}})v$ or $b < (1 - \phi^{\hat{\beta}})v$. In the former case, nontendering shareholders would be better off accepting the offer; in the latter case, tendering shareholders would be better off retaining their shares.

Note that since shareholders are indifferent between tendering and retaining their shares, an increase in the bid price also benefits nontendering shareholders. Moreover, as the deadweight loss associated with the extraction of private benefits is increasing in ϕ by assumption, the inverse relationship between b and ϕ also implies that the social surplus increases with the bid price.

It is worth pointing out that only the equilibrium outcome of stage 2 has been determined, not an equilibrium of the shareholders' strategies. For instance, the equilibrium outcome obtains when shareholders behave symmetrically, each tendering his shares with probability α and retaining them with probability $1 - \alpha$. Provided that the law of large numbers holds, exactly a fraction α of all shares is tendered in equilibrium (see sec. *B* of the Appendix for details).

At stage 1, the bidder chooses a bid price b to maximize his profit

$$\Pi(b) = (\omega + \alpha)(1 - \phi)v + d(\phi)v - \alpha b - c$$

subject to gaining control, that is, $\beta \geq 50$ percent.

LEMMA 3. The takeover has a unique equilibrium outcome: (i) for $c \leq [\omega(1 - \phi^{50\%}) + d(\phi^{50\%})]v$, the bidder offers $b = (1 - \phi^{50\%})v$, and his final stake is $\beta = 50$ percent; and (ii) for $c > [\omega(1 - \phi^{50\%}) + d(\phi^{50\%})]v$, the takeover does not take place.

The proof is given in section *C* of the Appendix. Since the bidder has to pay exactly the minority share value, he cannot make any profit on the tendered shares.[7] Hence, in the absence of a toehold ($\omega = 0$), his private gains constitute his only profit. Ex ante, the bidder would like to commit to distorting the resource allocation as much as possible. However, given that the extraction of private benefits involves a deadweight loss, this threat is not credible. If his final fraction is larger, he will distort the resource allocation to a lesser extent. By offering a low price, the bidder ensures that he does not acquire too many shares and thereby maintains high incentives to extract private benefits ex post.

Note that the bid price and the bidder's final holding are independent of his toehold. Indeed, because of the free-rider problem, his only gains are his private benefits $d(\phi)v$ and the value improvement of his initial stake $\omega(1 - \phi)v$. As a result, his marginal return from increasing his holding by offering a higher price and reducing extraction is $[-\omega + d'(\phi)]v$. Since $\omega < 50$ percent $\leq \beta$ and in equilibrium $\beta = d'(\phi)$, the same corner solution obtains for all ω.[8]

The conclusions of the analysis above are summarized in proposition 1. They will be central to the remainder of the paper.

PROPOSITION 1. The bidder's final holding is increasing in his bid. An increase in the bid price/final holding (i) increases social surplus, (ii) increases tendering and nontendering shareholders' return, and (iii) reduces the bidder's surplus. Hence, the bidder's optimal bid is low enough to gain control with as few shares as necessary. As a result, social surplus and security benefits are minimized.

Notice that two ingredients are necessary for the optimality of

[7] Note that the bidder bears the costs of extracting private benefits on his toehold but not on the shares he acquires. That is, although ex post the bidder bears these costs, they are already reflected in the bid price and are thus passed on to the tendering shareholders.

[8] This clear-cut result relies on the assumption that $d'(0) = 1$. If instead $d'(0) < 1$ were assumed, the loss on the initial stake might exceed the private gains. In this case, the bidder would not extract any private benefits and would offer a price equal to v. A sufficient condition for no extraction is $\omega > d'(0)$. The fraction tendered, however, would be indeterminate in the range $[1/2, 1]$ since the value of the minority share does not depend on the bidder's final holding.

holding only 50 percent: a public good problem and a commitment problem. First, a shareholder's decision to tender creates an externality for other shareholders. Indeed, when the bidder acquires more shares, the value of the remaining minority shares is higher. However, because of the free-rider problem, shareholders cannot compensate the bidder ex ante (by means of a large supply for a low price) for refraining from extracting private benefits ex post. Second, the bidder faces a time consistency problem. For instance, he cannot commit to distorting the allocation maximally should he receive less than 100 percent of the shares.

The bidder finds himself in a situation akin to that facing an entrepreneur in need of outside finance. Neither of them can commit ex ante to a specific behavior ex post. When the entrepreneur sells part of the return rights to outside investors, his incentives to exert effort fall. Anticipating this adverse incentive effect, outside investors pay less per share when the entrepreneur retains a smaller stake. The entrepreneur bears the full costs of going public (Jensen and Meckling 1976). In the present paper, the problem is reversed. The dispersed sellers anticipate that the (minority) share value will depend on the size of the bidder's final holding. Hence, all the gains from concentration go to them. The bidder responds by aiming at the minimum level of ownership concentration necessary, thereby maintaining his incentives to extract private gains.

The optimality of bidding for only 50 percent is also due to the bidder's perfect knowledge of the supply curve. When the bidder is uncertain about the actual supply curve, he may sometimes hold more than 50 percent and tender offers may sometimes fail. With sufficient noise, a bidder will not aim to ensure success with probability one. Increasing the probability of success by bidding higher increases the expected fraction of tendered shares but lowers expected private gains.[9]

B. *Upward-Sloping Supply Curve*

The previous analysis derived an equilibrium for a continuum of bid prices, where shareholders are indifferent between tendering and retaining their shares. This further feature is of interest in itself.

PROPOSITION 2. The supply of shares is strictly increasing in the bid price.

As the minority share value is increasing in the bidder's final hold-

[9] In some countries (e.g., Sweden), tax savings through the transfer of losses and gains among companies are allowed only for fully owned subsidiaries, providing an incentive to acquire 100 percent (Bergström, Högfeldt, and Högholm 1994).

ing (lemma 1), the equilibrium condition $b = (1 - \phi^{\beta})v$ implies that the fraction tendered increases in the bid price. That is, the bidder's scope for reducing the minority share value after having gained control generates an upward-sloping supply curve. This result relies solely on the increasing inefficiency associated with the extraction of private gains or on any other posttakeover moral hazard problem.

Empirical evidence seems to indicate that the number of shares supplied in a tender offer indeed increases with the bid premium (Hirshleifer 1995). The present model captures this feature even though shareholders are, by assumption, homogeneous and free-ride. In contrast, many takeover models that incorporate these two assumptions fail to generate an upward-sloping supply curve. Moreover, previous models reproducing such a curve seem to be geared to this very purpose. They rely either on uncertainty or on exogenous differences among shareholders. More precisely, an upward-sloping supply curve can also obtain if the shareholders' (common) opportunity costs of tendering are unknown to the bidder (Stulz 1988; Hirshleifer and Titman 1990); if they vary across shareholders because of, for example, liquidity needs, tax rates, or differing views about the value of the target firm (Bebchuk 1985*a*); or if each shareholder's marginal opportunity cost of tendering increases as he tenders more shares. In this paper, the opportunity cost of tendering is endogenous and increases with the *total* number of shares tendered. Yet, it is known to the bidder, uniform across shareholders, and for each shareholder constant in the number of shares that he tenders.

Note, moreover, that uncertainty per se (i.e., without heterogeneous shareholders) can generate only an upward-sloping *expected* supply curve. A higher bid price is more likely to exceed the shareholders' opportunity cost of tendering, inducing all shareholders to tender. However, ex post, all shareholders either tender or retain the shares. In contrast, in this paper, the actual supply curve is upward-sloping. Introducing opportunity costs unknown to the bidder would lead to uncertainty about the actual position of the supply curve, without affecting its shape.

IV. Corporate Decision Rules: The Single-Bidder Case

The previous section has shown that the maximization of social and shareholders' surplus requires that the bidder acquires as large a stake as possible. However, because of the free-rider problem, the bidder has the incentive to acquire as small a stake as possible. This conflict calls for rules designed by the social planner (e.g., through state legislation) or by the initial shareholders (in the corporate charter) to reduce these shortcomings of the tender offer mechanism. This section examines the impact of some commonly observed rules. Section V provides an analysis of competition among bidders. The model is extended as follows.

In stage 0, the social planner or the initial shareholders choose corporate decision rules. This choice is made under uncertainty about the characteristics $(c, \omega, v, d(\cdot))$ of the bidder appearing at stage 1. The probability distribution of these characteristics is known. The dispersed ownership structure is taken as given. The social planner maximizes expected social surplus $E[[(1 - \phi) + d(\phi)]v - c]$, whereas shareholders are assumed to maximize expected security benefits $E[(1 - \phi)v]$.

A. *Supermajority Rule and Security-Voting Structure*

The firm's security-voting structure and majority rule influence the amount of return rights that the new controlling party needs to hold. For simplicity, the analysis is restricted to two classes of shares: voting shares with a fraction s of return rights and nonvoting shares with a fraction $1 - s$ of return rights.[10] Denote $\kappa \in [1/2, 1]$ the control majority, that is, the fraction of votes required to gain control. For instance, $\kappa = 50$ percent corresponds to the simple majority rule.

LEMMA 4. The probability of a takeover is (weakly) decreasing in κs. Given that a takeover occurs, neither the expected premium nor the expected net social surplus need be monotonically increasing in κs.

The proof is given in section *D* of the Appendix. Acquiring nonvoting shares is of no use in gaining control. Furthermore, it reduces the bidder's private gains by increasing his final holding. Hence, he will bid only for voting shares so as to hold the required control majority, that is, a fraction κs of return rights. Increasing κs forces the bidder to hold a larger fraction of return rights. This implies lower gains available to the bidder to cover the takeover cost. Consequently, fewer potential bidders will find it profitable to undertake a tender offer. Note that, *for a given potential bidder,* the mitigation of the moral hazard problem through an increase in the control majority results in a higher minority share value and thus a higher takeover premium. This statement, however, does not generally hold

[10] In the comparative static exercises that follow, it is assumed that $\omega < \kappa s$, where ω is the fraction of return rights initially held by the bidder. Otherwise, the bidder's final holding is ω (instead of κs) either because he already has control or because he acquires control by selling nonvoting shares and buying voting shares.

true in expected terms. Indeed, the conditional expected takeover premium may be decreasing in κs. For instance, an increase in κs may deter those bidders who are highly inefficient at extracting private gains and were offering the highest premia.[11]

Lemma 4 has implications for the optimal security-voting structure that contrast with the results in the literature regarding the optimality of the one share–one vote rule.

PROPOSITION 3. For a given majority rule, the one share–one vote rule may prevent too many takeovers. Hence, it need maximize neither social surplus nor security benefits.

Consider an increase in the fraction of voting shares for a given majority rule. On the one hand, it reduces unambiguously the likelihood of a takeover. On the other hand, it may or may not have beneficial effects on the conditional expectation of the net social surplus and the shareholder return. Under the one share–one vote rule, the takeover probability is minimized, whereas neither the conditional expected net social surplus nor the conditional expected takeover premium is necessarily maximized. Consequently, there is no reason why the one share–one vote rule should be the solution to the social planner's or the shareholders' optimization problem. For instance, issuing some nonvoting shares is likely to be optimal when takeover costs are substantial. In contrast, when bidders face no costs, there is no potential for preventing takeovers, and one share–one vote is both socially and privately optimal for any majority rule. In general, however, no single rule will optimally resolve in all circumstances the trade-off between fewer takeovers and more efficient takeovers (respectively, higher takeover premia).

Since the effects described above are due to changes in the product κs, the majority rule and the security-voting structure are substitutes. The same value of κs is obtained for different pairs (κ, s). It is thus equally true that, given a security-voting structure, neither the social surplus nor the security benefits need be maximized under any given majority rule, such as the simple majority. While proposition 3 does not identify an optimal security-voting structure, it provides a rationale for nonvoting shares (or shares with low voting power). Nonvoting shares increase bidders' gains and hence promote the occurrence of takeovers. This consideration, however, abstracts from the consequences that nonvoting shares have on the ease with which a party can entrench itself.

[11] The independent and identical distribution of the bidders' characteristics is not sufficient to ensure that the conditional expected takeover premium is increasing in κs. This statement holds true, however, if the uncertainty pertains exclusively to the takeover cost c.

For both the social planner and the shareholders, the optimal rule trades off the improvement brought about by a bidder against the likelihood of a tender offer. Yet, socially optimal decision rules need not emerge from private contracting.

Proposition 4. The target shareholders' optimal decision rule requires the bidder to hold more return rights than the socially optimal rule, and the resulting takeover probability is less than socially optimal.

The proof is given in section *E* of the Appendix. As κs, the number of return rights required to gain control, increases, the likelihood of a takeover decreases. For the shareholders, the marginal cost of deterring bidders is smaller than the social cost since they do not take into account the bidder's private benefits net of the takeover cost. As a result, shareholders will pick a rule that deters more bidders than is socially optimal.[12] In particular, for a given majority rule, target shareholders will tend to choose a security-voting structure that is closer to one share–one vote than is socially optimal, thereby preventing some efficient takeovers. Conversely, for a given security-voting structure, they will set a higher majority rule than is socially optimal.

Although this section's results were developed within a dual-class share system, they can be extended to more sophisticated security-voting structures. Consider several classes of shares carrying different voting power. The bidder will acquire the required control majority by acquiring the least number of return rights possible. That is, he bids first for the shares with the highest voting power, then for those with the second-highest voting power, and so on until he reaches the control majority. Hence, this section's results extend naturally since the fraction of return rights that any such multiclass share structure forces the bidder to hold can be replicated within a dual-class system by choosing κ and s appropriately.

B. Freeze-out

A compulsory acquisition limit (CAL) entitles a bidder who holds more shares than a threshold f after a tender offer[13] to freeze out the remaining minority shareholders, that is, to force them to sell on the terms of the offer. The common motivation is to prevent a small group of shareholders from frustrating the complete success

[12] A value of $c > 0$ implies that the socially optimal level of return right κs required to gain control is not the corner solution that minimizes the bidder's surplus in a takeover. Hence, it also implies that the inequality in proposition 4 is strict.

[13] In most European corporate legal systems the CAL is 90 percent (Bergström et al. 1994).

of an offer. The present analysis provides another rationale for this rule.

PROPOSITION 5. For any given decision rule (κ, s), introducing any freeze-out rule $(1 > f > \kappa s)$ leads to an increase in takeover premia and constitutes a Pareto improvement.

The proof is given in section *F* of the Appendix. A freeze-out rule rewards a bidder for acquiring a fraction $f > \kappa s$ at a higher price $(1 - \phi^f)v$ by leaving him $\phi^f v$, the difference between the bid price and the maximal improvement in share value. When this option is introduced, some bidders who would not have made a tender offer and some who would have bid for the control majority switch to this new option. Hence, more tender offers take place, at a higher price, leading to more concentrated ownership. The first and second effects increase security benefits whereas the first and third increase social surplus. The welfare impact of a freeze-out rule is thus unambiguously positive, relative to a regime with no such rule (i.e., $f = 1$). Moreover, depriving remaining minority shareholders of the option to retain their shares can be beneficial for all target shareholders. In particular, by mitigating the free-rider problem, such a rule induces higher bid prices.

Similarly to the security-voting structures, the socially optimal freeze-out threshold need not coincide with the level preferred by the target shareholders. Shareholders are interested in high bids per se and ignore the bidder's private benefits and costs. Indeed, consider the effects of a decrease in *f*. The bidder's profit in the freeze-out option is increased since he has to bid a lower price to reach the CAL. Again, some bidders who would not have made a tender offer and some who would have bid for the control majority switch to this option. Those who have already chosen the freeze-out option stick to it. This third effect is neutral in terms of social surplus since the same final ownership concentration obtains $(\beta = 1)$. As a result, social surplus is decreasing in *f*. A lower CAL will induce more takeovers without costly extraction of private benefits.[14] However, the third effect is detrimental to shareholders: to reach a smaller threshold, the bidder reduces his bid price. Hence, security benefits need not be monotonic in *f*. The CAL maximizing security benefits trades off the likelihood of tender offers against the bid premium. It should be noted that this analysis abstracts from many issues that, in prac-

[14] In this model, the socially optimal rule is to have κs as small as possible and to set $f = \kappa s$. Under such a rule, the bidder extracts (almost) the whole social surplus. He thus has an incentive to maximize it, i.e., to abstain from extracting private gains. Obviously, this rule is subject to many flaws. In particular, it is extremely vulnerable to value-decreasing bidders who would benefit from the low κs but not exercise the freeze-out option.

tice, might make freeze-outs harmful for target shareholders (Bebchuk 1985*b*).

C. *Mandatory Bid Rule*

Within the takeover regulation, the mandatory bid rule (MBR) is highly controversial. Its two basic elements are the right to sell provision, which amounts to a prohibition of partial bids, and the equal bid provision, which requires bidders to offer all shareholders the same tender price.[15] Since shareholders are assumed to be atomistic and homogeneous, the present framework is not suited to analyzing the latter provision. The subsequent discussion of the MBR is concerned only with the prohibition of partial bids. For simplicity, one share–one vote and simple majority are assumed.

PROPOSITION 6. The mandatory bid rule is irrelevant.

Proof. The bidder's optimal *unrestricted* bid attracts 50 percent of the shares (proposition 1). Hence, the MBR does not affect the outcome.[16] Q.E.D.

It is interesting to note that the MBR leads neither to the acquisition of more shares by the bidder nor to a higher premium. The shortcoming of the MBR is its lack of coercion. It does not require the bidder to buy all shares, but merely those shares tendered. This obligation is vacuous since it remains still at the bidder's discretion how many shares will actually be tendered. In contrast, a supermajority rule effectively forces the bidder to offer a higher bid price in order to acquire the required larger number of shares.

The irrelevance of the MBR breaks down once restricted offers can be combined with a freeze-out in so-called front-end-loaded or two-tier bids. In a two-tier offer, the bidder makes a bid restricted to a fraction ρ of shares at an initial price b_0, where ρ is sufficient to transfer control to the bidder (i.e., $\rho \geq 50$ percent). If the bid is successful, the bidder has the option to buy out all remaining shareholders at an end price b_1 possibly lower than the initial price b_0. In the present framework, it is easily seen that the bidder would choose $\rho = 50$ percent and $b_1 \leq b_0$. If $b_0 = b_1$, the two-tier offer is equivalent to a freeze-out rule with threshold $f = \rho$, already analyzed in the previous subsection. Consider instead the case in which $b_0 > b_1$ and

[15] The U.K. city code and the E.C. directive on takeovers include the mandatory bid rule. While discriminatory offers are generally forbidden in the United States, partial bids are legal, except in Pennsylvania and Maine (Karpoff and Malatesta 1989).

[16] Note that under a restricted offer, the equilibrium outcome obtains with dominant strategies. In particular, there is no need to invoke the Pareto-dominance criterion.

$b_0 \geq 0$. Assume, moreover, that the bidder has, ex post, an incentive to buy out the remaining shareholders (i.e., $[\frac{1}{2}(1 - \phi^{\rho}) + d(\phi^{\rho})]v \leq v - \frac{1}{2}b_1$). It is a dominant strategy for all shareholders, anticipating that the bidder exercises this option, to tender in the initial offer. Several implications can be derived from this informal analysis. First, the option to make a two-tier bid that is restricted to a fraction of the shares is not innocuous. Contrary to the simple freeze-out rule, target shareholders are rationed in equilibrium. Second, a two-tier bid and an unrestricted offer followed by a freeze-out (with threshold $f = 50$ percent) are both means for the bidder to acquire 100 percent of the shares, but the former is cheaper. Hence, under the restrictions of the present framework, allowing two-tier bids is socially optimal since it leads to more takeovers and a more concentrated ownership structure. Finally, contrary to a simple freeze-out rule, allowing two-tier bids in which the front price can be higher than the end price need not benefit target shareholders. Actually, many states in the United States have introduced fair-price laws forbidding such bids (Karpoff and Malatesta 1989).

V. Corporate Decision Rules: The Competition Case

This section analyzes bidding contests and their implications for corporate decision rules.

A. *Competition*

Consider two bidders, bidders 1 and 2, competing in a second-price, sealed-bid auction with unrestricted conditional bids. Assume one share–one vote and simple majority. Bidder i can extract private benefits according to the function $d_i(\cdot)$ and has a valuation $v_i > 0$ with $v_1 < v_2$. For the sake of analytical simplicity, neither bidder owns an initial stake (i.e., $\omega_1 = \omega_2 = 0$) and takeover costs are set equal to zero (i.e., $c_1 = c_2 = 0$).[17]

LEMMA 5. Bidder 2 wins the contest with a bid price $b = \max[v_1; (1 - \phi_2^{50\%})v_2]$.

Bidder i is willing to bid up to v_i. For all $b_i < v_i$, the fraction tendered would be less than one (lemma 2), leaving him with some private gains. Since $v_1 < v_2$ by assumption, bidder 2 will win the contest. In addition to attracting 50 percent of the shares, bidder 2

[17] With two bidders, the English and second-price, sealed-bid auctions with private values are strategically equivalent (Burkart 1995). Abstracting from initial stakes and takeover costs is not innocuous and is likely to affect the results in this section. Initial stakes lead to overbidding in takeover contests (Burkart 1995), whereas the impact of takeover costs in bidding contests varies across models.

has to outbid his rival. When the latter constraint is binding, that is, $v_1 > (1 - \phi_2^{50\%})v_2$, competition results in a higher bid price. Hence, effective competition benefits target shareholders and is detrimental to the winning bidder. This seems hardly surprising and has been confirmed empirically (Stulz, Walkling, and Song 1990). More interesting and specific to the present model are the benefits of competition in terms of social surplus.

PROPOSITION 7. Compared to the single-bidder case, competition (even by a weaker rival) leads to the acquisition of more shares by the winning bidder and increases social surplus.

The proof is given in section *G* of the Appendix. The higher bid price $b = v_1 > (1 - \phi_2^{50\%})v_2$ leads to an increase in the supply of shares tendered and hence a larger social surplus. In most takeover models, the introduction of a rival bidder is generally beneficial to the target shareholders. However, competition is socially desirable only insofar as the new contender runs the firm more efficiently than its competitor. In the present paper's framework, introducing a new contender can increase social surplus even if the actual acquirer remains unchanged. This suggests that takeover regulations might put some weight on competition per se, that is, not only with regard to improving the pool of potential bidders.

A similar effect arises in the case in which a monopolist competes in prices against a rival with higher marginal cost. The pressure of the potential competition leads to a lower, constrained monopoly price, which in turn reduces the deadweight loss associated with the monopoly. Two differences are to be noted. Unlike these models, the present model assumes that the other side of the market consists of homogeneous agents. Moreover, competition is beneficial even to those agents that do not trade in equilibrium. In this sense, high takeover premia protect minority shareholders.

B. Security-Voting Structure

Bidder i counters his rival's offer as long as his profits are nonnegative. Hence, for a security-voting structure s, bidder i is willing to bid up to $b_i^s = \{(1 - \phi_i^s) + [d_i(\phi_i^s)/s]\}v_i$ per voting share.

LEMMA 6. b_i^s is decreasing in s.

The proof is given in section *H* of the Appendix. The result is due to two effects. First, a higher concentration of votes increases the winning bidder's private gains, since it allows him to hold fewer return rights. Second, the bidder spreads these private gains across fewer shares. The winner needs to outbid his opponent and to attract at least half the votes. Hence, if $b_j^s < b_i^s$, bidder i wins the contest, and the equilibrium price is $b = \max[b_j^s, (1 - \phi_i^{s/2})v_i]$. The fiercer competition induced by a greater concentration of voting rights has implications for the optimal design of corporate decision rules.

PROPOSITION 8. If there is effective competition under one share–one vote, then deviating from one share–one vote intensifies competition, thereby increasing social surplus and security benefits.

The proof is given in section *I* of the Appendix. Both social surplus and security benefits increase with the bid price when it results in a larger final holding (proposition 1). Departing from one share–one vote is optimal from both perspectives since it intensifies competition and thus raises bids. From a social perspective, this is true only as long as the competitive price b_1^s is less than the value of the minority shares if all voting shares are tendered, $(1 - \phi_2^s)v_2$. Beyond this threshold, a price increase does not translate into a larger holding of bidder 2, since the bid is restricted to voting shares. Instead further concentration of votes decreases his final holding. Provided that a contest takes place, the socially optimal security-voting structure is such that $b_1^s = (1 - \phi_2^s)v_2$.

In contrast, higher takeover premia are valuable per se to shareholders. Hence, they may be willing to decrease s further to extract more of the winning bidder's surplus even if it reduces social surplus.[18] It is interesting to note that shareholders deviate from the socially optimal rule in the direction opposite to that in the single-bidder case. In the latter case, maximizing takeover premia implies a larger than socially optimal control majority that will prevent some desirable takeovers. In the case of contests, higher premia are realized by restricting the number of shares for which the bidders compete. Consequently, shareholders may choose a smaller than socially optimal control majority, which will lead to a lower ownership concentration and a more inefficient allocation of corporate resources. Nonetheless, the present analysis suggests a rationale for a dual-class share system from both the social and the shareholders' viewpoint.

C. *Freeze-out*

In the absence of competition, the option to freeze out minority shareholders constitutes a Pareto improvement. Bidding contests make this option more attractive to the winning bidder and thus more effective. Indeed, in a contested takeover, the winning bidder acquires more than 50 percent of the shares. Hence, he incurs part of the costs of attracting the threshold fraction f anyway. Increasing the bid further in order to attract the fraction f is thus less costly relative to the freeze-out gains.

[18] The proof that a discrepancy is indeed possible is given in sec. *I* of the Appendix.

D. Mandatory Bid Rule and (Un)conditional Offers

Proposition 6 shows that in the absence of competition, the MBR has no effect irrespective of whether offers are conditional or not. The picture is quite different in the case of competition.

LEMMA 7. Under conditional offers, competing bidders make unrestricted offers. If unconditional offers are allowed, they make offers restricted to the control majority.

The proof is given in section *J* of the Appendix. Consider a bidding contest with conditional offers. There are three equilibrium outcomes: both offers fail, bidder 1 wins, or bidder 2 wins. Given that shareholders coordinate on the Pareto-dominant equilibrium, both bidders choose to make unrestricted offers, and the MBR has no effect. Indeed, bidder 1's most aggressive bid is to make an unrestricted offer at a price v_1 since this maximizes firm value under his control. Bidder 2 can match bidder 1's offer by a higher bid $b_2 > v_1$ restricted to ρ such that $\rho b_2 + (1 - \rho)(1 - \phi_2^{\rho})v_2 = v_1$. Alternatively, he can submit an unrestricted bid $b_2 = v_1$, and a fraction $\bar{\beta}$ of shares will be tendered such that $(1 - \phi_2^{\bar{\beta}})v_2 = v_1$. Since his profit is the difference between social surplus and v_1, he will choose the offer that maximizes social surplus. Given that social surplus increases with his final holding, bidder 2 will also choose an unrestricted offer.

Consider now a bidding contest in which unconditional restricted bids can be made. An unconditional bid with a higher price cannot fail in equilibrium. Shareholders accepting this offer would not be subject to rationing and would earn a higher return than by accepting the lower offer. Hence, given the choice of bid forms, the losing bidder's most aggressive offer is an unconditional bid restricted to 50 percent of the shares. It enables him to raise his bid the most by maximizing his potential private gains and spreading them among fewer shares (lemma 6). The winning bidder's best response is also an unconditional offer restricted to 50 percent. Since his only profits are private gains, he prefers to acquire as few shares as possible. Hence, in equilibrium, the winner acquires only 50 percent of the shares and sets $\phi_i = \phi_i^{50\%}$. It should be noted that with restricted bids either bidder may win, although $v_1 < v_2$.

PROPOSITION 9. The mandatory bid rule is irrelevant under conditional offers. When unconditional offers are allowed, the MBR is socially optimal but need not maximize security benefits.

The proof is given in section *K* of the Appendix. Under conditional offers, the MBR is irrelevant since bidders make unrestricted offers anyway. Under unconditional offers, the MBR ensures that a high price due to competition leads to a larger fraction acquired by the winning bidder and hence to a more efficient use of resources. Furthermore, imposing unrestricted bids also avoids the possibility that bidder 1 wins the contest, although the resulting social surplus, $[(1 - \phi_1^{50\%}) + d_1(\phi_1^{50\%})]v_1$, falls short of the surplus that bidder 2 would have generated, $[(1 - \phi_2^{50\%}) + d_2(\phi_2^{50\%})]v_2$.[19]

As regards the premium, the effect of restricted offers is similar to that of dual-class shares. The more intense competition for 50 percent of the shares does not diminish the bidders' potential private gains but forces the winner to pay part of it out to the shareholders. The higher takeover premium can in some cases more than compensate the shareholders for the lower minority share value associated with partial bids. Hence, they might prefer no MBR and unconditional offers.

Proposition 10. Social optimality requires either conditional offers or unconditional offers with MBR, but shareholders may prefer to allow restricted unconditional offers.

The proof is given in section *K* of the Appendix. The discrepancy between the social optimum and the rule preferred by shareholders stems again from the fact that the shareholders are after high takeover premia, ignoring the bidder's private costs and benefits. As pointed out earlier, the effect of restricted offers is similar to that of departing from the one share–one vote rule. In particular, allowing for restricted unconditional offers intensifies the competition for the control majority and leads to higher bids. These higher bids, however, do not translate into higher ex post ownership concentration and are thus purely neutral transfers from a social perspective.

VI. Value-Decreasing Bidders

For the sake of clarity, the model has deliberately abstracted from several issues that influence optimal corporate decision rules. Most important, it has been assumed that all potential bidders increase security benefits, irrespective of the severity of the moral hazard problem. This section relaxes this assumption and discusses informally the impact of various rules on the potential for value-decreasing takeovers. Consider the case in which some bidders always decrease share value below its current value whereas other bidders may

[19] Bidder 1's winning implies

$$[d_1(\phi_1^{50\%}) - \tfrac{1}{2}\phi_1^{50\%}]v_1 - [d_2(\phi_2^{50\%}) - \tfrac{1}{2}\phi_2^{50\%}]v_2 > \tfrac{1}{2}(v_2 - v_1).$$

This is the efficient outcome only if

$$\tfrac{1}{2}[d_1(\phi_1^{50\%}) - \phi_1^{50\%}]v_1 - \tfrac{1}{2}[d_2(\phi_2^{50\%}) - \phi_2^{50\%}]v_2 > \tfrac{1}{2}(v_2 - v_1).$$

The first inequality, however, does not ensure that the second is also satisfied.

or may not reduce security benefits, depending on the inefficiency associated with the extraction of private benefits.

Consider the impact of an increase in the fraction of voting shares in the absence of competition. The requirement to buy a larger stake in order to gain control induces the bidder to internalize more of the change in security benefits that he brings about. This has several effects. First, a bidder who would decrease security benefits but enjoy large private benefits might find it too costly to take over the firm (*deterrence effect*). Second, when a bidder is not deterred, an increase in the fraction of voting shares reduces the decrease in security benefits he brings about (*improvement effect*). This reduction might possibly be so large as to become a value improvement (*redemption effect*). All these effects are positive in terms of social surplus and security benefits. Similarly, in the absence of control contests, a supermajority rule increases the number of return rights required to gain control. Hence, the same three positive effects materialize as with an increase in the fraction of voting shares.

The introduction of a freeze-out provision will be of little interest to most value-decreasing bidders. A bidder who is going to lower security benefits attempts to acquire control with as few return rights as possible. Hence, he would not exercise the option to freeze out minority shareholders, and thus this option is neutral. Yet, some bidders who would have bid for 50 percent and decreased security benefits may now find it more profitable to acquire 100 percent and thus increase security benefits (*redemption effect*).

Finally, consider the impact of the MBR. Given that shareholders coordinate on the Pareto-dominant equilibrium, bids below the current stock price fail. A bidder who is going to decrease security benefits will make a loss on every share he acquires. Furthermore, anticipating the value decrease, all shareholders will tender. Hence, when allowed, the bidder makes a bid restricted to 50 percent of the shares and rations (prorates) tendering shareholders. By prohibiting rationing, the MBR forces the bidder to acquire a larger fraction of shares and thus has the same three positive effects as a supermajority rule. Moreover, the MBR prevents all takeovers in which shareholders realize a loss.

VII. Relation to the Literature

This section compares the present paper to some of the related literature, mainly Grossman and Hart (1980, 1988).[20] In Grossman and

[20] Harris and Raviv (1988) is very similar to Grossman and Hart (1988). For clarity, the comparison is made with respect to the latter paper but applies to the former as well.

Hart (1980), the exogenous posttakeover value of the security benefits determines the acquirer's optimal bid price. In the present paper, the security benefits are endogenous; that is, they are chosen by the new controlling party. This endogeneity reverses the causality between security benefits and bid price. To a given bid price corresponds a unique equilibrium outcome in the tendering stage.

In Grossman and Hart (1980), an externality arises among shareholders because control rights (i.e., votes) are attached to return rights: by retaining their return rights, shareholders prevent an efficient transfer of control. The present paper extends their analysis by identifying another externality. The bidder does not get compensated ex ante for abstaining from extracting private benefits ex post. As a result, he acquires control with as few shares as necessary, thereby maximizing the inefficiencies associated with the extraction of private benefits. This further shortcoming of the takeover mechanism arises irrespective of whether control rights are attached to return rights and whether control is at stake. For example, it also arises when a majority shareholder is bidding for additional shares.

The two papers differ also in their implications for the case of competition among bidders. Grossman and Hart argue that target shareholders are unlikely to experience excessive expropriation by granting the winning bidder the right to extract private benefits. In the case of effective competition, the winning bid has to match the rival's bid and thus protects shareholders from excessive expropriation. Note, however, that were a shareholder to decline the winning offer, he would suffer the same expropriation as in the absence of competition. In other words, competition protects shareholders only ex ante. In the present paper's framework, competition and the resulting higher premia protect minority shareholders also ex post.

From a modeling perspective, the present model combines features of the atomistic and the pivotal shareholder models of takeovers. Like the latter (Bagnoli and Lipman 1988; Bebchuck 1989; Holmström and Nalebuff 1992; Gromb 1993) but unlike the former, the present model derives an equilibrium for a continuum of bid prices in which shareholders are indifferent between tendering and retaining their shares. In contrast to the pivotal shareholder model but in accordance with the atomistic model, the shareholders are assumed to be atomistic, and the returns from tendering and retaining are identical from an ex ante as well as an ex post perspective.

Corporate decision rules have commonly been evaluated in terms of the trade-off between reducing the bidder's rent and providing sufficient incentives to undertake value-increasing takeovers. Grossman and Hart (1988) examine security-voting structures in this respect. In their adverse selection framework, the level of security and private benefits implemented by a given bidder are exogenous, that is, independent of his holding. In the case of a value-increasing bidder facing no competition, the security-voting structure is irrelevant. It affects neither the security benefits nor the bidder's profits. In the case of a value-decreasing bidder whose substantial private benefits make a takeover profitable, one share–one vote is optimal both from a social and from the shareholders' viewpoint. It maximizes the fraction of return rights that the bidder has to acquire to obtain control and thus forces him to internalize a larger share of the decrease in security benefits that he would implement.

In the present paper, the design of voting rights matters also for value-increasing single bidders. Concentrating votes enables the bidder to hold a smaller fraction of return rights. As a result, he extracts more private benefits. Although this is ex post detrimental to social surplus and shareholders' interests, it may prove crucial for the occurrence of takeovers in the presence of substantial takeover costs.

Note that replacing the adverse selection framework by a moral hazard model points at a potential conflict between the analyses of Grossman and Hart (1980, 1988). In their earlier paper, Grossman and Hart argue that in the case of substantial takeover costs, bidders should be granted the right to dilute minority rights so that their private benefits outweigh the takeover costs. In their later paper, they promote the one share–one vote rule as an efficient deterrent against value-decreasing bidders. In the present paper, departing from one share–one vote and granting the right to extract private benefits are equivalent.

In the case of competition, both Grossman and Hart (1988) and the present paper find that departing from one share–one vote can result in higher bid prices and thus maximize security benefits. However, in their model, one share–one vote is always socially optimal: as the bidder always acquires all voting shares, more voting shares imply that he has to acquire more return rights. The present paper shows that the latter relation does not necessarily hold. Indeed, the winning bidder no longer automatically acquires all voting shares. Instead fewer voting shares translate into a higher bid price; as a result, more voting shares are tendered.

Finally, the present paper's analysis of freeze-out rules is closely related to the analysis in Yarrow (1985), who shows that the CAL can solve the free-rider problem. When an offer conditional on acceptance of the freeze-out fraction succeeds, any remaining minority shareholder will be forced to sell his shares on the terms of the original offer. Hence, he may as well accept the original offer. In Yarrow's framework, a CAL's beneficial effects are to allow takeovers that would otherwise not be profitable. In the present paper, a CAL can improve in addition the efficiency and security benefits of takeovers that would take place even in its absence.

VIII. Concluding Remarks

This paper reconsiders the tender offer mechanism given a dispersed ownership structure. When moral hazard problems are anticipated to arise between minority shareholders and a new controlling party, the bidder's opportunity cost in a takeover increases with his final holding. Indeed, moral hazard is alleviated by the size of the bidder's final holding. However, because of the free-rider behavior of the target shareholders, the bidder is not compensated ex ante for the reduced moral hazard problem ex post. Moreover, the equilibrium supply of shares is shown to be increasing in the bid price. As a result, the bidder acquires as few shares as necessary to gain control, thereby maximizing the ex post moral hazard and the associated inefficiency.

State legislation and corporate charters are then examined in the light of these shortcomings. By increasing the fraction of shares required to gain control, the one share–one vote rule reduces ex post inefficiencies. However, it also reduces bidders' surplus and thus their incentives to launch takeovers. The presence of takeover costs creates a trade-off between a higher likelihood of tender offers and more efficient tender offers. It is interesting that by inducing higher premia and maximizing ex post efficiency, the option to freeze out minority shareholders constitutes a Pareto improvement. Competition (even by an inferior rival) also improves social welfare since it leads to a higher bid price and, thus, more shares tendered and less moral hazard. This effect can be further exploited by the security-voting structure: fewer voting shares make competition fiercer and hence lead to an even higher price and a larger supply of shares. The mandatory bid rule has no effect under conditional offers but is socially beneficial under unconditional offers. Finally, the paper also shows that socially optimal rules are unlikely to emerge through private contracting. Target shareholders' endeavor to extract high takeover premia either prevents some socially efficient takeovers or exacerbates the underconcentration of ownership.

The present model has abstracted from a number of issues. In particular, the impact of various rules on the potential for management entrenchment has not been considered. In addition, there may be instances in which a larger shareholding does not lead to an increase in security benefits (Burkart, Gromb, and Panunzi 1997). Another caveat is the assumption that the ownership structure remains stable once the offer is completed. If the bidder had the opportunity and incentive to retrade ex post, the takeover outcome would be affected. For instance, when the bidder increases his stake after the takeover, the share value increases, which in turn reduces the shareholders' incentive to sell in the tender offer. While a complete analysis of the bidder's incentive and ability to retrade is beyond the scope of the present paper, its main result provides a simple insight. Provided that trading is not anonymous, the purchase of an additional Δ shares after the takeover is not profitable for the bidder. This holds irrespective of whether the shareholders anticipate this further acquisition at the tender offer stage or not. In the former case, shareholders free-ride on the entire value improvement implied by the bidder's increased final holding. Consequently, the bidder has to pay for all shares the same price, equal to the postretrading share value $(1 - \phi^{\beta+\Delta})v$. By proposition 1, this cannot be an optimal strategy since it is equivalent to acquiring more shares than the control majority in the tender offer. In the case in which shareholders fail to anticipate subsequent retrading, the tender price remains unchanged, $(1 - \phi^{\beta})v$, and the bidder has to pay the post-retrading share value $(1 - \phi^{\beta+\Delta})v$ only for the Δ shares acquired subsequently on the open market. Even when shareholders are somewhat myopic, this additional acquisition is not profitable. First, the bidder does not make a profit on these Δ shares. Second, the reduction in private benefits due to the larger final holding exceeds the value increase of those shares acquired in the tender offer.[21] Of course, trades need not be public and traders may be excessively myopic, in which case the analysis should be amended.

Because of these various limitations, the analysis is biased, and it would thus be inappropriate to draw definite conclusions, let alone policy recommendations. Nevertheless, some important insights emerge that contrast with most of the received literature. The divergence is to a large extent due to one feature of the moral hazard framework: a larger final stake held by the bidder increases social surplus and shareholders' return but decreases his profits.

Several avenues are left for future research. First, as already mentioned, crucial to the analysis is the bidder's assumed inability to commit ex ante to a given level of private benefit extraction ex post. It may thus be interesting to explore the existence and impact of

[21] Buying Δ shares will not be profitable for the bidder if

$$(\beta + \Delta)(1 - \phi^{\beta+\Delta})v + d(\phi^{\beta+\Delta})v - \Delta(1 - \phi^{\beta+\Delta})v < \beta(1 - \phi^{\beta})v + d(\phi^{\beta})v.$$

This inequality can be written as

$$\beta(1 - \phi^{\beta+\Delta})v + d(\phi^{\beta+\Delta})v < \beta(1 - \phi^{\beta})v + d(\phi^{\beta})v,$$

which is satisfied by revealed preferences.

commitment technologies. One example might involve the mode of financing takeovers. It has been implicitly assumed that the bidder pays the acquired shares out of his own pocket. However, takeovers are typically highly leveraged, and creditors are protected by seniority. In the present paper's framework, this implies that for any given final stake, the fraction of the cash flow that the bidder can claim is decreasing in the debt level. This reduces the incentive effect of large shareholdings so that the extent of inefficient extraction of private gains by the bidder increases with leverage. This in turn shifts the share supply curve to the right, and the equilibrium bid price is reduced. Thus debt financing allows the bidder to extract more private benefits. Second, the analysis can shed some light on the trading of block holdings. Indeed, the transfer of a minority controlling block should be seen as an alternative to other means of transferring control, such as a tender offer. A tender offer generates positive externalities for small shareholders in the form of takeover premia and improved security benefits. By acquiring the block instead, the bidder can bypass small shareholders and share the externality with the incumbent block holder. The block is thus traded at a premium with respect to the price of dispersed shares before and after the control transfer. It may thus be possible to relate the occurrence and the observed patterns of block trading to the level and characteristics of the takeover activity (Burkart et al. 1996).

Appendix

A. *Proof of Lemma 1*

The first and second derivatives of the bidder's profit with respect to ϕ are $-\beta + d'(\phi)$ and $d''(\phi)$. The problem is concave as $d''(\phi) < 0$. The derivatives $d'(0) = 1$ and $d'(1) = 0$ ensure an interior solution for all $\beta \geq 1/2$. Q.E.D.

B. *Proof of Lemma 2*

When deciding to tender, shareholders compare b with $(1 - \phi^{\hat{\beta}})v$. If $b < (1 - \phi^{50\%})v$, then $b < (1 - \phi^{\hat{\beta}})v$ for all $\hat{\beta} \in [1/2, 1]$. Hence, no shares are tendered. If $b > v$, then $b > (1 - \phi^{\hat{\beta}})v$ for all $\hat{\beta} \in [1/2, 1]$. Hence, all shares are tendered; that is, $\alpha = 1 - \omega$. If $b \in [(1 - \phi^{50\%})v, v]$, then by lemma 1 there exists $\hat{\beta} \in [1/2, 1]$ such that $b = (1 - \phi^{\hat{\beta}})v$. Anticipating this $\hat{\beta}$, all shareholders are indifferent between tendering and retaining their shares. In addition, for all $b \geq (1 - \phi^{50\%})v$, any $\alpha < 1/2 - \omega$ is an equilibrium outcome. Indeed, anticipating failure, each shareholder is indifferent between tendering and retaining. However, this outcome is Pareto-dominated by the outcome in which the bid succeeds, that is, $\beta \geq 1/2$. Q.E.D.

Three comments about the equilibrium in lemma 2 should be made.

i) *Equilibrium strategies.*—The outcome with $b \in [(1 - \phi^{50\%})v, v]$ may be seen as originating from different types of equilibria. For instance, a mass α of shareholders may tender their shares whereas others retain theirs. However, this solution requires a rather unlikely degree of coordination among dispersed shareholders. Alternatively, each shareholder may tender a fraction α of his shares and retain the rest. This equilibrium requires no coordination but assumes that shareholdings can be (infinitely) split. Instead, each shareholder may tender all his shares with probability α and retain them with probability $1 - \alpha$. Provided that the law of large numbers holds, a fraction α of all shares is tendered. (Judd [1985] shows that a continuum of independent random variables may generate a stochastic outcome; i.e., the law of large numbers may fail to hold.) There are also semi-mixed-strategy equilibria, where some shareholders randomize but others play pure strategies.

ii) *Unconditional bids.*—Allowing for unconditional bids does not alter the basic results. For unconditional bids $b \geq (1 - \phi^{50\%})v$, proposition 1 is valid. Moreover, Pareto-dominated equilibrium outcomes disappear. An unconditional bid $b \geq (1 - \phi^{50\%})v$ cannot fail, since tendering is optimal whenever the bid is anticipated to fail. While unconditional bids yield clear-cut results for $b \geq (1 - \phi^{50\%})v$, the outcome for $b < (1 - \phi^{50\%})v$ is not well defined. There is no equilibrium in which the outcome is deterministic. Hence, if an equilibrium exists, the takeover must succeed with probability strictly between zero and one, contradicting the law of large numbers (Bagnoli and Lipman 1988).

iii) *Selection criterion and stability.*—Two Nash equilibrium outcomes have been identified, and one has been selected out by the Pareto-dominance criterion. Applying other refinement concepts is intricate since shareholders are atomistic. It can be shown that, with nonatomistic shareholders, equilibria in which the bid fails with probability one are not perfect equilibria (see Gromb 1993).

C. *Proof of Lemma 3*

Since $b = (1 - \phi)v$, $\Pi(b) = \omega b + d[(v - b)/v]v - c$, subject to $\beta \geq 1/2$. Thus

$$\frac{\partial \Pi(b)}{\partial b} = \omega - d'\left(\frac{v - b}{v}\right) = \omega - \beta < 0$$

as $\omega < 1/2 \leq \beta$. The bidder's individual rationality constraint requires $\Pi(b) = [\omega(1 - \phi^{50\%}) + d(\phi^{50\%})]v - c \geq 0$. Q.E.D.

D. *Proof of Lemma 4*

For a given decision rule (κ, s), let $X(\kappa s)$ be the set of characteristics $x = (c_x, \omega_x, v_x, d_x)$ such that a bidder will actually make a tender offer. By proposition 1, the bidder will acquire as few shares as necessary (i.e., κs) so that x is in X iff $[\omega_x(1 - \phi_x^{\kappa s}) + d_x(\phi_x^{\kappa s})]v_x - c_x \geq 0$.

As κs increases, the takeover probability decreases; that is, the measure of $X(\kappa s)$ decreases.

The conditional expected premium is

$$\frac{\int_{X(\kappa s)} (1 - \phi_x^{\kappa s}) v_x g(x)\, dx}{\int_{X(\kappa s)} g(x)\, dx},$$

which need not be increasing in κs. To see this, consider the following example. The bidder can be equiprobably one of two types, 1 or 2, which differ only in that $d_1(\phi) = \phi - (\phi^K/K)$ and $d_2(\phi) = \phi - (\phi^2/2)$, where $K > 2$ is an integer, whereas $v_1 = v_2 = v$, $\omega_1 = \omega_2 = 0$, and $c_1 = c_2$. In other words, the only uncertainty pertains to the level of inefficiency of private benefit extraction, type 1 being able to extract private benefits more efficiently than type 2. At stage 3, each type i chooses ϕ such that $\kappa s = d_i'(\phi_i^{\kappa s})$. Given $d_1(\cdot)$ and $d_2(\cdot)$, there exists a level κs such that type 2 just breaks even, and type 1's private benefits are still strictly positive. Actually, K can be chosen arbitrarily large, and so $\phi_1^{\kappa s}$ is arbitrarily close to one; that is, type 1's bid premium is arbitrarily close to zero. At κs, the conditional expected premium is then arbitrarily close to $\frac{1}{2}(1 - \phi_2^{\kappa s}) v > 0$. As a result of an increase slightly beyond κs, type 2 does not make an offer and type 1's bid is still arbitrarily close to zero. Hence, for large values of K, the conditional expected takeover premium drops from $\frac{1}{2}(1 - \phi_2^{\kappa s}) v$ to zero, when the control majority is increased marginally above κs. Note that in this example, for K large enough, the one share–one vote rule is strictly dominated. Q.E.D.

E. *Proof of Proposition 4*

Expected security benefits are

$$V(\kappa s) = \int_{X(\kappa s)} (1 - \phi_x^{\kappa s}) v_x g(x)\, dx,$$

where $g(\cdot)$ is the distribution of characteristics. Expected social surplus is

$$W(\kappa s) = \int_{X(\kappa s)} [(1 - \phi_x^{\kappa s}) v_x + d_x(\phi_x^{\kappa s}) v_x - c_x] g(x)\, dx.$$

As κs increases, $X(\kappa s)$ "shrinks" and $d_x(\phi_x^{\kappa s}) v_x - c_x$ decreases, so that

$$W(\kappa s) - V(\kappa s) = \int_{X(\kappa s)} [d_x(\phi_x^{\kappa s}) v_x - c_x] g(x)\, dx$$

decreases. Hence, W is maximized for a lower value of κs than V. Q.E.D.

F. *Proof of Proposition 5*

First note that no freeze-out rule is equivalent to $f = 1$. For each value of f, each potential bidder has three options: (1) bid $(1 - \phi_x^{\kappa s}) v_x$ to attract the control majority κs, (2) bid $(1 - \phi_x^f)v_x$ to attract a fraction f and freeze out the rest, or (3) not bid.

Following a decrease in f, (a) some bidders switch from option 3 to option 2, (b) some bidders switch from option 1 to option 2, and (c) bidders stick to option 2. Effect a obviously increases social surplus and security benefits. Effect b increases social surplus since it results in a more concentrated ownership and increases security benefits since a higher bid price is needed to attract more shares. Effect c is neutral from a social viewpoint since the final ownership concentration is unchanged. Hence social surplus is decreasing in f, so that it increases when any freeze-out rule is introduced, and it is maximized for $f = \kappa s$. However, effect c decreases security benefits since it results in a lower bid price. When there is no freeze-out rule, there is no such effect. Hence security benefits increase when a freeze-out rule is introduced but, in general, are not maximized under $f = \kappa s$. Q.E.D.

G. *Proof of Proposition 7*

Each bidder is willing to bid up to $b_i = v_i$. Hence, bidder 2 wins with $b_2 = \max[b_1, (1 - \phi_2^{50\%})v_2]$ since he has to outbid bidder 1 and attract at least 50 percent. If $v_1 \leq (1 - \phi_2^{50\%})v_2$, the constraint imposed by competition is not binding. Otherwise there is active competition and $b_2 = v_1$. Then proposition 1 applies. Q.E.D.

H. *Proof of Lemma 6*

Since ϕ_i^s is strictly decreasing in s, $\partial b_i/\partial s$ has the opposite sign of $\partial b_i^s/\partial \phi_i^s$. Substituting $d_i'(\phi_i^s)$ for s in b_i^s and differentiating yields $\partial b_i^s/\partial \phi_i^s = -d_i(\phi_i)d_i''(\phi_i)/[d_i'(\phi_i)]^2 > 0$. Q.E.D.

I. *Proof of Proposition 8*

Effective competition under $s = 1$ implies that bidder 2 wins at a price $b = v_1$. Denote by $\phi_2^{\bar{\beta}}$ the allocation that satisfies $(1 - \phi_2^{\bar{\beta}})v_2 = v_1$. Given that $v_2 > v_1 > (1 - \phi_2^{50\%})v_2$, that $(1 - \phi_2^s)v_2$ increases with s, and that b_1^s decreases with s, there exists $\hat{s} < 1$ such that $b_1^{\hat{s}} = (1 - \phi_2^{\hat{s}})v_2$. Denote by $\phi_2^{\beta^s}$ the allocation that satisfies $b_1^s = (1 - \phi_2^{\beta^s})v_2$. Since b_1^s decreases with s, $\beta^s > \bar{\beta}$ and $\phi_2^{\beta^s} < \phi_2^{\bar{\beta}}$ for all $s \in [\hat{s}, 1)$. Hence, social surplus is increasing as s decreases in this range. For $s < \hat{s}$, $b_1^s > (1 - \phi_2^{\beta^s})v_2$ and the final holding is determined by s. Hence, in the range $[0, \hat{s}]$, social surplus is increasing in s. Q.E.D.

Let s^* and s^{**} denote the social and private optima. The possibility that s^{**} can strictly exceed s^* is proved by an example. For $v_1 = 1$, $d_1(\phi) = \phi - \frac{1}{2}\phi^2$, $v_2 = 2$, and $d_2(\phi) = (1 + \phi)\ln(1 + \phi) - \frac{1}{2}\phi^2(1 + \ln 2)$, $s^* = 0.618492$ and $dV/ds|_{s=s^*} = -0.85326$.

J. *Proof of Lemma 7*

Consider effective competition, that is, $v_1 > (1 - \phi_2^{50\%})v_2$, with conditional offers and no MBR. Assume that shareholders coordinate on the Pareto-dominating equilibrium. Bidder k makes an offer at a price b_k restricted to a fraction ρ_k of the shares, $k = 1, 2$. Call the loser j and the winner i. Bidder j's most aggressive offer is to maximize shareholder surplus V_j under his control. Bidder i's best response is to maximize Π_i subject to the constraint that he offers the shareholders at least V_j. Bidder j's and i's programs are max V_j subject to $\Pi_j \geq 0$ and max Π_i subject to $V_i \geq V_j$. Both constraints are binding (proposition 1). Hence, the solution to j's problem is $b_j = v_j$, and $\rho_j = 1$; that is, j's offer is unrestricted.

The winner's problem can be rewritten as max W_i subject to $V_i = V_j$, where W_i is the social surplus under bidder i's control. Social surplus W_i is strictly increasing in bidder i's final holdings, that is, in ρ_i as long as $(1 - \phi_i^{\rho_i})v_i < b_i$, and is independent of b_j. Shareholder surplus V_i is a function of both b_i and ρ_i. Hence, at the optimum, $b_i = (1 - \phi_i^{\rho_i})v_i$; that is, there is no rationing of shareholders, which is equivalent to the offer's being unrestricted. Since by assumption $v_1 < v_2$, $j = 1$ and $i = 2$.

Consider effective competition, that is, $v_1 > (1 - \phi_2^{50\%})v_2$, with unconditional bids and no MBR. With unconditional bids, the higher bid cannot fail in equilibrium. As 50 percent = argmax b_j^{ρ} subject to $\beta \geq 50$ percent (lemma 6), the losing bidder j's most aggressive offer is a bid restricted to 50 percent of the shares. The winning bidder i submits a bid at the same price. His surplus is $\rho_i(1 - \phi_i^{\rho_i})(v_i - b_j) + d_i(\phi_i^{\rho_i})v_i$. Since ϕ_i is strictly decreasing in ρ_i, $\partial\Pi_i/\partial\rho_i$ has the opposite sign of $\partial\Pi_i/\partial\phi_i$. Substituting $d'(\phi_i^{\rho_i})$ for ρ_i and differentiating yields $\partial\Pi_i/\partial\phi_i = d''(\phi_i)[(1 - \phi_i)v_i - b_j] > 0$. Hence, bidder i's surplus is decreasing in ρ_i, and $\rho_i^* = 50$ percent. Q.E.D.

K. *Proof of Propositions 9 and 10*

Clearly, the MBR is irrelevant under conditional bids because bidders use unrestricted bids anyway.

Consider the case in which unconditional and restricted bids are allowed. If

$$[(1 - \phi_1^{50\%}) + 2d_1(\phi_1^{50\%})]v_1 > [(1 - \phi_2^{50\%}) + 2d_2(\phi_2^{50\%})]v_2, \quad j = 2, i = 1,$$

then $\phi = \phi_1^{50\%}$ and $W = [(1 - \phi_1^{50\%}) + d_1(\phi_1^{50\%})]v_1 < v_1$. If

$$[(1 - \phi_2^{50\%}) + 2d_2(\phi_2^{50\%})]v_2 > [(1 - \phi_1^{50\%}) + 2d_1(\phi_1^{50\%})]v_1, \quad j = 1, i = 2,$$

then $\phi = \phi_2^{50\%}$ and $W = [(1 - \phi_2^{50\%}) + d_2(\phi_2^{50\%})]v_2$.

Under MBR, proposition 7 applies, and bidder 2 always wins. Denote by $\phi_2^{\bar{\beta}}$ the allocation that satisfies $(1 - \phi_2^{\bar{\beta}})v_2 = v_1$. For $v_1 > (1 - \phi_2^{50\%})v_2$, $\phi = \phi_2^{\bar{\beta}}$ and $W = [(1 - \phi_2^{\bar{\beta}}) + d_2(\phi_2^{\bar{\beta}})]v_2$, which is larger than both $[(1 - \phi_1^{50\%}) + d_1(\phi_1^{50\%})]v_1$ and $[(1 - \phi_2^{50\%}) + d_2(\phi_2^{50\%})]v_2$.

Under the MBR, security benefits are v_1. Without MBR, bidder i bids up to $[(1 - \phi_i^{50\%}) + 2d_i(\phi_i^{50\%})]v_i$. If $b_2^{50\%} > b_1^{50\%} > (1 - \phi_2^{50\%})v_2$, bidder 2 wins by bidding $b_1^{50\%}$. Shareholders realize a return equal to $\frac{1}{2}b_1^{50\%} + \frac{1}{2}(1 - \phi_2^{50\%})v_2$, which is larger than v_1 if $b_1^{50\%} - v_1 > (\phi_2^{50\%} - \phi_2^{\bar{\beta}})v_2$.

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