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Security-Voting Structure and Bidder Screening*

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Abstract

This paper demonstrates that non-voting shares can promote takeovers. When the bidder has private information, shareholders may refuse to tender because they suspect to sell at an ex post unfavourable price. The ensuing friction in the sale of cash flow rights can prevent an efficient change of control. Separating cash flow and voting rights alters the degree of cross-subsidization among bidder types. It can therefore be used as an instrument to promote takeover activity and to discriminate between efficient and inefficient bidders. The optimal fraction of non-voting shares decreases with managerial ability, implying an inverse relationship between firm value and non-voting shares.

JEL Classification: G32, G34

Keywords: Tender offers, One share - one vote, Asymmetric information

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1 Introduction

Dual-class shares in publicly traded firms continue to be controversial. The New York Stock Exchange did not grant listings to firms with multiple share classes, but abandoned this requirement in 1986. Similarly, the European Commission recently withdrew a proposal to mandate the one share - one vote principle, which would have banned shares with differential voting rights and voting restrictions. If these provisions had been adopted, they would have affected a large number of firms: According to a survey commissioned by the Association of British Insurers, 29 percent of the top 300 European companies in 2005 had dual-class share structures. In the US, dual-class shares are less frequent but still fairly common; they are used in about 6 percent of all publicly-traded firms (Gompers et al., 2008).

Proponents of the one share - one vote rule argue that it is most conducive to an efficient allocation of corporate control. The theoretical foundation of this view is the analysis of Grossman and Hart (1988) and Harris and Raviv (1988). In their framework, security benefits and private benefits vary across bidders competing for a dispersedly held firm. Since bidders compete for voting shares, one share - one vote prevents divergence between bidders' willingness-to-pay for control and their ability to create value, thereby ensuring an efficient control allocation. By contrast, deviations from one share - one vote carry the risk that an inefficient bidder with large private benefits outbids more efficient bidders. At the same time, a dual-class share structure may be in the shareholders' interest as it allows extraction of more surplus from the winning bidder.

It must be noted that the security-voting structure matters for control allocation in this framework only if bidder ranking with respect to security benefits differs from bidder ranking according to private benefits. If the most efficient bidder also has the most private benefits, it wins the bidding contest irrespective of the security-voting structure. Moreover, the security-voting structure is immaterial to bid price and shareholder wealth in the absence of (effective) competitors. Due to target shareholder free-rider behaviour (Grossman and Hart, 1980), the bid price must, under full information, match the winning bidder's security benefits. Nonetheless, one share - one vote is optimal in the sense that no other security-voting structure leads to a more efficient control allocation under this framework.

We show that asymmetric information undermines the dominance of one share - one vote. Asymmetric information can lead to disagreement about what constitutes an acceptable price, which in turn may prevent a control transfer. The root of this failure is that cash flow and control rights must be jointly traded. Separating cash flow and voting rights mitigates the impact that disagreement on the value of cash flow rights has on the trade of votes. Thus, contrary to the prevailing view, one share - one vote does not ensure an efficient control allocation and is typically inferior to a dual-class share structure.

We develop this idea in a tender offer model with atomistic target shareholders and absent (effective) competition. Instead, the model assumes a single bidder who has private information about its own ability to create value. As a result, the bid price is determined by shareholder free-rider behaviour and must at least equal the expected post-takeover share value. Costly bids are feasible because the bidder can extract as private benefits part of the bidder generated value. Within this framework, we demonstrate that one share - one vote maximizes the severity of the asymmetric information problem, thereby deterring many value-increasing takeovers.

In our model, all bidder types who make a bid in equilibrium offer the same price. While the equilibrium price is equal to the average post-takeover share value, some (overvalued) bidder types pay more and some (undervalued) types pay less than their true post-takeover share value. In addition, there is a cut-off value, and bidder types who generate less value are deterred as they would make a loss when offering the equilibrium price. Hence, the presence of asymmetric information has two effects. First, it causes redistribution among all bidder types who actually make a bid. Second, it exacerbates the free-rider problem as, ceteris paribus, more bids fail than under symmetric information.

Separating cash flow and voting rights affects the takeover outcome by altering the extent of redistribution among bidder types and how shareholders update their expectations. (More) non-voting shares reduce the fraction of return rights that bidders purchase and therefore render a bid, ceteris paribus, more profitable for overvalued bidder types. Hence, some formerly frustrated bidder types can earn a profit and now make a bid. In response, shareholders revise their beliefs about post-takeover share value downward and are willing to tender at a lower price. This indirect price effect makes the takeover profitable for more bidder types.

The monotonic relationship between the fraction of voting shares and the cut-off value implies that the security-voting structure can be used to discriminate among desirable and undesirable bids. Unless takeover costs are either too large or too small relative to the bidder's private benefits, the socially optimal structure implements the first-best outcome: only bids with value improvements in excess of the takeover cost succeed. Moreover, whenever the issuance of non-voting shares is socially optimal, it is also in target shareholder interests. Our theory provides a rationale for issuing dual-class shares as part of an optimal sale procedure. Non-voting shares increase the likelihood of a subsequent takeover, which in turn translates into a higher share price.

The optimal security-voting structure varies with incumbent management quality. More non-voting shares increase the probability that the incumbent manager is replaced, which is warranted for less able managers. Conversely, it is optimal to protect very good management from takeover threats with the one share - one vote structure. Thus, our model is in accordance with the common perception that the chief merit of the one share - one vote structure is to prevent value-decreasing bids (Grossman and Hart, 1988). But our model also implies that one share - one vote may deter value-increasing bids, which is neither socially desirable nor in shareholder interests.

As a firm's current market value improves with the quality of its management, our model predicts that firms with (more) non-voting shares have lower market values. While this prediction is consistent with the empirical evidence, the underlying intuition runs counter to the usual explanation that dual-class shares destroy value because they enable corporate insiders to extract more private benefits (Bebchuk et al., 2000). In our model, the use of non-voting shares is an optimal response to low firm value under incumbent management, as it increases the likelihood of a value-increasing takeover.

Like non-voting shares, higher extraction rates promote takeovers. Thus, the optimal fraction of non-voting shares decreases with private benefits. While non-voting shares and private benefit extraction are substitutes, shareholders prefer to promote takeovers by increasing the fraction of non-voting shares rather than by allowing bidders to extract more private benefits. Extraction transfers wealth from shareholders to bidders, whereas the security-voting structure merely affects the extent of redistribution among bidder types. This result stands in contrast with the common view, which advocates private benefits as a means to mitigate the free-rider problem, and the one share - one vote structure as a means to deter value-decreasing bidders (Grossman and Hart, 1980, 1988).

In the main model, we assume a constant extraction rate, which implies a positive relationship between security and private benefits. This is meant to reflect circumstances where a bidder's ability to expropriate shareholders is primarily determined by the target firm, industry, or institutional characteristics. As a result of this positive correlation, shareholders, in equilibrium, overvalue bidder types with small private benefits and undervalue those with large private benefits. Increasing the fraction of voting shares therefore discourages bidder types with a low propensity to bid. However, when security and private benefits are inversely related, low private benefit bidder types are undervalued, and redistribution among bidder types promotes takeovers (Marquez and Yilmaz, 2006).

In general settings where bidders with large (small) security benefits can have large or small private benefits, non-voting shares continue to give rise to the two effects identified above. First, non-voting shares affect the extent of redistribution among bidders. The impact of the direct redistribution effect is, however, ambiguous in general settings: On the one hand, less redistribution encourages bidder types with large private benefits but small security benefits. On the other hand, less redistribution discourages bidder types with large security benefits but small private benefits. Second, as a result of the redistribution effect, target shareholders revise their beliefs about post-takeover security benefits downward and are willing to tender at a lower price. The indirect *price* effect unambiguously promotes takeovers, as it benefits all bidders irrespective of their type. It also highlights that shareholder beliefs are an important channel through which the security-voting structure affects takeover activity. When the price effect is sufficiently strong, attracting bidder types with small security benefits by lowering the fraction of voting shares ultimately also encourages bidder types with large security benefits. Thus, non-voting shares broaden the pool of active bidders along both the private benefit and the security benefit dimensions.

Besides asymmetric information, our analysis assumes a single-bidder setting and a widely held target firm. As noted above, the literature on the security-voting structure considers a competitive setting to derive the optimality of one share - one vote. While a successful bid must exceed any (potential) rival offer, it must also win shareholder approval. We intentionally presuppose that shareholder approval is the binding constraint and consider a single bidder who makes one offer. The single-bidder assumption does not literally rule out other parties interested in controlling the firm. It merely presumes that no competitor can create nearly as much value as the bidder under consideration. In fact, the optimal security-voting structure in our framework is such that the incumbent manager would not want to match the equilibrium offer, as such managers do not create enough value.

Takeover studies document that the single-bidder setting is empirically relevant. For instance, Betton and Eckbo (2000) report that 62 percent of all US tender offer contests (1,353) between 1971 and 1990 involved only one bid. This does not imply that shareholder approval is the binding constraint in all these cases. The single bid may instead have been set above the target shareholder reservation price to deter potential rivals. However, this hardly holds for the 22 percent of single bids which failed. Further support for shareholder approval as the binding constraint emerges from multiple-bid takeovers. In this subsample, all bids are made by the same bidder in 41 percent of cases. In addition, these bid revisions can only in very few cases be attributed to rumoured competition.

The assumption of a widely held target firm implies that the bid price must satisfy the free-rider condition. The key consequence of free-rider behaviour in our model is that the bidder's private information about post-takeover security benefits is tantamount to private information about the target shareholders' *reservation price*. Thus, our main result that the separation of cash flow and voting rights reduces inefficiencies in control transactions is not restricted to widely held targets, but applies more generally to settings where the bidder knows more about the sellers' outside options. For example, this is the case when the current shareholders suspect that the bidder knows their firm to be undervalued. As regards tender offers, our results extend to any ownership structure where the majority of voting rights is dispersedly held. Such ownership patterns are by no means unusual.[1]

Several papers analyze tender-offer games with a single bidder who has private information. Grossman and Hart (1981) establish that takeovers require an information advantage about the value improvement brought about by the bidder. That is, if takeovers were solely motivated by the bidder's knowledge that the target is undervalued, rational shareholders would not tender. Shleifer and Vishny (1986) show that the acquisition of a stake prior to the tender offer provides a partial solution to the free-rider problem. Their (partial) pooling equilibrium anticipates the equilibrium outcome in our benchmark case with a single share class. The difference is that the source of the bidder's gains is private benefit extraction rather than toeholds. Hirshleifer and Titman (1990) and Chowdhry and Jegadeesh (1994) analyze models in which takeover outcomes are probabilistic and equilibrium offers fully reveal bidder type.[2] None of these papers examine the role of the security-voting structure.

As discussed above, Grossman and Hart (1988) and Harris and Raviv (1988) show that forcing a would-be acquirer to purchase all return rights ensures an efficient control allocation in a bidding competition but may not maximize shareholder wealth. Bergström et al. (1997) and Cornelli and Felli (2000) revisit these effects in the context of the mandatory bid rule and the sale of a bankrupt firm. In Burkart et al. (1998), deviations from one share - one vote can be socially optimal, though there is no comprehensive analysis of the optimal security-voting structure. Moreover, the mechanisms through which non-voting shares affect the takeover outcome differ. In their model, the fraction of voting shares determines the bidder's private benefits, as opposed to shareholder expectations about post-takeover security benefits. Gromb (1992) shows in a framework with a finite number of shareholders that non-voting shares mitigate the free-rider problem. Reducing the number of voting shares makes each voting shareholder more likely to be pivotal and increases their tendering probability.[3] This model, contrary to our own, predicts that voting shares trade at a discount.

Our paper is perhaps most closely related to Marquez and Yilmaz (2006). Like us, these authors analyze the pooling equilibrium in a tender offer game with a privately informed

[1] In the sample of Gompers et al. (2008), which comprises all dual-class firms in the US between 1995 and 2002, corporate insiders do not have the majority of votes in about a third of the observations. In the sample of Pajuste (2005), which covers 493 dual-class firms from seven European countries (Denmark, Finland, Germany, Italy, Norway, Sweden and Switzerland) over the period 1996-2002, the two largest shareholders together control less than 20 percent of the votes in about a quarter of the firms. In the subsample of all firms (63) that were taken over, the majority of Swedish targets (16 out of 25) had widely held, dual-class shares.

[2] Separating cash flow and voting rights also promotes takeovers in variants of the tender offer game that allow for separating equilibrium outcomes (Burkart and Lee, 2010).

[3] For the same reason, supermajority rules increase takeover probability (Holmström and Nalebuff, 1992).

bidder. They focus on the impact that shareholder information has on the takeover outcome and the division of takeover gains. In an extension, they also consider supermajority rules which, when restricted bids are allowed, are tantamount to higher fractions of voting shares in a dual-class share structure. Yet, because they restrict attention to the case of negative correlation between security and private benefits, they neither identify the benefits of separating cash flow and voting rights nor the key role of the (assumed) correlation between security and private benefits. In this sense, our paper complements their findings on supermajority rules.

The paper proceeds as follows. Section 2 outlines the model and derives the pooling equilibrium in a simple case with a single share class and value-increasing bidders. Section 3 solves the model for a dual-class target and demonstrates that deviations from one share - one vote mitigate the asymmetric information problem. Section 4 introduces value-decreasing bidders and shows that the security-voting structure can be used to screen bidder types. We derive the socially and shareholder optimal security-voting structure and examine the comparative static properties of these structures. Section 5 discusses more general settings which allow for alternative correlations between security and private benefits. Concluding remarks are set forth in Section 6, and the mathematical proofs are presented in the Appendix.

2 Model

Consider a widely held firm that faces a single potential acquirer, henceforth bidder B. If the bidder gains control, it can generate revenues V. While the bidder learns its type prior to making the tender offer, target shareholders merely know that the revenues V are distributed on $\left[\underline{V}, \overline{V}\right]$ according to the continuously differentiable density function $g(V)$. The cumulative density function is denoted by $G(V)$.

In addition, the bidder can divert part of the revenues as private benefits. The non-contractible diversion decision is modelled as the bidder's choice of $\phi \in \left[0, \bar{\phi}\right]$, such that security benefits (dividends) are $X = (1-\phi)V$ and her private benefits are $\Phi = \phi V$. The upper bound $\bar{\phi} \in (0,1)$ is commonly known and identical for all bidder types. This latter assumption will be relaxed in Section 5 where we allow for a more general type space.

Tender offers are the only admissible mode of takeover, and a successful offer requires that the bidder attracts at least 50 percent of the firm's voting rights. To illustrate the workings of the model, we first consider the one share - one vote structure and defer the analysis of dual-class shares to subsequent sections. If the takeover succeeds, the bidder incurs a fixed cost K of administrating the takeover which is independent of bidder type and is common knowledge.

If the takeover does not materialize, the incumbent manager remains in control. The incumbent can generate revenues V^I, which are known to all shareholders. Like the bidder, the incumbent can extract a fraction $\phi \in \left[0, \bar{\phi}\right]$ of the revenues. Hence, shareholders obtain $X^I = (1-\phi)V^I$ in the absence of a takeover. Initially, we restrict attention to value-increasing bids and set $V^I = \underline{V}$. The sequence of events unfolds as follows.

In stage 1, the bidder learns its type V and decides whether to make a take-it-or-leave-it, conditional, unrestricted tender offer. If the bidder does not make a bid, the game moves directly to stage 3. If the bidder does make a bid, it offers to purchase all shares for total price P, provided that at least 50 percent of the shares (voting rights) are tendered. Moreover, the offer must be for cash, which precludes that its terms depend on the future observation of V. We discuss this last assumption on the form of the bid at the end of this section.

In stage 2, the target shareholders non-cooperatively decide whether to tender their shares. Shareholders are homogeneous and atomistic and do not perceive themselves as pivotal to the tender offer outcome.

In stage 3, if at least 50 percent of the shares are tendered, the bidder gains control and pays price P and cost K. Otherwise, the incumbent manager remains in control. In either case, the controlling party chooses which fraction ϕ of the revenues to divert as private benefits, subject to the constraint $\phi \leq \bar{\phi}$.

Given that private benefit extraction entails no deadweight loss, the stage 3 diversion decision is straightforward. Setting $\phi = \bar{\phi}$ is a successful bidder's (weakly) dominant strategy, and the post-takeover security benefits are independent of the size of the bidder's final stake. If the bid fails or does not materialize, the incumbent manager chooses likewise the maximum extraction rate $\bar{\phi}$, as the incumbent owns no equity.

Since shareholders are atomistic, each one tenders at stage 2 only if the offered price at least matches the expected security benefits. Shareholders condition their expectations on offered price P, known takeover cost K and anticipated extraction decision $\phi = \bar{\phi}$. Hence, a successful tender offer must satisfy the free-rider condition

$$P \geq \mathrm{E}\left(X|P, K, \phi\right) = (1 - \bar{\phi})\mathrm{E}\left(V|P, K\right).$$

For simplicity, we assume that shareholders - after observing bid price P and updating their beliefs - tender unless the price is strictly lower than the expected post-takeover security benefits. This is to say that they do not select a weakly dominated action at the time of the tendering decision. This assumption ensures a unique equilibrium outcome: When the free-rider condition is violated, the bid fails. Otherwise, success is the unique equilibrium outcome, and the bidder acquires all shares.[4]

At stage 1, the bidder is willing to offer at most $V - K$, as a successful offer attracts all shares. Thus, the bidder's participation constraint is simply $V - K \geq P$.

To avoid trivial outcomes, we impose a joint restriction on takeover cost, maximum extraction rate, and the support of bidder types.

Assumption 1 $\bar{\phi}\underline{V} < K < \bar{\phi}\overline{V}$.

These restrictions ensure that some but not all bidder types can make a profitable bid when paying a price equal to their respective post-takeover security benefits. This in turn excludes outcomes where either no or all bidder types make an offer.

In any Perfect Bayesian Equilibrium, the bidder must have correct expectations about which bid prices are acceptable and must prefer the smallest successful offer. Given that shareholders by assumption tender when the free-rider condition is satisfied, this immediately rules out equilibria in which offers succeed at different prices. As there can be only a single equilibrium price P^*, shareholders infer from observing a bid that such price may come from any bidder type who makes a non-negative profit at that price. Thus, shareholders' conditional expectations about post-takeover security benefits are

$$\mathrm{E}\left(X|P^*, K\right) = (1-\bar{\phi})\mathrm{E}\left(V|V \geq P^* + K\right).$$

Given the distribution of V, a bid is therefore made and succeeds in equilibrium if the bidder's participation constraint

$$V - P^* \geq K \tag{1}$$

and the free-rider condition

$$P^* \geq \left(1-\bar{\phi}\right)\int_{P^*+K}^{\overline{V}} \frac{g(V)}{1-G[P^*+K]} V dV \tag{2}$$

hold.

There exists a continuum of prices that satisfy these conditions and so constitute Perfect Bayesian Equilibria of the tender offer game. Following Shleifer and Vishny (1986), we select the minimum bid equilibrium which is the unique equilibrium satisfying the credible

[4] Given that a bid is conditional, a shareholder who believes the bid to fail is indifferent between tendering and retaining. Imposing this belief on all shareholders and breaking the indifference in favour of retaining supports failure as an equilibrium, irrespective of the offered price (Burkart et al., 2006). To avoid co-existence of success and failure as equilibrium outcomes, it is typically assumed that shareholders tender when they are indifferent. Contrary to our assumption, this precludes failure as the equilibrium outcome for a conditional bid, and hence the existence of an equilibrium when the free-rider condition is violated.

beliefs criterion of Grossman and Perry (1986). All other equilibria require shareholders to believe that bidders generate, on average, security benefits that are smaller than the offered equilibrium price. (Details of the equilibrium selection are provided in the Appendix.)

Proposition 1 *Given the one share - one vote structure, only bidder types $V \in [V^c, \overline{V}]$ make a bid and offer the same price P^* where $P^* = \min\left\{P : P = (1-\bar{\phi})\mathrm{E}\left(V|V \geq P+K\right)\right\}$ and $V^c = P^* + K$.*

Since a bidder can appropriate part of the revenues as private benefits, some value-increasing bids succeed in equilibrium despite the target shareholders' free-rider behaviour. Nonetheless, all bidder types below the cut-off value V^c are frustrated.[5] Asymmetric information aggravates the free-rider problem, which becomes most apparent when considering the bidder's participation constraint $\bar{\phi}V \geq [(P^* - X) + K]$. In a full information setting, free-riding would imply $P^* = X$, and all bidder types with $\bar{\phi}V \geq K$ would make a successful bid. Under asymmetric information, $P^* = X$ holds on average, but not for each individual bidder type. Instead, some bidder types pay more and others less than their respective post-takeover security benefits. Such mispricing deters some bidder types whose private benefits are sufficient to cover the takeover cost. That is, the cut-off value V^c under asymmetric information exceeds $K/\bar{\phi}$ (the cut-off value under full information).[6] Moreover, bidder types $V \in [K/\bar{\phi}, V^c)$ cannot succeed with a lower offer because all bidder types $V \geq V^c$ would then make the same offer, and target shareholders would on average be offered less than the post-takeover security benefits. Hence, asymmetric information exacerbates the free-rider problem and prevents some bids, even though they would be value-increasing.

Corollary 1 *Takeover probability decreases with the takeover cost and increases with private benefits.*

The ex ante probability of a takeover corresponds to the probability that a bidder type exceeds cut-off value V^c. Accordingly, the corollary follows from the fact that the cut-off value increases in K but decreases in $\bar{\phi}$.

When takeover cost increases, any bidder who can still break even must on average generate higher revenues. As a bid signals higher post-takeover security benefits, target shareholders tender only at a higher price. This increases the cut-off value, thereby decreasing takeover probability.

[5] In an extension with private benefit extraction, Chowdhry and Jegadeesh (1994) derive an equilibrium in which a subset of bidder types also offer an uninformative bid price.

[6] To see this, rewrite the cut-off bidder type's participation constraint, $V^c - P^* \geq K$, as $\bar{\phi}V^c - K \geq P^* - X^c$. If $P^* > X^c$, this inequality requires that $\bar{\phi}V^c > K$, or equivalently $V^c > K/\bar{\phi}$. Finally, note that indeed $P^* = \mathrm{E}(X|\, X \geq X^c) > X^c$ as $X^c < \overline{X}$ by Assumption 1.

By contrast, larger private benefits ($\bar{\phi}$-values) not only enable bidders to recoup takeover cost more easily, but also lower post-takeover share value. Both effects induce target shareholders to revise their expectations about post-takeover share value downward. This lowers both the equilibrium bid price and the cut-off value.

In our framework with cash offers, the equilibrium price reveals only that bidder valuation V is above cut-off value V^c. As a consequence, the free-rider problem is aggravated, and more bidder types are deterred relative to the full information setting. Relaxing the restrictions on the bid form can help to overcome the asymmetric information problem. Indeed, an all-security exchange offer replicates the full information outcome, although it does not reveal bidder type: Shareholders accept a bid that exchanges each share against a new share, thereby preserving their fraction of the cash flow rights. If the offer were to exchange shares at less than a one-to-one ratio, each shareholder would reject it. Moreover, all bidder types whose private benefits are sufficient to cover the takeover cost are willing to make such a one-to-one security exchange offer.[7]

Although the all-securities exchange offer resolves the asymmetric information problem, it is unconvincing for two reasons. First, it leaves all cash flow rights with the shareholders, making it equivalent to a simple replacement of management. This begs the question of why a takeover is needed in the first place. Second, the bidder gains control only if it offers non-voting equity, or at least separates the majority of the votes from the cash flow rights. Thus, the takeover implements a new security-voting structure. More generally, once bidders are allowed to freely recombine votes and cash flow rights, the existing security-voting structure becomes irrelevant to the takeover outcome (Hart, 1995). Like previous models in this literature (e.g., Grossman and Hart, 1988), we treat the security-voting structure as a constraint rather than a choice variable of the bidder.

3 Non-Voting Shares and Takeover Activity

We now explore the impact of dual-class shares on takeover outcome. More specifically, the target firm has a fraction $s \in (0, 1]$ of voting shares entitled to the same (pro-rata) cash flow rights as the $1 - s$ non-voting shares. Here we treat the fraction s as a parameter and analyze its optimal choice in the next section.

The takeover bid and the decision to tender proceed under the same premises as before. In addition, the tender offer may discriminate between share classes but not within the same

[7] Contrary to bilateral bargaining models (e.g., Eckbo et al., 1990; Hansen, 1987), Burkart and Lee (2010) show that neither restricted bids nor the means of payment (mix of cash and equity) can serve as a signal in tender offer games.

class. Thus, the bidder may quote different prices for voting and non-voting shares. However, if the bidder submits a price for a particular share class, it must buy all tendered shares from that class, conditional upon a control transfer.[8]

To derive the equilibrium, we initially assume that the bidder offers to buy only voting shares. As we show below, this is (part of) the optimal bidding strategy. Since either all or none of the voting shareholders tender in equilibrium, a bidder must pay sP to gain control. Hence, the bidder's participation constraint is

$$\bar{\phi}V - s\left(P - X\right) \geq K. \tag{3}$$

Upon observing a bid, shareholders infer that the bidder can make a profit when buying all s voting shares at that price. Consequently, their expectations are

$$\mathrm{E}\left[X \left| V \geq V^c(s,P)\right.\right] = \left(1 - \bar{\phi}\right) \int_{V^c(s,P)}^{\overline{V}} \frac{g(V)}{1 - G[V^c(s,P)]} V dV \tag{4}$$

where

$$V^c(s,P) \equiv \frac{sP + K}{\bar{\phi} + s\left(1 - \bar{\phi}\right)}.$$

In equilibrium, the bid price must at least match these expectations. As before, we impose the credible beliefs criterion to select the minimum bid equilibrium.

Lemma 1 *Given $s \in [0,1]$, only bidder types $V \in [V^c(s), \bar{V}]$ make a bid and offer the same price $sP^*(s)$ for the voting shares where $P^*(s) = \min\left\{P : P = (1-\bar{\phi})\mathrm{E}\left(V|V \geq V^c(s,P)\right)\right\}$ and $V^c(s) = V^c(s, P^*(s))$.*

Lemma 1 replicates Proposition 1 for a target firm with dual-class shares. All bidder types who make a bid offer the same price, which is equal to their average post-takeover security benefits. Hence, a given bidder type purchases the s voting shares either at a premium ($P^*(s) > X$) or at a discount ($P^*(s) < X$), but the gains of the undervalued bidder types are exactly offset by the losses of the overvalued types. Furthermore, all bidder types $V < V^c(s)$ abstain from bidding because the cost of purchasing overpriced (voting) shares exceeds their private benefits net of takeover cost.

Since non-voting - like voting - shareholders tender only if the bidder offers at least the post-takeover security benefits, a bidder needs to offer the same price to purchase the non-voting shares. Accordingly, only undervalued bidder types have an incentive to extend the

[8]The assumption that a bid must be unrestricted for a given class is not critical. Indeed, one can easily replicate the analysis of intra-class restricted bids by redefining s. For example, restricted offers for half of the voting shares are equivalent to unrestricted offers for all $s' = s/2$ voting shares.

offer P^* to non-voting shares. Since shareholders are aware of this, they would reject bids for all shares. Thus, acquiring only voting shares is optimal for all bidder types who make a bid in equilibrium: Overvalued bidder types limit the loss on the shares purchased in the offer, while undervalued bidder types avoid revealing that they purchase the voting shares at a discount.

Even though non-voting shareholders are excluded from the offer, both classes of shareholders realize the same expected payoff. Conditional on a takeover, voting shareholders receive the bid price in cash, whereas non-voting shareholders retain shares of uncertain value. In equilibrium, the mispricing cancels out on average such that the expected post-takeover share value equals the cash amount paid to the voting shareholders.

Equal expected payoffs in an uncontested takeover translate into a zero voting premium only if a bidding contest is from an ex-ante perspective a zero-probability event. Otherwise, voting shares trade at a premium that reflects the odds that the market puts on a future bidding contest. Voting premia do not arise in our model precisely because the model analyses the takeover outcome when a bidding contest does not materialize.[9]

The comparative static properties of the minimum bid equilibrium are key to our subsequent analysis of the optimal security-voting structure. Lemma 1 shows that each security-voting structure s maps into a unique minimum bid equilibrium. (Being the minimum of a closed subset of $\mathbb{R}$, $P^*(s)$ is always unique.) Moreover, we show in the Appendix that equilibrium price $P^*(s)$ and cut-off value $V^c(s)$ are continuously increasing in the fraction s of voting shares. This has a straightforward implication for the takeover probability.

Proposition 2 *Non-voting shares promote takeovers.*

In equilibrium, the marginal bidder type who makes bid ($V = V^c(s)$) purchases the voting shares at a loss that is exactly offset by its private benefits net of takeover cost. A lower fraction of voting shares enables such bidder to earn a positive profit as it must purchase fewer overvalued shares. In addition, fewer voting shares render a bid feasible to some previously deterred bidder types whose participation constraint (3) is now satisfied. Hence, a higher fraction of non-voting shares induces more bidder types to bid, even if the price were to remain unchanged.

Shareholders infer that less exposure to mispricing extends the pool of bidder types making a bid. They revise their expectations accordingly and are willing to tender at a lower price. This price effect in turn further relaxes the participation constraint (3) and

[9] Furthermore, the result of equal expected returns to both classes of shareholders is specific to the minimum bid equilibrium. In any other Perfect Bayesian Equilibrium, tendering (voting) shareholders receive on average more than the expected post-takeover security benefits, and voting shares trade accordingly at a premium.

induces additional bidder types to bid, thereby reinforcing the reduction in the minimum acceptable bid price.

4 Optimal Security-Voting Structure

The quality of a security-voting structure is determined by the extent to which it frustrates value-decreasing bids but encourages value-increasing bids. To examine both dimensions, we introduce value-decreasing bidder types and let $V^I \in \left[\underline{V}, \overline{V}\right]$.

The presence of value-decreasing bidder types does not affect the analysis and results presented thus far. Indeed, share value under the incumbent management is irrelevant to the takeover outcome. Each shareholder tenders if the offered bid price matches the conditional expected post-takeover security benefits. Similarly, the decision to make a tender offer depends for a given price solely on bidder type. Hence, Lemma 1 continues to hold for any $V^I \in \left[\underline{V}, \overline{V}\right]$, and success for a value-decreasing bid is an equilibrium outcome in our setting whenever $V^I > V \geq V^c(s)$.

It must be noted that failure of a conditional tender offer - whether value-decreasing or increasing - can in general be supported as an equilibrium outcome (see fn. 4). However, our assumption that shareholders tender to a given bid unless, given their beliefs, retaining is a weakly dominant choice, eliminates failure as an equilibrium if the bid satisfies the free-rider condition. That is, when success or failure of a given bid can be supported as equilibrium outcomes, we select success even if the bidder is inferior to the incumbent manager.

Alternatively, one may assume that shareholders reject all bids below the current share value. This selection criterion abstracts from coordination problems among dispersed shareholders, such as the pressure-to-tender problem and the resulting undesirable takeover outcomes. But these are precisely the major issues in the literature on takeover regulation (e.g., Bebchuk and Hart, 2001). Addressing these concerns, we select success as the equilibrium outcome and analyze how the security-voting structure can help to overcome coordination problems.

Given our selection criterion, V^I affects neither takeover probability nor takeover outcome. Nonetheless, since it represents revenues when a takeover fails, V^I is relevant to the choice of security-voting structure. To analyze this choice, we assume that the social planner decides on the fraction $s \in (0, 1]$ of voting shares, knowing current share value, takeover cost K, the upper bound $\bar{\phi}$ and the distribution of bidder types. Later (Section 4.2), we also derive the shareholders' preferred security-voting structure under the same information assumptions.

4.1 Social Planner's Choice

From a social perspective, the takeover cost is a deadweight loss, and it is immaterial how the revenues are shared between shareholders and the bidder or incumbent manager. Hence, the expected social welfare is

$$W = (1 - \Pr(V \geq V^c))V^I + \Pr(V \geq V^c)\left(\mathrm{E}\left[V | V \geq V^c\right] - K\right).$$

Takeovers are socially desirable if they increase revenues by more than the takeover cost. That is, the socially optimal cut-off value is equal to $V^I + K$. Indeed, inserting the takeover probability converts the social welfare function into

$$W = V^I + [1 - G(V^c)] \int_{V^c}^{\overline{V}} \frac{g(V)}{1 - G(V^c)} \left(V - V^I - K\right) dV,$$

and the first-order condition with respect to V^c yields

$$V^c_{soc} = V^I + K. \tag{5}$$

Since $\partial^2 W / \partial (V^c)^2 \big|_{V^c_{soc}} = -g(V^c_{soc}) < 0$, the first-order condition identifies the unique optimum. Implementing the optimal cut-off value is straightforward in view of the inverse relationship between s and V^c (Proposition 2).

Proposition 3 *Each firm has a unique socially optimal fraction of non-voting shares which decreases with the revenues generated by the incumbent manager and increases in the quality of shareholder protection.*

Due to the monotonic relationship between s and V^c, there is a unique fraction of voting shares that implements the cut-off value $V^I + K$ (or the closest achievable value). Thus, each firm as defined by its V^I has a unique socially optimal security-voting structure which increases in V^I. So long as the optimal security-voting structure includes both voting and non-voting shares ($0 < s^* < 1$), such structure achieves the first-best control allocation: It frustrates only value-decreasing bids. This does not hold for the two corner solutions, $s^* = 1$ and $s^* = 0$. If V^I is sufficiently high, the one share - one vote structure is constrained optimal in the sense that not all (though as many as possible) value-decreasing bids are frustrated. Similarly, for sufficiently low V^I, complete separation of cash flow and voting rights does not ensure that all value-increasing bids succeed.

Variations in the optimal fraction of non-voting shares across firms translate into varying degrees of control contestability. Low values of V^I go together with high fractions of non-voting shares. Such stark deviations from one share - one vote are necessary to elicit bids from the many bidder types that can generate higher revenues (net of takeover cost) than the incumbent manager. By contrast, one share - one vote is optimal if the firm is run by a sufficiently competent manager. Since most bidder types are in this case less competent, the optimal takeover barrier is set high. In all other cases, one share - one vote offers incumbent managers too much protection. Thus, we find that deviations from one share - one vote are in many cases socially optimal. At the same time, our theory concurs with the argument that one share - one vote is effective in deterring value-decreasing bids (Grossman and Hart, 1988).

Higher maximum extraction rates enable bidders to recoup takeover costs more easily and they lower shareholder expectations about post-takeover share value. Higher extraction rates and non-voting shares are therefore substitutes; both promote takeovers. As a result, more voting shares are required to implement a given cut-off value, when other governance mechanisms put weaker constraints on private benefit extraction. This suggests that the rationale for one share - one vote is strongest in countries with weak shareholder protection whereas shares with differential voting rights may be desirable in environments where extraction is limited by strong institutions. Incidentally, a tentative but suggestive European study (European Commission, 2007) reports that non-voting preference shares and multiple-vote shares appear to be most frequently used in the UK and Sweden, both commonly considered countries with strong shareholder protection (Nenova, 2003).[10]

Proposition 3 has several policy implications. First, it suggests that the optimal security-voting structure is firm-specific and country-specific. Hence, it weakens the case for harmonizing security-voting structure regulation, especially across otherwise diverse governance systems. Second, it raises doubt about the desirability of the so-called "coattail" provision, which requires bidders to make voting and non-voting shareholders the same offer (Allaire, 2006). This provision replicates the one share - one vote structure and hence may deter some value-increasing bids. Thus, even though this provision leads to higher takeover premia, it need neither be socially optimal nor in the target shareholders' interest. Third, the argument also pertains to restricted bids for single-class targets. Like non-voting shares, restricted bids reduce the fraction of cash flow rights the bidder must purchase to gain control. Consequently, Proposition 3 implies that the mandatory bid rule can deter too many

[10] The optimal fraction of non-voting shares also depends on the size of the takeover cost. On the one hand, higher costs raise the socially optimal cut-off value, as the revenues generated by the bidder must exceed current revenues by a larger margin. On the other hand, higher costs require larger private benefits to break even. This deterrence effect is reinforced by the adjustment of shareholder expectations about post-takeover security benefits. The latter price effect dominates so that the optimal fraction of non-voting shares increases with takeover cost.

takeovers.[11]

4.2 Shareholders' Choice

As the equilibrium bid price always equals the expected post-takeover share value, voting and non-voting shareholders have homogeneous preferences. Hence, we may describe their collective and individual preferences via the aggregate wealth function

$$\Pi = (1-\phi)\, V^I + [1 - G(V^c)] \int_{V^c}^{\overline{V}} \frac{g(V)}{1 - G(V^c)} (1-\phi) \left(V - V^I\right) dV. \tag{6}$$

In contrast to the social planner, shareholders are concerned only about security benefits. Simplifying and deriving the first-order condition with respect to V^c yields

$$V^c_{sh} = V^I.$$

Target shareholders benefit from a takeover whenever the bidder can generate more revenues than the incumbent manager, irrespective of takeover cost. Thus, target shareholders prefer a lower cut-off value than socially optimal and choose an accordingly lower fraction of voting shares. The privately and socially optimal security-voting structures coincide only when both are corner solutions, i.e., when either complete separation is socially optimal or one share - one vote is privately optimal. In all other cases, shareholders prefer too many takeovers.

Unless the incumbent manager is of high quality, shareholders benefit from a dual-class structure as it increases expected takeover gains. Accordingly, shares under the dual-class structure command a higher price. This in turn translates into higher proceeds for a block-holder who wishes to exit. Thus, our theory argues that the adoption of dual-class share structures - whether before or after going public - can be part of an optimal sale procedure.[12] Consistent with this prediction, several empirical studies report positive abnormal returns following the announcement of dual-class recapitalizations (Adams and Ferreira, 2008). In particular, Bauguess et al. (2007) report that most dual-class recapitalizations in their sample are associated with sell-outs by dominant shareholders.

Like the social planner, shareholders have an interest to protect competent managers.

[11] While restricted bids are functionally similar to non-voting shares, they are by no means equivalent. First, partial bids must be for at least 50 percent of the cash flow rights to ensure a voting majority, whereas the fraction of cash flow rights attached to voting shares can be lower. Hence, a dual-class structure is in principle a more powerful instrument with which to screen bidders. Second, the security-voting structure is set by the target firm, while the fraction of shares to which the bid is restricted is in the bidder's discretion.

[12] Bebchuk and Zingales (2000) offer a similar rationale for dual-class shares. In their model, a dual-class structure enables the firm founder to extract more rents from a future acquirer. Here, dual-class shares encourage takeover bids once ownership has been dispersed.

Their preferred level of control contestability, and hence the optimal fraction of non-voting shares, decreases in the incumbent's ability.

Proposition 4 *For a given firm, a dual-class share structure may increase the proceeds from selling out in the stock market. Nevertheless, under both the privately and the socially optimal security-voting structures, firms with (more) non-voting shares have lower market values.*

A firm's market value increases with the incumbent manager's ability, even though the probability of a value-increasing takeover decreases. To see why this is the case, compare two firms, 1 and 2, with $V_1^I < V_2^I$. Under the privately optimal structure, all bids that increase shareholder value succeed, and firm 1 is more likely to be taken over. The difference in the takeover probabilities is $1 - G(V_1^I) - \left[1 - G(V_2^I)\right] = G(V_2^I) - G(V_1^I)$, which is the probability that firm 1 is taken over by a bidder with valuation $V \in (V_1^I, V_2^I]$, thereby (partially) catching up with firm 2's current value. That is, firm 1's higher takeover probability stems only from the potential value improvements that firm 2 has already realized. Thus, firm 2's shares must have a higher market value under the privately optimal security-voting structure. Clearly this reasoning also applies to the firms' socially optimal structures, which takes takeover costs into account.

Proposition 4 is consistent with empirical studies reporting a valuation discount for dual-class firms (Gompers et al., 2008; Villalonga and Amit, 2009). However, our result differs from the standard explanation, typically raised with respect to controlling shareholders, that the use of dual-class shares induces corporate insiders to extract more private benefits at the expense of share value (e.g., Bebchuk et al., 2000; Masulis et al., 2009). In our model with dispersed control, the causality runs in the opposite direction: It is low firm value under the incumbent manager that induces shareholders to choose (more) non-voting shares. In doing so, they increase the likelihood that a better management team will acquire the firm.

Given that non-voting shares and extraction rates are substitutes, the question arises of which combination of s and $\bar{\phi}$ target shareholders prefer. To this end, we compare two regimes implementing the same takeover probability. More precisely, consider the alternatives $\{\bar{\phi}', s'\}$ and $\{\bar{\phi}'', s''\}$, where $\bar{\phi}' < \bar{\phi}''$, $s' < s''$ and $V^c|_{s',\bar{\phi}'} = V^c|_{s'',\bar{\phi}''}$.

Proposition 5 *For a given takeover probability, shareholder wealth is higher in the regime with less extraction and more non-voting shares.*

This result reverses the role commonly attributed to the security-voting structure and to private benefit extraction (e.g., Grossman and Hart, 1980, 1988). In our setting, shareholders do not choose a high $\bar{\phi}$ to promote takeovers and a high s to frustrate inefficient bids.

Instead, a low $\bar{\phi}$ is used to deter undesirable bidders and a low s is used to encourage the others. The security-voting structure affects redistribution among bidder types. More specifically, reducing the fraction of voting shares promotes takeovers by reducing the gains that high bidder types earn from mimicking low bidder types. By contrast, the extraction rate affects how the takeover surplus is split between shareholders and bidders. When using $\bar{\phi}$ to encourage bids, shareholders essentially bribe bidders out of their own pockets. From a social perspective, the regimes are equivalent as they both implement the same takeover probability and hence the same control allocation.

5 Pooling Along Two Dimensions

So far, we have assumed that the security and private benefits are positively correlated. This is a plausible assumption when private benefits are primarily determined by target firm characteristics and the institutional environment rather than bidder characteristics. At the same time, one may well argue that security and private benefits are independent, or even negatively correlated, because of bidder-specific governance differences.

The assumed correlation between security benefits and private benefits matters with respect to the impact of non-voting shares. For instance, when security and private benefits are inversely related, forcing bidders to acquire a *larger* fraction of cash flow rights can *encourage* takeover bids (Marquez and Yilmaz, 2006). To illustrate this point, consider an extreme two-bidder-type example: Both bidder types create the same value V but differ in their extraction abilities. Bidder 1 can extract the entire V as private benefits, while bidder 2 can extract no private benefits. If offers were fully revealing, bidder 2 would have to offer the entire V. Hence, bidder 2 does not make a bid unless it is pooled with bidder 1. The pooling price allows bidder 2 to buy shares at a price below V and to make a profit despite the absence of private benefits. Fewer voting shares decrease bidder 2's profits and may prevent it from recouping the takeover cost. To be sure, bidder 2 never bids under complete separation of cash flow and voting rights.

In the two-bidder-type example, as in the preceding sections, non-voting shares reduce the extent of redistribution among bidder types. However, the impact of redistribution differs across the two settings. It discourages takeovers when security and private benefits are positively correlated, but has the opposite effect when they are inversely related. In general, in settings where bidders with large (small) security benefits can have large or small private benefits, one would expect the two effects to be conflicting. Interestingly, this need not be the case. As we show below, the effects can positively reinforce each other in the promotion of takeovers.

Consider a tender offer game with four bidder types, $(X, \Phi) \in \{\underline{X}, \overline{X}\} \times \{0, \overline{\Phi}\}$, all of whom generate more value than the incumbent manager. Each bidder knows its own type, whereas target shareholders merely know the respective probabilities, $\theta_{X,\Phi}$. For simplicity, we assume that takeover cost K is small. The takeover bid and the decision to tender proceed under the same premises as before.

Clearly, type $(\underline{X}, 0)$ cannot make a profitable bid as the price must at least match $\underline{X}$ in equilibrium. Hence, the optimal security-voting structure implements an outcome in which the three other bidder types make a bid. Since bidder type $(\overline{X}, \overline{\Phi})$ can always make a profitable bid at $P = \overline{X}$, the concern when choosing the security-voting structure is to induce types $(\overline{X}, 0)$ and $(\underline{X}, \overline{\Phi})$ to bid. This challenge captures the general problem of promoting takeovers along two dimensions: to encourage bidder types with large security benefits along with bidder types with large private benefits.[13]

Proposition 6 *Complete separation of cash flow and voting rights is never optimal, whereas one share - one vote is suboptimal for* $\overline{\Phi} - K < E[X \,|(X, \Phi) \neq (\underline{X}, 0)] - \underline{X}$.

Bidder type $(\underline{X}, \overline{\Phi})$ refrains from bidding when it must purchase shares at a large premium. As the inequality in the Proposition shows, this is more likely when such bidder's net private gains $\overline{\Phi} - K$ are small relative to the premium $E[X \,|(X, \Phi) \neq (\underline{X}, 0)] - \underline{X}$ that it must pay. Introducing non-voting shares reduces the number of shares that must be acquired at a premium. That is, restricting redistribution among bidders may be necessary to encourage the bidder type with small security benefits to make a bid.

By contrast, bidder type $(\overline{X}, 0)$ may refrain from bidding not because she has to buy shares at a premium but because its private benefits do not cover the takeover cost. To make a profitable bid, such bidder needs to purchase shares at a price below the true post-takeover security benefits $\overline{X}$. Yet, target shareholders do not tender at such a price unless they expect bidder type $(\underline{X}, \overline{\Phi})$ to bid as well. Consequently, type $(\overline{X}, 0)$ participates in equilibrium only if type $(\underline{X}, \overline{\Phi})$ participates, and redistribution among bidder types promotes takeovers: Bidding by the bidder type with small security benefits lowers the bid price, which in turn makes it profitable for the bidder type with large security benefits (but small private benefits).[14]

[13]For $\theta_{\underline{X}0} = 0$ and constant $\theta_{\overline{X}} \equiv \theta_{\overline{X},\overline{\Phi}} + \theta_{\overline{X}0}$, the setting converges to the no-correlation case when $\theta_{\overline{X},\overline{\Phi}} \to \theta_{\overline{X}}$ and to the negative correlation case when $\theta_{\overline{X}0} \to \theta_{\overline{X}}$. Proposition 6 also applies to either case, as it only depends on $\theta_{\overline{X}}$, but not on the individual probabilities $\theta_{\overline{X},\overline{\Phi}}$ and $\theta_{\overline{X}0}$.

[14]When the takeover cost K is large, the optimal security-voting structure may at best implement a mixed-strategy equilibrium in whichbidder type $(\overline{X}, \overline{\Phi})$ always makes a bid and bidder types $(\overline{X}, 0)$ and $(\underline{X}, \overline{\Phi})$ randomize. The qualitative result that bidder type $(\overline{X}, 0)$ never bids unless bidder type $(\underline{X}, \overline{\Phi})$ (sometimes) bids, as well as the fact that the latter may have to be induced to bid by introducing non-voting shares, continues to hold.

However, once type $(\overline{X}, 0)$ makes a bid in equilibrium, further reductions in the fraction of voting shares can be detrimental. With fewer voting shares, the gains from purchasing shares at a discount shrink. Below a certain threshold level, there is too little redistribution for the bidder type with large security benefits to make a profitable bid.

To summarize, (more) non-voting shares have three effects. First, there is a *positive direct effect* which facilitates bids from bidder types with large private benefits. Second, this leads to an *indirect price effect* - lower shareholder expectations and hence bid price - which facilitates bids from bidder types with large security benefits. Third, there is for a given bid price a *negative direct effect* which discourages bids from bidder types with large security benefits.

These three effects of non-voting shares are also present in more general settings with a continuous-type space $(X, \Phi) \in [\underline{X}, \overline{X}] \times [0, \overline{\Phi}]$. Suppose that a firm's security-voting structure is s and that $P(s)$ is the corresponding equilibrium price. In equilibrium, the set of bidder types that makes a bid includes all types (X, Φ) for which the participation constraint

$$\Phi \geq \max\{K + s[P(s) - X], 0\}$$

is satisfied. In Figure 1a, this set represents all bidder types above the solid downward-sloping line.

Insert figure about here

Keeping the price constant, a reduction in s to $s' < s$ has two direct effects. On the one hand, it relaxes the participation constraint for all bidder types that suffer from redistribution $[P(s) > X]$. On the other hand, it tightens the participation constraint for all bidder types that benefit from redistribution $[P(s) < X]$. The positive and negative direct effects are represented by the vertically and horizontally striped areas in Figure 1a. Apart from the redistribution effect, there is also the indirect price effect. Because the decrease to s' induces bidder types with smaller security benefits to make a bid, shareholders reduce their expectations about post-takeover security benefits and hence lower the price at which they are willing to tender from $P(s)$ to $P(s')$. This relaxes the participation constraint for all bidder types, as the diagonally striped area in Figure 1b illustrates.

The overall impact of non-voting shares depends on the relative strength of these three effects, which in turn depends on the distribution of bidder types and the takeover cost. In Figure 1a, non-voting shares are more likely to be beneficial when bidder distributions have little probability mass in the horizontally striped area. Moreover, it is straightforward to see that this area is smaller when the takeover cost K is smaller. Finally, even if the negative direct effect is considerable, it is mitigated by the indirect price effect. When the price effect is sufficiently strong, non-voting shares unambiguously broaden the pool of bidders: By attracting bidder types with smaller security benefits, non-voting shares reduce the equilibrium bid price, thereby allowing bidder types with large security benefits to make a profit by buying shares at a discount.

The optimal security-voting structure strikes a balance between the above effects. Due to the negative direct effect, the optimal structure may be interior ($0 < s^* < 1$) even when all bidder types are value-increasing. In the presence of value-decreasing bidder types ($X + \Phi \leq V^I$), additional constraints arise from the screening motives discussed in Section 4. However, the insights of that section continue to hold - the optimal fraction of non-voting shares decreases in the incumbent manager's ability, and a firm's optimal fraction of non-voting shares and its market value are inversely related.

6 Conclusion

This paper identifies a new mechanism through which the security-voting structure influences the tender offer outcome. When the bidder has private information about the post-takeover security benefits, it and the target shareholders may not agree on a mutually acceptable price, and the takeover fails. Non-voting shares mitigate this problem because the bidder can acquire control while buying fewer cash flow rights. Conversely, one share - one vote maximizes the risk that disparate information about the security benefits prevents a takeover. Therefore, one share - one vote is in general not optimal.

While developed in a takeover model with atomistic shareholders, the insight that separating cash flow and voting rights can help to bring about efficient control transactions is not confined to tender offers. The essence of free-rider behaviour is to create a link between the bidder's private information and each target shareholder's outside option, which in turn can lead to disagreement about the purchase price. Such disagreement is by no means limited to settings with an infinite number of uninformed shareholders. For instance, this can also arise when current owners suspect a potential buyer of wanting to purchase their firm because it is (currently) undervalued. To invalidate this suspicion, the buyer may have to offer a price that renders the acquisition unprofitable despite its value improvements. Separating the trade of cash flow and control rights can overcome this deadlock.

In the recurring debate about the optimality of one share - one vote, dual-class shares are often criticized because they allow owners to lock in control without holding a corresponding majority stake. By contrast, this paper shows that widely held dual-class shares increase control contestability, thereby promoting value-increasing takeovers. For this reason, single-class structures in dispersedly held firms entrench professional managers and need not be in the dispersed shareholders' best interest. Conversely, dual-class recapitalizations may increase share value and be a means for dominant shareholders to improve the terms at which they sell out in the market. Furthermore, the optimal security-voting structure depends on the quality of both the incumbent manager and the governance mechanisms limiting management self-dealing. Thus, our analysis casts doubt on the merits of mandating a uniform security-voting structure across firms or countries.

Appendix

Proof of Proposition 1

Define the function $f(P) \equiv (1-\bar{\phi})\mathrm{E}\left(V|V \geq P+K\right)$ for $P \in \left[\underline{V}-K, \overline{V}-K\right]$. This function has the following properties.

(a) $f(P)$ is continuous.

(b) $f(\underline{V}-K) = (1-\bar{\phi})\mathrm{E}\left(V\right) > \underline{V}-K$.

(c) $f(\overline{V}-K) = (1-\bar{\phi})\overline{V} < \overline{V}-K$.

While property (a) follows from the continuity of the density function $g(\cdot)$, (b) and (c) follow from Assumption 1. Indeed, $\bar{\phi}\underline{V} < K$ is equivalent to $(1-\bar{\phi})\underline{V} > \underline{V}-K$ which implies $(1-\bar{\phi})\mathrm{E}(V) > \underline{V}-K$. Similarly, $(1-\bar{\phi})\overline{V} < \overline{V}-K$ follows from $\bar{\phi}\overline{V} > K$.

Properties (a) to (c) imply that there exists at least one fixed point of $f(P)$. Denote the smallest fixed point by P^*. From properties (a) to (c), it follows that (2) is satisfied for some $P \geq P^*$, whereas it is violated for all $P < P^*$. Denoting $\mathcal{S}_f \equiv \{P : P \geq f(P)\}$, it follows that $P^* = \min \mathcal{S}_f$.

Any element in $\mathcal{S}_f$ can be supported as a Perfect Bayesian Equilibrium by imposing appropriate out-of-equilibrium beliefs, e.g., $\mathrm{E}[V|\, P] = \overline{V}$ for all $P \neq P^+$ where P^+ is some element in $\mathcal{S}_f$. The credible beliefs criterion imposes that target shareholders believe a deviating (out-of-equilibrium) bid to come only from bidder types that would want the bid to succeed. For any Perfect Bayesian Equilibrium with $P^+ > P^*$, denote the set of bidder types whose participation constraint is satisfied for P^* by $D \equiv \left\{V \in \left[\underline{V}, \overline{V}\right] : V \geq P^* + K\right\}$ and its complement by D^C. No bidder type in D^C would want to bid P^* and succeed, whereas bidder types in D would want to bid and succeed. Consequently, the credible beliefs criterion imposes that shareholders believe $\Pr\left[V \in D|\, P = P^*\right] = 1$. Given such beliefs and sequential rationality, shareholders would accept the deviation bid P^*. Hence, no Perfect Bayesian Equilibrium with $P^+ > P^*$ survives the credible beliefs refinement. If $P^+ = P^*$, there exists no bid price to which any bidder type would like to deviate as any lower price is rejected. Hence, P^* is the unique price (Perfect Sequential Equilibrium) that satisfies the credible beliefs criterion. ■

Proof of Corollary 1

In the minimum bid equilibrium, $V^c = P^* + K$ and $P^* = \mathrm{E}(X|\, V \geq V^c) = \mathrm{E}(X|\, V \geq P^* + K)$. From the proof of Proposition 1, we know that $P < \mathrm{E}(X|\, V \geq P + K)$ for any

$P < P^*$. Now consider the effect of an increase in the takeover cost from K to $\hat{K}$ where $\hat{K} > K$. All else equal, the cut-off value increases. Thus, a necessary condition for $\hat{V}^c \leq V^c$ is that $\hat{P}^* < P^*$. However, this would violate the free-rider condition. To see this, note that $P < \mathrm{E}(X|\, V \geq P + K)$ implies $P < \mathrm{E}(X|\, V \geq P + \hat{K})$, with the former condition being satisfied for any $P < P^*$. Hence, it must be that $\hat{P}^* > P^*$. This in turn implies that $\hat{V}^c > V^c$. The positive relation between takeover probability and extraction rate $\bar{\phi}$ follows directly from the proof of Proposition 1 and the fact that an increase in $\bar{\phi}$ reduces $f(P) = (1-\bar{\phi})\mathrm{E}(V|V \geq P + K)$ for any given P. ■

Proof of Lemma 1

The free-rider condition is now given by

$$P \geq (1-\bar{\phi})\mathrm{E}\left[V|V \geq V^c(s,P)\right] = (1-\bar{\phi})\int_{V^c(s,P)}^{\overline{V}} g(V)V dV / \left(1 - G\left[V^c(s,P)\right]\right)$$

Define $h(s,P) \equiv (1-\bar{\phi})\mathrm{E}\left[V|V \geq V^c(s,P)\right]$ for $P \in \left[\underline{V} - K, \overline{V} - K\right]$. As $V^c(s,P)$ is continuous in P, so is $h(s,P)$. (Note that $h(s,P) = f(P)$ for $s = 1$.) Like $f(P)$ in the proof of Proposition 1, $h(s,P)$ satisfies property (b)

$$g(s, \underline{V} - K) = (1-\bar{\phi})\mathrm{E}\left[V \,\middle|\, V \geq \frac{s\underline{V} + (1-s)K}{\bar{\phi} + s\left(1-\bar{\phi}\right)}\right] \geq (1-\bar{\phi})\mathrm{E}\left(V\right) > \underline{V} - K$$

and property (c)

$$g(s, \overline{V} - K) = (1-\bar{\phi})\mathrm{E}\left[V \,\middle|\, V \geq \frac{s\overline{V} + (1-s)K}{\bar{\phi} + s\left(1-\bar{\phi}\right)}\right] \leq (1-\bar{\phi})\overline{V} < \overline{V} - K.$$

Hence, existence and uniqueness of the minimum bid equilibrium follow from the proof of Proposition 1. ■

Proof of Proposition 2

Since $h(s,P) \equiv (1-\bar{\phi})\mathrm{E}\left[V|V \geq V^c\right]$ is an increasing function of V^c, we know that $h(s,P)$ is increasing in s if and only if

$$\frac{\partial V^c(s,P)}{\partial s} > 0. \tag{A.1}$$

Partially differentiating $V^c(s,P)$ and imposing (A.1) gives

$$P > \left(1-\bar{\phi}\right) K/\bar{\phi}. \tag{A.2}$$

This condition is satisfied as the free-rider condition

$$P \geq (1-\bar{\phi})\mathrm{E}\left[V \middle| V \geq \frac{sP+K}{\bar{\phi}+s\left(1-\bar{\phi}\right)}\right]$$

implies

$$P > (1-\bar{\phi})\frac{sP+K}{\bar{\phi}+s\left(1-\bar{\phi}\right)}$$

which is equivalent to (A.2). Given condition (A.2) holds, $h(s,P)$ is increasing in s for all potential solutions to $P \geq h(s,P)$, including the minimum bid equilibrium $P^*(s)$. ■

Proof of Proposition 3

It remains to show that the optimal fraction of voting shares s is decreasing in the quality of shareholder protection $\bar{\phi}$. The threshold V^c_{soc} is independent of both $\bar{\phi}$ and s. For a given $\bar{\phi}$, the optimal s^* must be such that $V^c(s^*,\bar{\phi}) = V^c_{soc}$. Consider the extraction rates $\bar{\phi} < \bar{\phi}'$ and the corresponding optimal security-voting structures s^* and s'^*. The first step is to establish that $V^c(s^*,\bar{\phi}) > V^c(s^*,\bar{\phi}')$. To see this, insert the explicit expressions for $V^c(s^*,\bar{\phi})$ and $V^c(s^*,\bar{\phi}')$ to obtain

$$\frac{s^*P^*(s^*,\bar{\phi})+K}{\bar{\phi}\left(1-s^*\right)+s^*} > \frac{s^*P^*(s^*,\bar{\phi}')+K}{\bar{\phi}'\left(1-s^*\right)+s^*}.$$

The inequality holds because (a) the denominator on the right-hand side is larger and (b) because $P^*(s^*,\bar{\phi}') < P^*(s^*,\bar{\phi})$ follows from $\partial V^c(s,P)/\partial\bar{\phi} < 0$ for any given s and P and from the arguments made to show that $h(s,P)$ hence decreases with $\bar{\phi}$ (similarly to the proof of Proposition 2). Given $V^c(s^*,\bar{\phi}) > V^c(s^*,\bar{\phi}')$ and $\partial V^c(s,P^*(s))/\partial s > 0$ (Proposition 2), $s'^* > s^*$ must hold to implement $V^c(s'^*,\bar{\phi}') = V^c_{soc}$. ■

Proof of Proposition 4

We prove this proposition only for the case of privately optimal structures. The proof for socially optimal structures is analogous. Under the privately optimal structure, every bidder type with $V^B \geq V^I$ (or $X^B \geq X^I$) succeeds. The probability that the bidder is of such a type is given by

$$\Pr(V \geq V^I) = 1 - G(V^I).$$

The expected security benefits conditional on a successful takeover are

$$(1-\bar{\phi})\mathrm{E}(V \left| V \geq V^I \right.) = (1-\bar{\phi}) \int_{V^I}^{\overline{V}} g(V) V dV / \left(1 - G(V^I)\right).$$

The unconditional expected gain from a takeover is therefore

$$\Pr(V \geq V^I)(1-\bar{\phi})\mathrm{E}(V \left| V \geq V^I \right.) = (1-\bar{\phi}) \int_{V^I}^{\overline{V}} g(V) V dV,$$

and the current market value, which also takes into account the security benefits in the absence of a takeover, is

$$(1-\bar{\phi}) \left[G(V^I) V^I + \int_{V^I}^{\overline{V}} g(V) V dV \right].$$

Taking the partial derivative of the term in the brackets with respect to V^I gives

$$g(V^I)V^I + G(V^I) - g(V^I)V^I = G(V^I) > 0.$$

Since higher V^I also imply a smaller optimal fraction of non-voting shares, the proposition follows. ■

Proof of Proposition 5

Let $\phi' < \phi''$ and choose s' and s'' such that $V^c|_{s',\bar{\phi}'} = V^c|_{s'',\bar{\phi}''} = v$, where $v \in \left[\underline{V}, \overline{V}\right]$. Following the proof of Proposition 3, we know that $\phi' < \phi''$ implies $s' < s''$. Comparing shareholder wealth (6) across the two regimes and noting that the cut-off value is identical,

$$(1-\phi') \left[V^I + \int_v^{\overline{V}} g(V) \left(V - V^I\right) dV \right] > (1-\phi'') \left[V^I + \int_v^{\overline{V}} g(V) \left(V - V^I\right) dV \right],$$

proves the result. ■

Proof of Proposition 6

In an equilibrium in which all but bidder type $(\underline{X}, 0)$ make a bid, the price must satisfy the free-rider condition

$$P \geq E\left[X\,|(X,\Phi) \neq (\underline{X},0)\right] \equiv \underline{P}.$$

Bidder type $(\overline{X}, \overline{\Phi})$'s participation constraint is always satisfied as the price cannot exceed $\overline{X}$ in equilibrium. For a given price $P \leq \overline{X}$, bidder type $(\underline{X}, \overline{\Phi})$ makes a bid only if $s(\underline{X} - P) + \overline{\Phi} \geq K$ or $s \leq \overline{s} \equiv \overline{\Phi} - K/(P - \underline{X})$. Bidder type $(\overline{X}, 0)$ makes a bid if $s(\overline{X} - P) \geq K$ or $s \geq \underline{s} \equiv K/(\overline{X} - P)$. Hence, bidder types $(\underline{X}, \overline{\Phi})$ and $(\overline{X}, 0)$ participate if the interval $[\underline{s}, \overline{s}] \cap [0, 1]$ is non-empty for prices satisfying the above free-rider condition. For small K, we have that $\underline{s} \in (0, 1)$ so that $[\underline{s}, \overline{s}] \cap [0, 1]$ is non-empty whenever $\overline{s} \geq \underline{s}$. The latter inequality implies an upper bound for the price,

$$P \leq \left(1 - \frac{K}{\overline{\Phi}}\right)\overline{X} + \frac{K}{\overline{\Phi}}\underline{X} \equiv \overline{P},$$

which is compatible with the free-rider condition for sufficiently small K as $\overline{P} \underset{K\to 0}{\longrightarrow} \overline{X}$. More specifically, the condition $\overline{P} \geq \underline{P}$ requires that the takeover cost K satisfies

$$K \leq \overline{\Phi} \times \Pr\left[X = \underline{X}\,|(X,\Phi) \neq (\underline{X},0)\right].$$

Finally, one share - one vote cannot implement the optimal outcome when $\overline{s} < 1$ which is equivalent to

$$\begin{aligned} \overline{\Phi} - K &< P - \underline{X} \\ \overline{\Phi} - K &< E\left[X\,|(X,\Phi) \neq (\underline{X},0)\right] - \underline{X} \end{aligned} \tag{A.3}$$

where in (A.3) we choose the minimum bid price to maximize the range of parameters for which one share - one vote implements the optimal outcome. ■

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