GOVERNANCE OF CORPORATE TAKEOVERS: TIME FOR SAY-ON-TAKEOVERS?

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Abstract

We study the potential for digital, online information and electronic voting to improve shareholder surplus by facilitating a new governance structure: *owner-governance*, which shifts control of the takeover decision from the board to shareholders. We compare analytical models of owner-governance to the current practice of delegated-governance in the context of increasing availability of online information which increases public informedness. Our analysis shows that shareholders of the target firm and the acquirer both prefer owner-governance to delegated-governance when informedness is sufficiently high. Interestingly, we find a region where owner-governance offers a higher probability of takeover but delegated-governance offers higher shareholder surplus. Under delegated-governance, the board endogenously sets an entrenchment level that is always greater than the entrenchment level preferred by the shareholders and increasing informedness reduces the probability of a takeover. Our results suggest that owner-governance should be considered because of increasing informedness.

Keywords: *Governance, Takeovers, Corporate Control, Corporate Governance, Boards, Entrenchment, Anti-takeover Provisions, Electronic Voting, e-voting, Shareholder Welfare, IT, Information Technology, Information, Informedness*

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INTRODUCTION

We examine corporate governance of unsolicited takeovers, also referred to as the market for corporate control (Manne, 1965). Unsolicited takeovers are a powerful governance institution, because the threat of a takeover forces discipline onto boards so that they focus on ensuring shareholder value. Under the current model of delegated-governance, boards retain veto power over the decision to accept or reject takeovers (Bebchuk, 2002). The advantage of the current practice of delegated-governance is that the board of the firm that is the potential acquisition target, the target firm, can leverage superior information regarding outside options and has the ability to negotiate with the acquirer. Therefore, boards will negotiate on behalf of the shareholders who are diffuse and hence unable to negotiate with an acquirer.

However, there is a major disadvantage to delegated-governance. Agency problems arise from misalignment of interest between shareholders, who can be viewed as the principal, and the board that is their agent (Hermalin and Weisbach, 1991) with respect to takeovers. Boards derive both pecuniary and non-pecuniary benefits from their directorship and may have a conflict of interest, because a takeover typically results in the dissolution of the target firm's board, leading to a termination of benefits. Hence, boards may reject takeovers using antitakeover provisions that entrench the target firm board unless the offer premium is large enough to provide reputational value to the board. Therefore, under delegated-governance entrenched boards can act in their self-interest leading to an agency cost to shareholders.

We propose a new takeover governance model where shareholders directly control the takeover decision, bypassing the board, and thus eliminating this agency problem. While this proposed model eliminates the agency problem, it has the disadvantage that diffuse shareholders cannot negotiate with the acquirer and have less information compared to the board. However, the Internet information age makes shareholders increasingly well informed and therefore, mitigates the informational disadvantage.

What role does information play in these two approaches to takeover governance? Boards and acquirers possess both public and private information – private information such as information obtained through the use of experts and consultants and public information such as SEC filings. Therefore, the board's and the acquirer's information set is superior to the publicly available information used by shareholders. Under traditional delegated-governance, boards use their private information about the opportunities and challenges facing the firm, which we refer to as outside options, to negotiate with the acquirer. The acquirer uses private and public information to determine its valuation of the target firm based on synergies obtained from merging the two firms.

The development of the Internet has allowed widespread dissemination of digital information to inform shareholders (Coffee, 1997; Wallman, 1998) of the prospects for their firm and the potential of a takeover. Seeking Alpha (seekingalpha.com) is one example of a website that provides such public information. Many firms provide free online access to their annual reports, transcripts of conference calls, Securities and Exchange Commission (SEC) filings, and other investor material on their corporate websites. Third party firms also provide such information, for example, digital recordings of earnings conference calls can be found on EarningsCast (http://earningscast.com/calls).

We define *informedness* as the aggregate state of knowledge of the public which depends on the quantity, quality, timeliness, and ease of access of investor information that is publicly available. The Internet also enables an efficient and cost-effective electronic voting mechanism, exemplified by the SEC adoption of e-voting (Gordon, 2008). IBM and General Electric are examples of many firms that have instituted electronic proxy voting using the Internet. Hence, we propose and analyze a new takeover governance, and referred to as *owner-governance*, which shifts control of takeovers from the board to shareholders. The role of Information Technology (IT) here is twofold: (i) electronic voting, and (ii) increasing informedness. Increasing

informedness reduces the informational disadvantage of shareholders relative to the board and favors owner-governance over delegated-governance.

A recent example of agency issues in corporate takeovers is the failed takeover of Emulex Corporation by Broadcom Corporation. Broadcom made an offer of $11/share[1] which represented a 66% premium over Emulex's closing stock price on April 20, 2009, and this offer was rejected by the Emulex board. Despite rejecting such an attractive offer, the board members did not face any repercussions because Emulex's takeover protections included a poison pill and a staggered board (Please see Appendix 1). Poison pills trigger a dilution of shares, effectively raising the cost of acquisition to prohibitive levels. Staggered boards are segmented into classes where one class is elected each year, making it costly to control the target firm's board because an acquirer faces expensive proxy contests in multiple years. Hence, boards can entrench themselves using such protections.

There are two opposing views on board entrenchment in the literature: 1) that board entrenchment benefits shareholders, or 2) that entrenchment weakens the disciplinary effect of takeovers and reduces shareholder value. Studies in support of entrenchment include the bargaining power hypothesis and managerial myopia arguments.

The bargaining power hypothesis suggests that entrenched boards have a stronger bargaining position vis-à-vis the acquirer because the acquirer is unable to replace the board (Harris, 1990; Holl and Kyriazis, 1997). The bargaining power hypothesis is supported by empirical studies that report high takeover premiums for firms with entrenched boards (Comment and Schwert, 1995; Georgeson & Co., 1988, 1997; J. P. Morgan, 1995; Lipton, 1979; Malatesta and Walkling, 1988; Rygnert, 1988). These studies argue against shareholder control of takeover decisions.

[1] Broadcom Raises All-Cash Tender Offer for Emulex to $11.00 Per Share. *http://www.broadcom.com/press/release.php?id=s392805*

The managerial myopia argument says that entrenchment allows a board to strategically focus on maximizing shareholder value through long term investments instead of short term goals. Stein (1988) suggests that the threat of takeovers drives myopic behavior, while Zhao et al. (2012) found evidence that entrenchment discourages myopic behavior and encourages focus on long term performance.

The primary argument against entrenchment uses agency theory, where boards are viewed as agents of shareholders (Bebchuk, Coates, and Subramanian, 2002; Subramanian, 2003). Entrenchment alters the board's incentive structure, weakening their alignment with shareholder interests. A non-entrenched board is aware that it can be replaced if it does not act in the interests of shareholders. In contrast, an entrenched board can act on private incentives without threat of removal. Studies have found empirical evidence showing that entrenchment reduces shareholder surplus (Cremers and Ferrell, 2014; Bebchuk, Cohen and Ferrell, 2009; Guo, Kruse and Nohel, 2008; Gompers, Ishii and Metrick, 2003; Rygnert, 1988). Finally, in his comprehensive review of the research on the effect of entrenchment on shareholder value, Coates (2000) concluded there is conflicting empirical evidence regarding the value of entrenchment.

The first part of this paper develops a framework for analyzing delegated-governance and the effect of informedness on shareholder surplus. Given the importance of takeovers in corporate governance, we propose and analyze a new model of takeover governance, denoted as owner-governance, in the second part of the paper. Finally, we compare the two models of takeover governance to examine the effect on shareholders, the acquirer and their joint surplus.

Our analytical models capture the following scenarios for takeover governance: (1) delegated-governance, where the board controls takeover decisions, and (2) the proposed owner-governance, giving shareholders control of takeovers ("say-on-takeovers"). The advantage of the current practice of delegated-governance is that the target firm board can leverage superior information regarding outside options and has the ability to negotiate with the acquirer. In

contrast, under our proposed owner-governance, the advantage is that shareholders have better information about their own preferences on whether to accept a takeover offer. Under this proposed model, board entrenchment is no longer a factor in takeover decisions.

MODEL OF DELEGATED GOVERNANCE AND BOARD ENTRENCHMENT

We develop a stylized model of delegated governance to consider a publicly traded target firm represented by a board of directors with one potential acquirer. Hence, there are three parties in our model: (i) target firm shareholders, (ii) target firm board of directors, and (iii) the acquirer. Under delegated-governance shareholders do not control the takeover decision, but want their expected surplus from a takeover to be maximized. The board of directors has the authority to make all decisions on takeovers and negotiates with the acquirer to determine the takeover premium. The negotiated takeover price depends on the bargaining power of the target firm and the level of endogenously determined board entrenchment. Board entrenchment level determines the minimum premium required for a successful takeover. Takeover premium is computed from the current market price of the target firm's share (p_C) and the takeover offer price (p_A). The price premium is represented by p is defined as the ratio $(p_A - p_C)/p_C$.

We treat the board of the target firm as a monolithic entity for ease of exposition and simplicity. The board derives pecuniary and non-pecuniary benefits from the directorship (Adams et al., 2008; Fama, 1980; Fama and Jensen, 1983; Hermalin and Weisbach, 2001). Such benefits include the net value of pecuniary compensation benefits, such as cash compensation, as well as non-pecuniary benefits. We denote total pecuniary and non-pecuniary benefit to the target firm board based on its incumbent status as W (Adams et al., 2008; Fama, 1980; Fama and Jensen, 1983; Harford, 2003; Hermalin and Weisbach, 2003). Board compensation is public information. If the target firm is taken over, the board loses its directorship and related benefits W, and is replaced by the acquirer's board.

In addition, the target firm board derives a reputation benefit $\gamma \cdot p$ from being acquired, where p is the takeover price premium paid to target firm shareholders by the acquirer and γ is a scaling parameter. Thus, the higher the takeover premium, the greater is the reputational benefit to the board from a successful takeover, however the board loses the benefits of incumbency W (Harford, 2003). The board seeks to maximize its benefit by evaluating the tradeoff between the loss of incumbency benefits and the gain in reputational benefit derived from a takeover. The board sets its entrenchment level (c) in order to maximize its net expected benefits. The entrenchment level effects the outcome of the takeover negotiation between the board and the acquirer as described later in this section.

The takeover transaction is modeled as a sequence of four steps. It begins with the acquirer expressing an interest in the target firm to the target firm's board. The target firm board then negotiates with the acquirer to determine the premium required for a successful takeover. Figure 1 shows the conceptual model of delegated-governance.

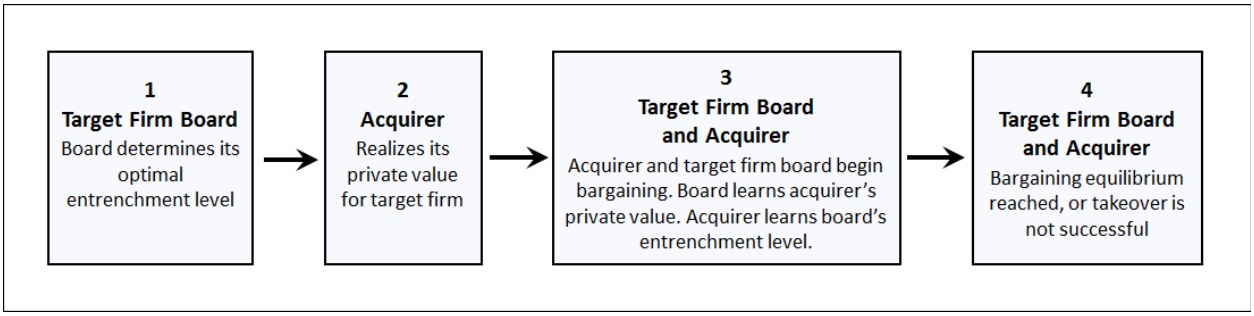

Figure 1: Model of delegated-governance and board entrenchment

In practice, if the board accepts an offer, it recommends the takeover and puts it to a formal shareholder vote which is routinely approved. If the board decides not to accept the takeover, shareholders have no opportunity to indicate a preference. As discussed, boards often have private incentives to apply stricter criteria to takeovers so that a board-approved takeover results in routine shareholder approval. We do not model the formality of a routine shareholder

approval following board acceptance of a takeover offer. Therefore, if the target firm's board and the acquirer reach agreement, the takeover is successful.

Boards and acquirers use both public and private information such as information obtained through the use of experts and consultants. Therefore, the board's and the acquirer's information set is superior to publicly available information. The shareholders are informed through public information. Regulation Fair Disclosure (Reg FD) by the SEC prohibits selective disclosure of material information which ensures all material information is publicly released (www.sec.gov/answers/regfd.htm), and there is evidence that Reg FD has prevented selective disclosure of nonpublic information (Gintschel and Markov, 2004). Furthermore, the SEC has also approved the use of social media for company announcements (www.sec.gov/News/PressRelease/Detail/PressRelease/1365171513574). There is significant literature that discusses how the availability of online information has reduced information asymmetry between management and shareholders, where management includes the board (Brown and Hillegeist, 2007; Brown et al., 2004; Fu et al., 2012; Healy and Palepu, 2001; Merton, 1987; Mohanram and Sunder, 2006; Nasri, 2013; Van Buskirk, 2012). In our model, the informedness parameter $\phi \in (0,1)$ captures the state of public information. The increasing availability of online information (increasing ϕ) leads to shareholders being better informed and thus reduces the information asymmetry between the shareholders and the board.

Prior literature shows that increasing informedness of the shareholders results in lower cost of capital (Diamond and Verrecchia, 1991; Easley and O'Hara, 2004; Ferreira and Laux, 2007; Gelb and Zarowin, 2000; Healy et al., 1999; Kim and Verrecchia, 1994; Merton, 1987). Lower cost of capital, ceteris paribus, results in a higher market value for the firm (Modigliani and Miller, 1958). Increased market value results in a higher share price p_C. We assume the share price demanded by shareholders in order to sell and the share price an acquirer is willing to offer p_A does not change because p_A is based on the acquirer's private information and public

information. Therefore, increased informedness results in (1) a reduction in the premium ($(p_A - p_C)/p_C$) the acquirer is willing to pay and (2) a reduction in the premium the shareholders demand in order to sell.

The target firm shareholders are uncertain about the acquirer's willingness to pay. We capture this by modeling the premium the acquirer is willing to pay as being drawn from a distribution. The uniform distribution is used for tractability and ease of exposition. The lower support is zero, indicating no premium, and the upper support $(1-\phi)n_a$ is the maximum possible premium an acquirer may offer. The maximum premium is a decreasing function of the state of informedness ϕ , because increasing informedness leads to increased market value and lowers the premium, as described in the introduction. $\hat{n}_a$ represents the premium drawn by the acquirer. The model parameters and variables are listed and described in Table A2 in Appendix 1.

The negotiation between the target firm board and the acquirer is modeled as a Nash bargaining process, a widely accepted result in bargaining theory. Binmore, Rubinstein, and Wolinsky (1986) show that the Nash bargaining model can be applied to economic modeling and has been used within the context of takeovers (Harris, 1990, 1994; Högfeldt and Högholm, 2000). Nash bargaining (Nash, 1953) is a cooperative game in which two parties, under certain axiomatic conditions, come to an equilibrium allocation of available gains by revealing their outside options. In our setting, the outside options for the target firm (O_s) and the acquirer (O_a) are exogenously determined using private information. Examples of the outside option for target firm shareholders include the possibility of a successful new product, or the possibility a technology under development will succeed, leading to an increase in the stock price. Outside options for the acquirer can include the takeover of an alternate firm.

Nash bargaining, may or may not lead to a successful takeover. As discussed previously, the board determines its level of entrenchment (c) based on optimizing its private incentives.

The board will consider only those offers with a premium greater than c. Therefore, whenever the acquirer draws a premium such that $(\hat{n}_a < c)$ then the takeover fails. On the other hand, whenever $(\hat{n}_a > c)$ the takeover is successful. In this case, the takeover premium is determined based on the level of informedness, the outside options of both parties, and the entrenchment level.

The outside options for the target firm (O_s) and the acquirer (O_a) determine the bargaining power of the target firm board: $k \in (0,1)$. The takeover premium received by the shareholders in case of a successful takeover is: $max\{c^*, k\hat{n}_a\}$. Thus, the takeover premium is determined by the level of entrenchment when the target firm's bargaining power is low, otherwise, it is determined by the bargaining power and the acquirer's willingness to pay. In practice, the takeover bargaining process involves an exchange of information as part of due diligence (DePamphilis, 2015). This typically takes place over a matter of weeks where the acquirer learns detailed information about the target and the target firm learns about the acquirer. We state the assumptions below.

Assumptions

A1. Rationality: The three parties (shareholders, acquirer, and target firm board) are rational.

A2. Single acquirer: There is a single acquirer, and the acquirer's premium valuation of the target firm is a random draw $\hat{n}_a$ from uniform distribution $U[0,\ (1-\phi)n_a]$. This distribution is considered common knowledge.

We analyze entrenchment and the effect of informedness under the traditional delegated-governance structure, where target firm shareholders are represented by an entrenched board. The objective function of the board is:

$$\underset{c}{Max}\{E[S_B]\} = \begin{cases} \int_{c}^{c/k} \frac{c\gamma}{(1-\phi)n_a} d\hat{n}_2 + \int_{c/k}^{(1-\phi)n_a} \frac{k\hat{n}_a\gamma}{(1-\phi)n_a} d\hat{n}_2 + \int_{0}^{c} \frac{W}{(1-\phi)n_a} d\hat{n}_a, & c < k(1-\phi)n_a \\ \int_{c}^{(1-\phi)n_a} \frac{c\gamma}{(1-\phi)n_a} d\hat{n}_2 + \int_{0}^{c} \frac{W}{(1-\phi)n_a} d\hat{n}_a, & c \geq k(1-\phi)n_a \end{cases}$$

In our setting, entrenchment eliminates potential takeovers because the highest premium an acquirer is willing to offer may fall below the premium threshold dictated by entrenchment $(\hat{n}_a < c)$. On the other hand, entrenchment may enable the board to obtain a higher premium. The steps and information set are shown in Table 1.

Steps and information set
Board determines its entrenchment level • The target firm board sets its optimal entrenchment level c^*.
Acquirer's realizes its private value for target firm • The acquirer realizes its private value $\hat{n}_a$ for the target firm.
Bargaining process takes place • The target firm board and the acquirer begin bargaining. • The board learns $\hat{n}_a$, acquirer learns c^*, board and acquirer learn each other's outside options, and bargaining power k.
Bargaining outcome • A bargaining solution is achieved when $\hat{n}_a \geq c^*$ and the takeover is successful, and target firm shareholders receive $max\{c^*, k\hat{n}_a\}$ from the acquirer. • Otherwise, when $\hat{n}_a < c^*$ the takeover is not successful.

Table 1: Delegated-governance with entrenched target firm board

The bargaining equilibrium is reported in Lemma 1, the optimal entrenchment level of the board in Lemma 2, and a theoretical benchmark case of entrenchment which maximizes shareholder surplus is reported in Lemma 2.

LEMMA 1: Bargaining equilibrium between target firm board and acquirer
Nash bargaining under delegated-governance delivers an allocation

$k = (1/2) + (O_s - O_a)/(1-\phi)n_a$ *of the surplus to the target firm shareholders, where* $k \in (0,1)$.

Bargaining power is determined by the exogenous outside options facing the target firm

(O_s) and the acquirer (O_a) (Ahern, 2012; Barnes et al., 1990; Rosenkranz, 2005). Such outside options, and therefore bargaining power, will be affected by the competitive environment, market conditions, technology, and other factors. For example, technological change may enhance future prospects and, in turn, increase outside options and bargaining power. The development of cloud technology now allows firms that sell IT applications software to offer Software as a Service (SaaS) to their customers. This addition of cloud-based SaaS products may provide the potential for revenue and profit growth, and increase the value of staying independent. Alternatively, the firm's markets could face an economic slowdown, reducing outside options and bargaining power. For example, any increase in the price of oil is likely to lower the outlook for firms in the automotive industry, where revenues would be expected to decline. Decreasing revenues could result in lower profits, implying poor outside options. As a result, staying independent could reduce shareholder surplus. Similar factors may be in play in determining outside options for the acquirer, including availability of alternatives for acquisition.

The board will determine its entrenchment level by maximizing expected private benefits. In this process, the board compares the benefit from incumbency against the reputational benefit from a takeover. The probability of a takeover decreases with increasing entrenchment, but increasing entrenchment also increases the board's reputational benefit conditional on a successful takeover. We also model a benchmark entrenchment level that maximizes expected shareholder surplus. The objective function of the shareholders is

$$\underset{c}{Max}\{E[S_S]\} = \begin{cases} \int_{c}^{c/k} \frac{c}{(1-\phi)n_a} d\hat{n}_a + \int_{c/k}^{(1-\phi)n_a} \frac{k\hat{n}_a}{(1-\phi)n_a} d\hat{n}_a, & c < k(1-\phi)n_a \\ \int_{c}^{(1-\phi)n_a} \frac{c}{(1-\phi)n_a} d\hat{n}_a, & c \geq k(1-\phi)n_a \end{cases}$$

Lemma 2 reports the board's endogenously determined entrenchment level as well as the benchmark level of entrenchment.

LEMMA 2: The board's optimal entrenchment level and benchmark entrenchment

Under delegated-governance, the target firm board sets its entrenchment level at c^* *to maximize expected benefits, where* $c^* = \begin{cases} kW/\left(\gamma(2k-1)\right), & (W/\gamma) < (2k-1)(1-\phi)n_a \\ (W/2\gamma) + \left((1-\phi)n_a/2\right), & (2k-1)(1-\phi)n_a \le (W/\gamma) \le (1-\phi)n_a \\ (1-\phi)n_a, & (W/\gamma) > (1-\phi)n_a \end{cases}$.

The theoretical benchmark entrenchment level c^* *that maximizes expected shareholder surplus is:* $c_S^* = \begin{cases} (1-\phi)n_a/2, & 0 < k \le 1/2 \\ 0, & 1/2 < k < 1 \end{cases}$.

Intuition suggests that when the value of incumbency captured by pecuniary and non-pecuniary benefits W is large, the board will vote in favor a higher level of entrenchment, whereas when the reputational value of a takeover represented by γ is high, the board will favor a lower level of entrenchment. The ratio W/γ captures the tension between the benefits of incumbency and the reputational benefit from a takeover. We refer to this ratio using the term *Board Incentive Ratio (BIR)*.

The right-hand side conditions reported in the board's entrenchment level are determined by the board's BIR, W/γ. A low value for BIR is captured by the first condition $(W/\gamma) < (2k-1)(1-\phi)n_a$, high BIR is captured by $(W/\gamma) \ge (2k-1)(1-\phi)n_a$, and a very high BIR is captured by the condition $(W/\gamma) > (1-\phi)n_a$. When BIR is very high, the entrenchment level is so large that no takeovers occur. Henceforth, we assume $(W/\gamma) \le (1-\phi)n_a$ in order to rule out such conditions outside the boundary condition $(W/\gamma) = (1-\phi)n_a$.

We also analyzed the benchmark case where entrenchment level is determined by shareholders for benchmarking, and to measure the degree of misalignment with shareholder preferences. This benchmark level of entrenchment $\left(c_S^*\right)$ maximizes shareholder surplus from a

takeover. As discussed in the Introduction section, some scholars argue in favor of entrenchment while others argue that entrenchment is harmful to shareholders. By comparing this benchmark entrenchment level with the board's endogenous entrenchment level, we can determine the merits of each argument.

It can be seen that when the board determines its entrenchment level endogenously, board entrenchment will be greater than the level preferred by shareholders. This occurs because when $W = 0$, the board maximizes expected shareholder surplus, whereas when $W > 0$, the board's optimization deviates from shareholder surplus maximization. The entrenchment level that is beneficial to shareholders is strictly positive only when the firm's bargaining power is low $(k < 1/2)$.When the firm's bargaining power is high $(k \geq 1/2)$, shareholders prefer no entrenchment.

To understand the intuition behind this, we examined the two effects of entrenchment. The first reduces shareholder surplus because potential takeover transactions are eliminated as a consequence of entrenchment. Transactions are eliminated when the acquirer's valuation of the target firm is below the board's entrenchment level. Elimination of such transactions reduces expected shareholder surplus. The second effect increases shareholder surplus because entrenchment delivers a higher surplus than what is obtained from Nash bargaining, when bargaining power is below a threshold $(k < c/\hat{n}_a)$. In such cases entrenchment forces the acquirer to offer a higher premium than the premium achieved through the Nash bargaining process.

Comparing the two effects of entrenchment, we see that gains from entrenchment make up for the transactions that are lost when the firm has low bargaining power. In this situation, entrenchment is beneficial to shareholders. On the other hand, when the target firm has greater bargaining power, the effect is reversed and entrenchment is disadvantageous to shareholders.

The benchmark entrenchment in Lemma 2 supports the bargaining power hypothesis

suggested by those who favor board entrenchment as being beneficial to shareholders, when bargaining power is low. On the other hand, the board always sets its entrenchment level to be greater than the level which maximizes shareholder surplus, supporting the view that excessive board entrenchment is harmful to shareholders.

We now examine the role of informedness in a takeover setting. As discussed in the section on the delegated-governance model, the informedness parameter $\phi \in (0,1)$ captures the level of information available to all parties, and is defined as the aggregate state of knowledge of the public.

COROLLARY 1: Comparison of board's endogenous entrenchment with benchmark case

The board's endogenous entrenchment level is always greater than the benchmark entrenchment level preferred by shareholders.

Corollary 1 shows that when the board determines its entrenchment level endogenously, board entrenchment will always be greater than the entrenchment level preferred by shareholders. This result is independent of the level of informedness. The intuition is straightforward in that the board's objective function is based on maximizing its private benefits instead of shareholder surplus. Entrenchment levels greater than the benchmark level of entrenchment reduce shareholder surplus and therefore lend support to scholars and practitioners who regard board entrenchment as harmful to shareholders.

PROPOSITION 1: Impact of informedness and bargaining power on entrenchment

(i) When the BIR ratio (W/γ) *is sufficiently small,* c^* *is unaffected by informedness, and it decreases with bargaining power:* $\frac{\partial c^*}{\partial \phi} = 0, \quad \frac{\partial c^*}{\partial k} = -\left(\frac{W}{(1-2k)^2 \gamma} \right)$ *when* $(W/\gamma) < (2k-1)(1-\phi) n_a$.

(ii) When the BIR ratio (W/γ) *is sufficiently large,* c^* *decreases with informedness, and it is*

unaffected by bargaining power: $\frac{\partial c^*}{\partial \phi} = -(n_a / 2)$, $\frac{\partial c^*}{\partial k} = 0$ *when* $(W / \gamma) \geq (2k-1)(1-\phi) n_a$.

Proposition 1 suggests that under the conditions stated in the second part, a board will reduce its entrenchment level with informedness. We describe this condition in Lemma 2 as a high Board Incentive Ratio (BIR) condition. When BIR is low, informedness does not affect the board's entrenchment level.

When BIR is high, successful takeover premiums are determined solely by the board's entrenchment level, because the premium determined by entrenchment is always greater than the premium derived from the bargaining solution. The first order condition contains an interaction term between entrenchment and informedness because the highest premium an acquirer may have is a function of informedness. Hence, the board's endogenous entrenchment level is a function of informedness.

With respect to bargaining power, when BIR is low, we show in Proposition 1 that the board decreases entrenchment with bargaining power. Increased bargaining power will improve the reputational benefits for the board, and one might expect there would be no reason to reduce the entrenchment level. However, by reducing the entrenchment level, the board can increase the number of transactions that generate reputational benefits. Therefore, the board will reduce its entrenchment level with bargaining power.

Misalignment between the board and shareholders in the preference for entrenchment level imposes an agency cost on shareholders. This agency cost arises because the board selects an endogenous entrenchment level that is greater than the entrenchment level that maximizes shareholder surplus (Lemma 2). We define the board agency cost as the difference in shareholder surplus between, (a) when shareholders determine the level of board entrenchment (benchmark case), and (b) when the board determines its level of entrenchment.

We employ model parameters to derive a metric called Board Alignment Ratio (BAR) that can serve as a measure of misalignment between the board and shareholders. BAR is the

ratio of the difference between entrenchment preferred by the board (c^*) versus the benchmark entrenchment level preferred by shareholders (c_S^*), and the standardized benchmark level of entrenchment preferred by shareholders: $BAR = (c^* - c_S^*) / (1 + c_S^*)$. Lower values thus imply better alignment, and BAR increases with increasing incumbent benefits to the board (W), and decreases with increasing reputational benefit from a takeover (γ).

PROPOSITION 2: Impact of informedness on board agency cost

(i) Board agency cost increases with informedness when: $\{k \geq 1/2,\ (W/\gamma) < (2k-1)(1-\phi)n_a\}$

or $\{0 \leq k < k_1,\ (W/\gamma) \geq (2k-1)(1-\phi)n_a\}$, *where* $k_1 = \left(1 + \left((W/\gamma)/\left((1-\phi)n_a\right)\right)^2\right)/2$,

(ii) Board agency cost decreases with informedness when: $\{k \geq k_1,\ (W/\gamma) \geq (2k-1)(1-\phi)n_a\}$.

Proposition 2 shows that increasing informedness often makes the shareholders worse off when the board sets its entrenchment level endogenously. We find that board agency cost generally increases with informedness. The second part of Proposition 2, where the agency cost decreases in an interval, is a technical consequence of the discrete transition of the board's change in endogenous entrenchment level from zero, to a decrease in entrenchment when informedness increases.

To understand the result that board agency cost increases with informedness, we examine the two conditions in the first part. Under the first condition, recall that the benchmark entrenchment preferred by the shareholders was zero, and also that increasing informedness reduces the expected premium from the acquirer. When the board does not decrease entrenchment with increasing informedness, entrenchment will eliminate a greater number of potential takeover transactions. Therefore, agency cost increases with informedness.

The second condition in part (i) is more nuanced, as the shareholders mostly prefer a strictly positive entrenchment level. Under this condition, the premium at which successful takeovers are achieved is determined by the entrenchment level. The board's endogenous

entrenchment level is greater than the benchmark entrenchment preferred by shareholders (Lemma 2), and the benchmark entrenchment and board's entrenchment will be reduced at the same rate with increasing informedness. This occurs because the acquirer's premium valuation decreases with informedness. A reduction in entrenchment by the same amount translates to higher percentage reduction in entrenchment under the benchmark. Thus, this leads to the elimination of a greater number of potential takeover transactions under delegated-governance.

Proposition 2 implies that delegated-governance as a takeover governance structure performs better when informedness is low. With the Internet driving increased informedness, there is a greater need for an alternate takeover governance structure that offers better performance for shareholders. The results in Proposition 2 are illustrated in Figure 2. The shaded region in the left panel shows board agency cost (BAC), which is the difference in surplus between the two entrenchment levels. BAC increases with informedness. The right panel shows that bargaining power improves shareholder surplus only when bargaining power is moderate to high.

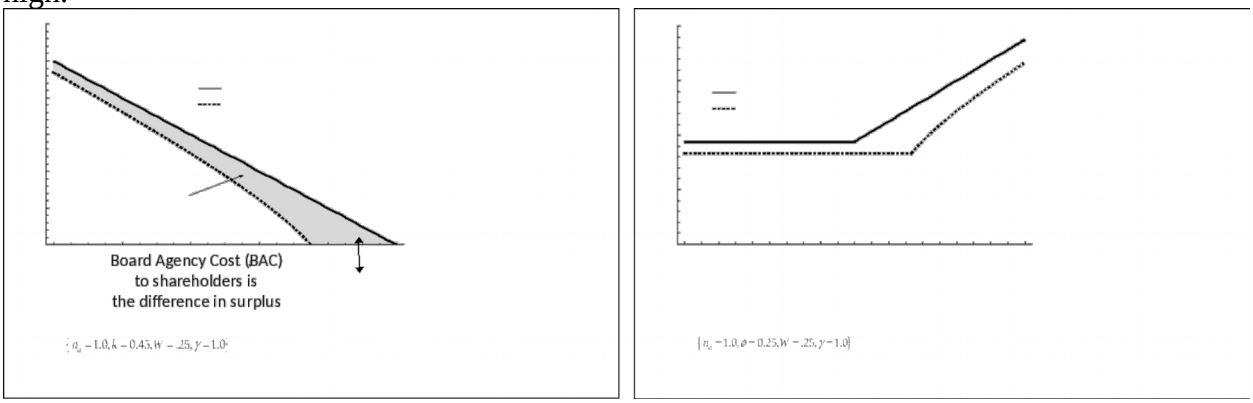

Figure 2: Shareholder surplus vs. informedness and bargaining power

PROPOSITION 3: Conditional shareholder surplus and bargaining power

Under delegated-governance, shareholder surplus conditional on a takeover is decreasing in bargaining power k *when:* $k_1 < k < \bar{k} \equiv \frac{L}{(2L-W)} + \frac{(L-W)\sqrt{2LW}}{2L(2L-W)}$, $(W/\gamma) < (2k-1)(1-\phi)n_a$, *and*

weakly increasing in bargaining power otherwise; where $L = \gamma(1-\phi)\, n_a$, $k_1 = \left(\frac{1}{2} + \frac{W}{2\gamma(1-\phi)\, n_a}\right)$.

Proposition 3 states the comparative static of shareholder surplus conditional on a successful takeover with respect to bargaining power. Intuition would suggest that increasing bargaining power would deliver increasing surplus to shareholders, conditional on a successful takeover. However, Proposition 3 shows that this is not always the case. This situation occurs because the premium received under a successful takeover can be determined either by bargaining power or by the level of board entrenchment. When bargaining power is low, the premium is driven by the entrenchment level and when bargaining power is very high, the premium is likely to be driven by bargaining.

When bargaining power is moderate $\left(k_1 < k < \bar{k}\right)$ then either entrenchment or bargaining power can determine the premium. When the acquirer's valuation of the target firm is high, then bargaining power determines the premium, whereas when it is low, entrenchment level drives the premium. When bargaining power increases, the optimal level of entrenchment decreases because the range of acquirer valuations that is captured via bargaining power increases. The entrenchment level now impacts the lower range of acquirer valuations and hence entrenchment decreases. The increase in bargaining power increases the expected premium whereas the reduction in entrenchment decreases the expected premium. When the probability that a successful takeover transaction is driven by entrenchment is much greater than the probability that it is driven by bargaining power, the expected premium conditional on a successful takeover will decrease with bargaining power, but the probability of a takeover will increase. This explains the decrease in shareholder surplus with increase in bargaining power within a certain range of bargaining power.

MODEL OF OWNER-GOVERNANCE

We propose and analyze a new form of takeover governance which transfers control of the takeover decision from the board to shareholders. Prior literature (Bebchuk, 2002) makes

qualitative arguments for shareholder control of takeovers. Recent U.S. legislation (Dodd-Frank, 2010) now affords more control over executive compensation to the shareholders of a public firm. The Dodd-Frank Act gives shareholders the right to a take non-binding vote once every three years on executive compensation proposals put forth by the board. The U.K. has had such a policy since 2002, which has been shown to be beneficial to shareholders (Ferri and Maber, 2013). Our proposed model of owner-governance is consistent with the trend towards greater shareholder control.

In our model, each target firm shareholder is assumed to have a share price premium for which she is willing to sell her share(s) to an acquirer. Furthermore, the target firm has an approved voting rule that denotes the minimum fraction of votes required to approve a takeover. When a takeover offer is received, it is put to a shareholder vote where each shareholder can accept or reject the premium offered. If the proportion of shareholders who vote to accept the takeover offer is greater than the voting rule threshold, the takeover becomes binding on all shareholders. Figure 3 shows the conceptual model of owner-governance.

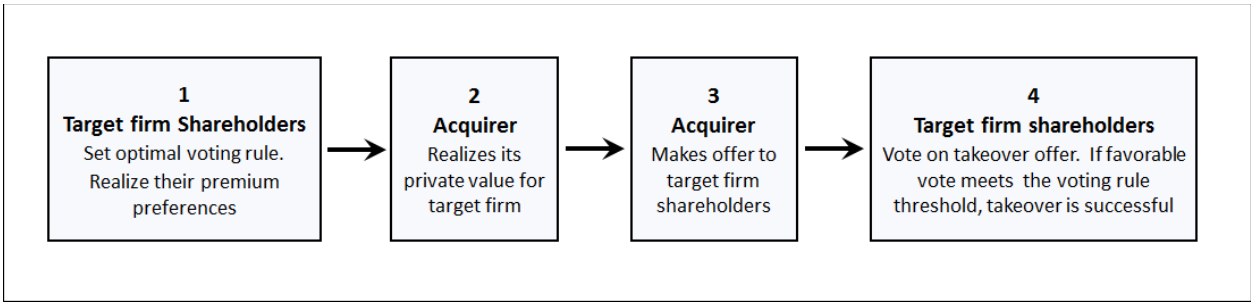

Figure 3: Model of owner-governance or "say-on-takeovers"

The acquirer uses public information and private information such as information obtained through the use of experts and consultants. Therefore, the acquirer's information set is superior to publicly available information. In our model, the informedness parameter $\phi \in (0,1)$ captures the state of public information. Reduced information asymmetry caused by the availability of online information is characterized by an increase in the parameter ϕ. As

discussed in the section on delegated-governance, increasing informedness of the shareholders leads to lower cost of capital, which in turn leads to higher market value for the target firm. Therefore, increased informedness results in a reduced premium demanded by the shareholders and offered by the acquirer.

Hence, acquirer heterogeneity in the premium for the target firm is captured by the Uniform distribution $U\left[0,(1-\phi)\, n_a\right]$. Owner-governance brings the shareholders into the decision process. The premium at which a shareholder is willing to accept a takeover offer is also modeled using a Uniform distribution $U[0,\hat{n}_s]$. The lower support of zero represents the shareholder who will accept zero premium and $\hat{n}_s$ represents the shareholder demanding the highest premium. We allow $\hat{n}_s$ to be drawn from a second Uniform distribution $U\left[0,(1-\phi)\, n_s\right]$ to capture randomness in the shareholder preference distribution. The highest premium is a decreasing function of the state of informedness ϕ because increasing informedness increases the current market value and thus lowers the premium, as described in the introduction. These assumptions are formally stated below.

Assumptions

A3. Shareholder non-negotiation: Shareholders of the target firm are diffuse. They cannot negotiate directly with the acquirer and act as price takers.

A4. The premium demanded by target firm shareholders is exogenous, and can be ordered from the shareholder demanding the least premium to the shareholder demanding the greatest premium. These two premiums are assumed to be the lower and upper support of the shareholder premium distribution. For tractability and exposition, the shareholder premium preferences are assumed to be uniformly distributed, $U[0,\hat{n}_s]$. Therefore, a shareholder will

approve a takeover offer if her premium demanded, which is drawn from this distribution, is less than the premium offered by the acquirer.

A5. Uncertainty of shareholder premium distribution: Parameter $\hat{n}_s$, which determines the upper bound for the support of the shareholder premium distribution in A4, is a random variable drawn from another independent uniform distribution $U\left[0,(1-\phi)\,n_s\right]$. This distribution is common knowledge. Note that the first distribution in A4 represents a specific target firm's shareholder preferences ordered from the lowest premium demanded to the highest premium demanded. Hence, in order to capture uncertainty about the shareholder distribution function we incorporate this second distribution.

A6. Voting rule: Shareholders determine a voting rule $q \in [0,1]$ that defines the minimum proportion of shareholder votes required for a successful takeover. Therefore, a takeover will take place only if the premium offered by the acquirer is $q \times \hat{n}_s$ or greater.

A7. Asymmetric information: The acquirer's valuation $\hat{n}_a$ of the target firm and individual shareholder preferences are private information. The shareholder distribution parameter $\hat{n}_s$ is common knowledge. The acquirer is able to compute the voting rule q based on distribution parameters n_s and n_a. Appendix 2 considers the extension when the acquirer is uninformed of the shareholder preference distribution represented by $\hat{n}_s$.

The steps and information set are as described in Table 2.

Steps and information set
Target firm shareholders determine their optimal voting rule and realize preferences • The target firm shareholders maximize expected surplus to determine their optimal voting rule q^* knowing the distribution $U\left[0,(1-\phi)\,n_s\right]$. • The target firm shareholders realize their preference distribution parameter $\hat{n}_s$ as a random draw from $U\left[0,(1-\phi)\,n_s\right]$. Acquirer realizes valuation for target firm and makes offer

- Acquirer realizes private valuation $\hat{n}_a$ for target firm as a random draw from $U\left[0,(1-\phi)\, n_a\right]$.
- Acquirer makes a takeover offer of premium p to the target firm shareholders.

Shareholders vote on offer

- Target firm shareholders vote on the offer. If the voting rule threshold q^* is satisfied, the takeover is successful. Otherwise there is no takeover.

Table 2: Owner-governance

Model Parameters and Role of Information

The public Internet enables the collection and dissemination of digital information, which plays a role in two of the model parameters conceptualized in this paper. The Internet offers numerous sources of stock market news and analysis. For example, marketwatch.com (Market Watch, 2014) includes analysis of the potential for firms to be acquired, while other sites, including seekingalpha.com, discuss potential strategic acquirers. We capture this informational effect through the informedness parameter ϕ as discussed in the section on delegated-governance. Analogous to the section on delegated-governance, the selling price premium of target firm shareholders is captured by the distribution parameter $(1-\phi)\, n_s$ described in Assumption A5.

LEMMA 3: Surplus under owner-governance

Under owner-governance the optimal voting rule is: $q^* = \begin{cases} 3n_a / 4n_s & , n_a < 4n_s / 3 \\ 1 & , n_a \geq 4n_s / 3 \end{cases}$,

expected shareholder surplus is: $E[S_s] = \begin{cases} 3(1-\phi)\, n_a / 16 & , n_a < 4n_s / 3 \\ (1-\phi)\, n_s (1/2 - n_s / 3n_a) & , n_a \geq 4n_s / 3 \end{cases}$,

expected acquirer surplus is: $E[S_a] = \begin{cases} 7(1-\phi)\, n_a / 32 & , n_a < 4n_s / 3 \\ (1-\phi)\left(n_a / 2 - n_s (1/2 - n_s / 6n_a)\right) & , n_a \geq 4n_s / 3 \end{cases}$,

and expected joint surplus is: $E[S_t] = \begin{cases} 13(1-\phi)\, n_a / 32 & , n_a < 4n_s / 3 \\ (1-\phi)\left(n_a / 2 - n_s^2 / 6n_a\right) & , n_a \geq 4n_s / 3 \end{cases}$.

Lemma 3 reports the optimal voting rule, target firm shareholder surplus, acquirer surplus, and joint surplus. Joint surplus represents the combined surplus of target firm shareholders and the acquirer. The acquirer is informed of the realized shareholder preference distribution parameter $\hat{n}_s$ and computes the optimal voting rule, and will not make offers higher than the minimum premium necessary for a favorable vote, $\left(q^* \times \hat{n}_s\right)$. Successful takeover offers will be made when the acquirer's private valuation of the target firm is sufficiently high, $\hat{n}_a > \left(q^* \times \hat{n}_s\right)$. The results are reported in two parts. The second part is a boundary condition which occurs when the acquirer's distribution of premiums is sufficiently high such that the shareholders set their optimal voting rule to 1, which implies that 100% of votes accepting the takeover offer are necessary for a successful takeover.

Please see Appendix 2 for an analysis of the case when the acquirer is uninformed about the realized target firm shareholder preference distribution parameter $\hat{n}_s$. Proposition 4 compares the results from Lemma 3 to the results of this extension. The comparison shows that information structure plays an important role in the surplus generated under owner-governance.

PROPOSITION 4: Comparison between informed acquirer and uninformed acquirer

Under owner-governance, the target firm shareholder surplus, acquirer surplus and joint surplus are higher when the acquirer is informed about the realized shareholder preference distribution parameter $\hat{n}_s$ *than when uninformed about* $\hat{n}_s$.

This result is of interest, because one might expect target firm shareholders to benefit from withholding preference information from the acquirer. However, Proposition 4 reports that both shareholder and acquirer surpluses are higher when the acquirer is informed about target shareholder preferences. This may be understood by examining the bidding behavior of the acquirer. When the acquirer is uninformed about target shareholder preferences and the voting

rule is relatively high, transactions are rejected due to information asymmetry, whereas an informed acquirer will make offers that meet the voting threshold as long as they obtain a non-negative surplus. On average, such transactions increase surpluses for both parties. Therefore, it is better for target firm shareholders to credibly inform the acquirer of their premium preferences. Our results are consistent with Myerson and Satterthwaite (1983).

COMPARISON BETWEEN DELEGATED-GOVERNANCE AND OWNER-GOVERNANCE

We compare delegated-governance with owner-governance to determine the preferred governance structure, the factors that affect choice of governance structure, and available surplus to shareholders, acquirer, and joint surplus. We begin with a comparison of the probability of a takeover under the two governance structures.

PROPOSITION 5: Probability of takeover under two governance structures

(i) The probability of takeover decreases with informedness under delegated-governance, whereas it is unchanged under owner-governance.

(ii) Owner-governance has a greater probability of a successful takeover compared to that under delegated-governance: (a) when $W/\gamma \geq (2k-1)(1-\phi)n_a$ *, or (b) when* $W/\gamma < (2k-1)(1-\phi)n_a$ *, and informedness is sufficiently high,*

$$\phi \geq \begin{cases} 1-\dfrac{8kW}{3(2k-1)\gamma n_a}, & n_a < 4n_s/3 \\ 1-\dfrac{2kW}{(2k-1)\gamma n_s}, & n_a \geq 4n_s/3 \end{cases},$$ *otherwise delegated-governance has a greater probability of a takeover.*

The probability of a takeover does not change with informedness under owner-governance. Whereas, under delegated-governance, the probability of a takeover decreases with informedness. The lower probability of a takeover will reduce the expected surplus for shareholders and the acquirer, because more potential takeover transactions are eliminated. Figure 4 illustrates the effect of informedness on the probability of a takeover under both governance regimes. When informedness is moderate to high, the probability of a takeover is higher under owner-governance.

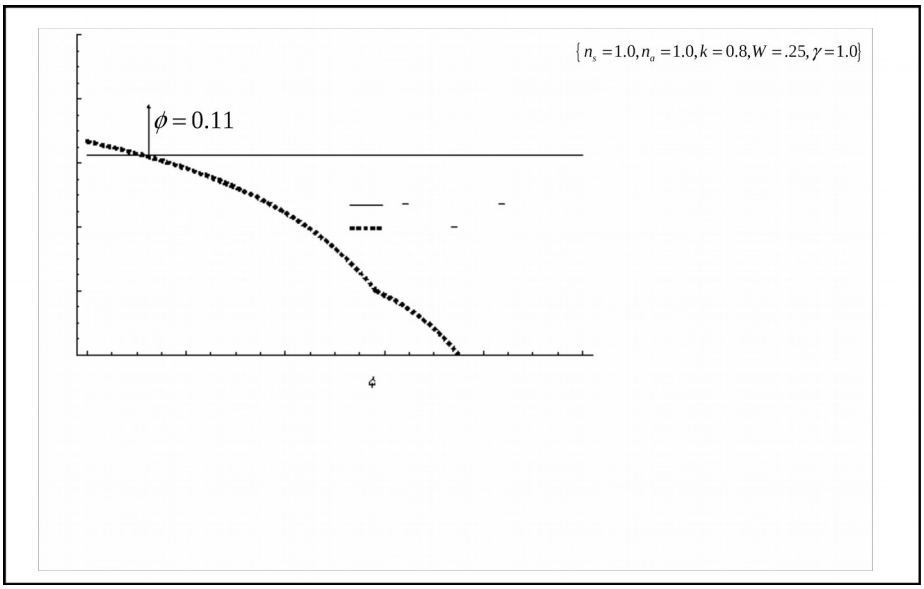

Figure 4: Probability of a takeover and informedness

Intuition might suggest that when the probability of a takeover under owner-governance is higher than that under delegated-governance, the joint surplus will also be greater under owner-governance. While such intuition holds true for the most part, there is a small region where it does not. Comparing Figures 4 and 5, we can see that when informedness is between $(\phi = 0.11)$ and $(\phi = 0.23)$, although the probability of a takeover is higher under owner-governance, the joint surplus is greater under delegated-governance. This counterintuitive finding occurs because in this region, there is a small probability of a takeover under owner-governance even when the acquirer's premium valuation for the target firm is small. In contrast,

under delegated-governance, takeovers occur only when the acquirer's premium is greater than the board's entrenchment level. Due to some takeovers occurring at very low acquirer premiums, the probability of a takeover can be higher under owner-governance even though the joint surplus is higher under delegated-governance. The reason that takeovers can occur for a small premium under owner-governance is that the success of a takeover is determined by the preferences of the target firm shareholders, and there is a small probability that they may be willing to accept a takeover at a small premium.

PROPOSITION 6: Comparison of shareholder surplus under two governance structures
Shareholders prefer owner-governance compared to delegated-governance when informedness ϕ *is sufficiently large:*

$$\textit{(i)}\ \phi \geq \begin{cases} 1-\dfrac{2W\sqrt{2k}}{\gamma n_a\sqrt{(2k-1)(8k-3)}}, & (W/\gamma) < (2k-1)(1-\phi)\, n_a\ ,\ n_a < 4n_s/3 \\ 1-2W/(\gamma n_a), & (W/\gamma) \geq (2k-1)(1-\phi)\, n_a\ ,\ n_a < 4n_s/3 \end{cases}$$

$$\textit{or,}\quad \textit{(ii)}\ \phi \geq \begin{cases} 1-\dfrac{W\sqrt{3k}}{\gamma\sqrt{(2k-1)\left(2n_s^2-3n_s n_a+3kn_a^2\right)}}, & (W/\gamma) < (2k-1)(1-\phi)\, n_a,\ n_a \geq 4n_s/3 \\ 1-\dfrac{W\sqrt{3}}{\gamma\sqrt{\left(4n_s^2-6n_s n_a+3n_a^2\right)}}, & (W/\gamma) \geq (2k-1)(1-\phi)\, n_a,\ n_a \geq 4n_s/3 \end{cases}$$

When informedness is sufficiently high, shareholders prefer owner-governance. Why does increasing informedness favor owner-governance? Note that an increase in informedness reduces expected surplus under both governance structures. However, there is a greater reduction in expected surplus under delegated-governance because the expected surplus depends on both the expected premium as well as the probability of a successful takeover. Under delegated-governance, increasing informedness weakly reduces expected premiums and also reduces the probability of a successful takeover. Whereas, under owner-governance expected premiums decrease with increasing informedness and the probability of a successful takeover does not change with increasing informedness. Hence, increasing informedness causes a greater reduction in shareholder surplus under delegated-governance compared with owner-governance. Therefore,

when informedness is sufficiently high, owner-governance is preferred by shareholders. Figure 6 shows the region in which shareholders prefer owner-governance with respect to bargaining power and informedness.

Bargaining power also plays a role: When bargaining power is sufficiently high under delegated-governance, shareholders benefit from increased bargaining power and the board reduces their entrenchment, whereas under owner-governance bargaining power plays no role in shareholder surplus. Therefore, the region of preference for delegated-governance grows when bargaining power is high compared with the case when bargaining power is low.

PROPOSITION 7: Comparison of acquirer surplus under the two governance structures
The acquirer prefers owner-governance except when $k \in (0.5,\ 0.5625)$ *and informedness meets the following condition:*

$$\phi \le \begin{cases} 1-\left(\dfrac{4W}{\gamma(2k-1)\,n_a}\right)\div\sqrt{\dfrac{(1-k)\,k}{(9-16k)}}, & (W/\gamma) < (2k-1)(1-\phi)\,n_a\ ,\ n_a < 4n_s/3 \\ 1-\left(\dfrac{W}{\gamma(2k-1)}\right)\div\sqrt{\dfrac{3(1-k)\,k}{(3n_s n_a - 3kn_a^2 - n_s^2)}}, & (W/\gamma) < (2k-1)(1-\phi)\,n_a\ ,\ n_a \ge 4n_s/3 \end{cases}.$$

The acquirer prefers owner-governance except in a small region where bargaining power (k) is between 0.5 and 0.5625 and informedness is sufficiently low. To understand why the acquirer mostly prefers owner-governance, note that under delegated-governance, the acquirer must offer a premium that is the greater of the premium determined by entrenchment, and the premium determined by bargaining power. The probability of a takeover under owner-governance is typically greater than the probability of a takeover under delegated-governance (see Figure 4). These factors coupled with the lack of perfect alignment of the board's incentives lead the acquirer to prefer owner-governance.

We define joint surplus as the sum of target firm shareholder surplus and acquirer surplus. By examining shareholder and acquirer preferences for governance structure, we can see that when informedness is high, both parties prefer owner-governance. However, when informedness

is low, the acquirer generally prefers owner-governance but shareholders may prefer delegated-governance. Because joint surplus is the sum of shareholder surplus and acquirer surplus, optimizing joint surplus may be viewed as maximizing the chances for a successful takeover. Any increase in bargaining power k increases the probability of a takeover under delegated-governance, whereas under owner-governance the probability of a takeover is not affected by bargaining power. Hence, when bargaining power is sufficiently high, joint surplus is greater under delegated-governance, provided informedness is sufficiently low.

PROPOSITION 8: Comparison of joint surplus under two governance structures
Owner-governance produces greater joint surplus compared to delegated-governance when informedness is sufficiently high:

$$\textit{(i)}\ \phi \geq \begin{cases} 1-\dfrac{4kW}{\sqrt{3}(2k-1)\gamma n_a}, & k>1/2,\ (W/\gamma)<(2k-1)(1-\phi)n_a,\ n_a<4n_s/3 \\ 0, & (W/\gamma)\geq(2k-1)(1-\phi)n_a,\ n_a<4n_s/3 \end{cases}$$

$$\textit{or,}\quad \textit{(ii)}\ \phi \geq \begin{cases} 1-\dfrac{\sqrt{3}kW}{(2k-1)n_s\gamma}, & k>1/2,\ (W/\gamma)<(2k-1)(1-\phi)n_a,\ n_a\geq 4n_s/3 \\ 0, & (W/\gamma)\geq(2k-1)(1-\phi)n_a,\ n_a\geq 4n_s/3 \end{cases}$$

The effect of informedness on joint surplus is illustrated in Figure 5.

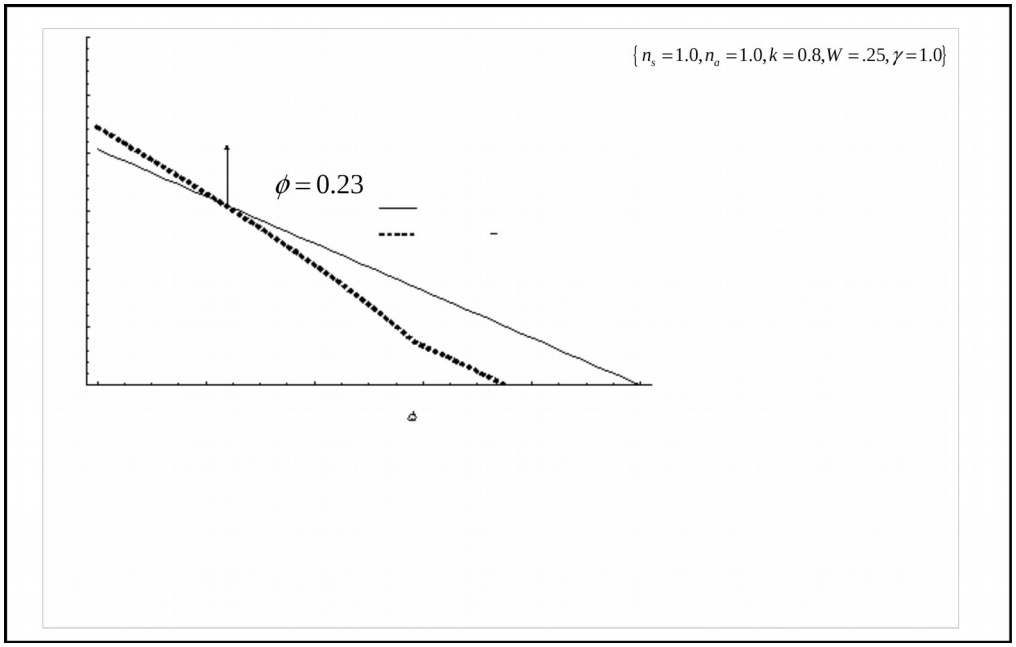

Figure 5: Joint surplus and informedness

Figure 5 shows that joint surplus under delegated-governance is higher when informedness is low. When informedness is moderate or high, owner-governance provides greater joint surplus.

Shareholders and acquirers represent opposite sides of the takeover transaction and intuition suggests divergent interests. Hence, it is relevant to examine the conditions under which this divergence vanishes, and shareholders and the acquirer become aligned in their preference of governance structure. We combine the results of Propositions 6, 7, and 8 to highlight regions where target firm shareholders and acquirer prefer the same governance structure.

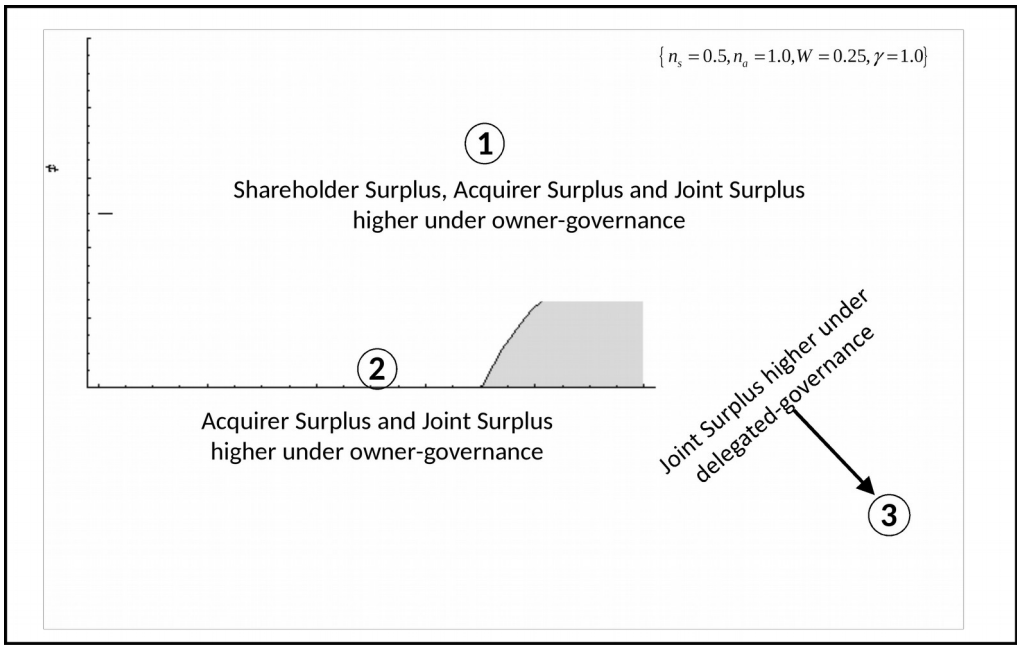

Figure 6: Preferred governance structure and target shareholder surplus, acquirer surplus, and joint surplus

Figure 6 illustrates three numbered regions where one or more of the parties prefer owner-governance. In region 1, all parties prefer owner-governance and no party prefers delegated-governance. Region 2 represents the region where owner-governance produces greater joint surplus and the acquirer also prefers owner-governance, and where target firm shareholders prefer delegated-governance. Finally, in region 3, the acquirer prefers owner-governance whereas

the target firm shareholders prefer delegated-governance which also produces greater joint surplus.

Region 1 is interesting because one might expect a structure that is preferred by one party such as the target firm shareholders to be disadvantageous to the other party such as the acquirer. Instead, we found that both parties prefer owner-governance. This is because higher informedness will reduce the probability of a takeover under delegated-governance but not under owner-governance. Therefore, when informedness is sufficiently high, the overall pie is larger under owner-governance than under delegated-governance. Hence, in region 1, all parties prefer owner-governance, and this region also produces greater joint surplus. Please note that for the parameter values used in Figure 6 the condition on informedness from Proposition 7 becomes $\phi < 0$, which implies that the acquirer always prefers owner-governance.

The surplus generated for all parties is related to the probability of a takeover. Hence, the comparison of takeover probability under each governance structure, as shown in Proposition 5, helps us understand the expected occurrence of takeovers under each structure.

DISCUSSION

We use analytical models to examine the corporate governance of unsolicited takeovers, a powerful governance institution which can discipline boards and management to ensure that they act in the best interests of shareholders. This paper models and analyzes the current takeover governance structure of delegated-governance where the board controls takeover decisions. We also propose and analyze a new takeover governance structure referred to as *owner-governance*, or *say-on-takeovers*, which shifts the control of takeovers from the board to shareholders. We compare the two takeover governance structures and our analysis captures the impact of online information availability by incorporating the level of informedness within the model.

We study the role of several factors on the relative attractiveness of the two takeover structures including bargaining power, public informedness, and the premium that the acquirer is

willing to pay. The relative attractiveness of delegated-governance vs owner-governance to shareholders depends on (1) the probability of a takeover, and (2) the premium received conditional on a takeover. Informedness affects the relative attractiveness of the governance structures because it reduces the probability of a takeover under delegated-governance but has no effect under owner-governance. Increase in informedness reduces the premium under both governance structures. Thus, increasing informedness increases the relative attractiveness of owner-governance.

Bargaining power affects the relative attractiveness of the two takeover structures because it is one of the factors that determine the division of takeover surplus under delegated-governance. Bargaining power plays a role in delegated-governance but has no role in owner-governance. Bargaining power is determined by outside options available to the target firm and to the acquirer. Under delegated-governance, an increase in bargaining power increases the probability of a takeover because higher bargaining power increases the board's incentive to accept a takeover. Increasing bargaining power increases target firm shareholder surplus under delegated-governance whereas it has no effect under owner-governance. However, when conditioned on the occurrence of a takeover, increasing bargaining power does not always increase shareholder surplus because it can lead to lower board entrenchment, which increases the number of low premium transactions while simultaneously increasing the probability of a takeover.

Increase in the upper support of the acquirer's premium distribution $\left(n_a \right)$ benefits shareholders under both governance structures. It increases the probability of a takeover and the premium conditional on a takeover. However, increase in the upper support of the acquirer distribution benefits shareholders under delegated-governance more than under owner-governance because the board demands a high premium through entrenchment when bargaining power is low. When bargaining power is high then shareholders benefit by taking a larger portion

of the acquirer's total available surplus.

Our finding that target firm shareholders prefer owner-governance when informedness is sufficiently high has implications for practice because information technology and digital information is enabling shareholders to become more informed. This trend suggests that policymakers and practitioners should consider a structure similar to the owner-governance structure proposed in this paper. Supporting this argument is the finding that owner-governance is often preferred by the acquirer and it often yields higher joint surplus as well.

Under delegated-governance, the endogenously determined entrenchment level of the board is always greater than the entrenchment level shareholders would prefer (benchmark entrenchment level). Thus, while our results provide some support for the bargaining power hypothesis, in the benchmark case shareholders pay an agency cost as a consequence of the board's ability to set its entrenchment level endogenously. Thus, shareholder surplus is lower under delegated-governance than under the benchmark case.

One result under owner-governance that has policy implications is that the welfare of all parties is improved when the acquirer is informed of the target firm shareholders' premium preferences. IT enables estimations of shareholder preferences through electronic shareholder surveys (e.g. surveymonkey.com).

Implementing a policy that provides more control of takeover decisions to the shareholders can lead to increased stock prices. Many studies have estimated the value of voting rights (Bhagat and Brickley, 1984; Dyck and Zingales, 2004; Horner, 1988; Lease et al., 1983; Levy, 1982; Megginson, 1990; Robinson and White, 1990; Zingales, 1994, 1995). Zingales (1994) found an 82% premium for control in the Milan stock market and Zingales (1995) reported that the trading price of a stock is in part explained by the voting rights associated with that stock. Dyck and Zingales (2004) found that average premium for voting rights of 14 percent across 39 countries. Therefore, allowing shareholders direct control of the takeover decision may increase the value of such stocks.

Proposition 4 shows that the probability of a takeover under delegated-governance declines with increasing informedness. This has implications for the trend in the number of unsolicited takeovers over time because informedness, which is impacted by online information dissemination appears to be increasing over time. This result suggests that unsolicited takeovers should decline. There is anecdotal evidence that unsolicited takeovers are trending down (DePamphilis, 2010; Solomon, 2013), declining from a peak of 14% of all takeovers in the 1980s to 4% in the 1990s. Even though total takeovers increased from 1427 to 2040, the number of unsolicited takeovers has declined from 200 to 82 (Andrade et al., 2001; Manne 2002).

This study may have implications for other areas where boards control decision-making, such as executive compensation and investments in firms with board interlocks. Spurred by many reports of excessive executive compensation, the Dodd-Frank reform bill passed by Congress has a non-binding provision that allows shareholders to vote on executive compensation. Our study suggests that a binding vote may be welfare-enhancing. Another area involves investment in firms with board interlocks, which occurs when a director of one firm is the Chief Executive Officer (CEO) of another firm. Investments or material partnerships between such firms are subject to agency concerns as actions may be taken for the director's benefit and not for shareholder value.

Our results generate empirically testable hypotheses. This paper predicts that under delegated governance, (i) higher levels of pecuniary compensation for the board are likely to lead to higher levels of board entrenchment; (ii) high levels of board entrenchment are likely to lead to fewer takeovers with higher premiums when there is a successful takeover; and (iii) target firm shareholder surplus is expected to decrease with increasing informedness. This study has implications for research in other areas where decision making is controlled by the board, such as executive compensation and investments in firms with board interlocks.

Our study has several limitations. Given the heterogeneity of preferences, shareholders may vary in their likelihood of voting whereas we assume that all shareholders vote. When only

some shareholders vote, our results hold as long as the probability of a shareholder casting a vote is independent of the premium desired for a takeover. We assume that the informedness parameter has a linear effect on market prices, however this assumption may not hold for values of informedness approaching 1, because some synergistic benefits can only be obtained through a takeover. We assumed Uniform distributions for target firm shareholder preferences and acquirer valuations, for exposition and tractability. For robustness, we evaluated alternate distributions including a Truncated Normal distribution and a Gamma distribution using simulations. These numerical results show that our main results continue to hold with these alternate distributions. They suggest that these distributions would shift the preference towards owner-governance in terms of target firm shareholders and joint surplus. Future studies may analyze such alternate distributions in more detail.

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APPENDIX 1

Glossary of governance and takeover terms

Term	Description
Hostile takeover	Acquirer makes takeover offer without target firm board consent or approval
Unsolicited takeover	Generally synonymous with hostile takeover. Also means the offer was not requested by the target firm board.
Antitakeover provisions	Target firm provisions in the bylaws or board approved motions to prevent unsolicited takeovers
Poison Pill	Target firm board approved motion to trigger a dilution of shares typically through a dividend issue, if an acquirer secures a threshold of ownership such as a 10% stake
Staggered Board	The separation of directors on the board into separate classes where only one class comes up for reelection each fiscal year. The typical number of classes is three such that it takes at least two years for an acquirer to take control of the board through a proxy vote.
Classified Board	Same as a Staggered Board
Board entrenchment	The characteristic of a board that seeks to maintain their incumbent board position. Entrenchment is enabled through anti-takeover measures such as Poison Pills and Staggered Boards.
Bargaining power hypothesis	The hypothesis that an entrenched board is better able to secure a higher premium from an acquirer than a non-entrenched board.

Table A1: Governance and takeover terms

List of model variables and parameters with descriptions

	Description
ϕ	Variable denoting informedness.
n_s	Upper support parameter of the range of the shareholder premium preference distribution $U\left[0,(1-\phi)\,n_s\right]$.
$\hat{n}_s$	Random variable associated with the shareholder premium preference distribution.
n_a	Upper support parameter of the range of the acquirer's distribution $U\left[0,(1-\phi)\,n_a\right]$ of the private premium value for the target firm.
$\hat{n}_a$	Random variable associated with the acquirer's private premium value distribution.
c	Variable denoting board entrenchment as a premium demanded by the board under delegated-governance.
k	Bargaining power of the target firm under delegated-governance.
q	Voting rule that determines the minimum proportion of votes required in favor of a successful takeover under owner-governance.
W	Value of benefits to the target firm board as an independent firm.
p	Variable denoting the takeover offer premium.
γ	Parameter that determines reputational value $(\gamma \times p)$ to the target firm board from a successful takeover premium.

Table A2: Model variables and parameters

Proof of Lemma 1

The parties are modeled to maximize the Nash Product of the expected gains from bargaining:

$$\underset{k}{Max}\left\{E\left[\left((k\times\hat{n}_a)-O_s\right)\right]\times E\left[\left((1-k)\,\hat{n}_a-O_a\right)\right]\right\}$$

Which leads to the first order condition:

$$\frac{1}{4}(1-\phi)\,n_a\left(2(O_s-O_a)-(2k-1)(1-\phi)\,n_a\right)=0$$

Solving the first order condition generates the solution

$$k=(1/2)+(O_s-O_a)/(1-\phi)\,n_a$$

This completes the proof.

Proof of Lemma 2

Board's endogenous entrenchment

Case 1: When entrenchment is such that, $c < k(1-\phi)n_a$, the board maximizes its expected benefits through the objective function, $\underset{c}{Max}\{E[S_B]\}$ where:

$$E[S_B] = \int_{c}^{c/k} \frac{c\gamma}{(1-\phi)n_a} d\hat{n}_2 + \int_{c/k}^{(1-\phi)n_a} \frac{k\hat{n}_a\gamma}{(1-\phi)n_a} d\hat{n}_2 + \int_{0}^{c} \frac{W}{(1-\phi)n_a} d\hat{n}_a$$

Which leads to the first order condition $\frac{kW - c(2k-1)\gamma}{k(1-\phi)n_a} = 0$, and solving the first order condition generates the board's optimal entrenchment level and we have $c^* = kW/((2k-1)\gamma)$, and the case 1 condition $c < k(1-\phi)n_a$ is now expressed as $(W/\gamma) < (2k-1)(1-\phi)n_a$. Furthermore, $c^* > 0$ requires that $k > 1/2$.

Case 2: When entrenchment is such that, $k(1-\phi)n_a \le c \le (1-\phi)n_a$, the board maximizes its expected benefits through the objective function, $\underset{c}{Max}\{E[S_B]\}$ where:

$$E[S_B] = \int_{c}^{(1-\phi)n_a} \frac{c\gamma}{(1-\phi)n_a} d\hat{n}_a + \int_{0}^{c} \frac{W}{(1-\phi)n_a} d\hat{n}_a$$

Which leads to the first order condition $\gamma + \frac{W - 2c\gamma}{(1-\phi)n_a} = 0$, and solving the first order condition generates the board's optimal entrenchment level and we have $c^* = (W/2\gamma) + ((1-\phi)n_a/2)$, and the case 2 condition $c \ge k(1-\phi)n_a$ is now expressed as $(W/\gamma) \ge (2k-1)(1-\phi)n_a$.

Case 3: When entrenchment eliminates all takeovers, we have $c > (1-\phi)n_a$. This condition is outside the interior solution because all takeovers are eliminated. By inspection it is readily seen that the maximum possible entrenchment is at $c^* = (1-\phi)n_a$ at which all takeovers are eliminated and would constitute the boundary condition. The condition $c > (1-\phi)n_a$, outside the boundary is obtained when we set $(W/2\gamma) + ((1-\phi)n_a/2) > (1-\phi)n_a$, and simplifying we obtain $W/\gamma > (1-\phi)n_a$.

Hence, we generate the three-part solution to the board's optimal entrenchment as:

$$c^* = \begin{cases} kW/((2k-1)\gamma), & (W/\gamma) < (2k-1)(1-\phi)n_a \\ (W/2\gamma) + ((1-\phi)n_a/2), & (2k-1)(1-\phi)n_a \le (W/\gamma) \le (1-\phi)n_a \\ (1-\phi)n_a, & (W/\gamma) > (1-\phi)n_a \end{cases}$$

Theoretical benchmark entrenchment

Case 1: When entrenchment is such that $c < k(1-\phi)n_a$, the shareholders expected surplus is maximized,

$\underset{c}{Max}\{E[S_S]\}$ where:

$$E[S_S] = \int_{c}^{c/k} \frac{c}{(1-\phi)n_a} d\hat{n}_a + \int_{c/k}^{(1-\phi)n_a} \frac{k\hat{n}_a}{(1-\phi)n_a} d\hat{n}_a = \frac{k(1-\phi)n_a}{2} - \frac{c^2(2k-1)}{2k(1-\phi)n_a}$$

Which leads to the first order condition $-c(2k-1)/(k(1-\phi)n_a) = 0$, and the optimal entrenchment level that maximizes shareholder surplus is $c_s^* = 0$, and the case 1 condition is $0 < k(1-\phi)n_a$.

Case 2: When entrenchment is such that, $c \geq k(1-\phi)n_a$, the shareholders expected surplus is maximized,

$\underset{c}{Max}\{E[S_S]\}$ where:

$$E[S_S] = \int_{c}^{(1-\phi)n_a} \frac{c}{(1-\phi)n_a} d\hat{n}_a = \frac{c((1-\phi)n_a - c)}{(1-\phi)n_a}$$

Which leads to the first order condition $((1-\phi)n_a - 2c)/((1-\phi)n_a) = 0$, and solving the first order condition generates the optimal entrenchment level that maximizes shareholder surplus, and we have $c_s^* = (1-\phi)n_a/2$, and the case 2 condition simplifies to $0 < k \leq 1/2$. Hence, the case 1 condition simplifies to $1/2 < k < 1$.

Hence, we generate the two-part solution to the benchmark entrenchment as:

$$c_S^* = \begin{cases} (1-\phi)n_a/2, & 0 < k \leq 1/2 \\ 0, & 1/2 < k < 1 \end{cases}.$$

This completes the proof.

Proof of Corollary 1

Case 1: When $(W/\gamma) < (2k-1)(1-\phi)n_a$, from Lemma 2, the difference in entrenchment between the board's endogenous level and the benchmark case is:

$$kW/(\gamma(2k-1)) - 0 > 0$$

Case 2: When $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, from Lemma 2, the difference in entrenchment between the board's endogenous entrenchment level and the benchmark case is:

$$(W/2\gamma) + (1-\phi)n_2/2 - (1-\phi)n_2/2 = W/2\gamma > 0$$

This completes the proof.

Proof of Proposition 1

(i) From case 1 in Lemma 2 we have $c^* = kW/\left((2k-1)\gamma\right)$ and $(W/\gamma) < (2k-1)(1-\phi)n_a$. Taking the partial derivatives $\frac{\partial c^*}{\partial \phi}$, $\frac{\partial c^*}{\partial k}$ generates the result $\frac{\partial c^*}{\partial \phi} = 0$ and $\frac{\partial c^*}{\partial k} = -\left(\frac{W}{(2k-1)^2 \gamma} \div \right)$ when $(W/\gamma) < (2k-1)(1-\phi)n_a$.

(ii) From case 2 in Lemma 2 we have $c^* = (W/2\gamma) + \left((1-\phi)n_a/2\right)$ and $(W/\gamma) \geq (2k-1)(1-\phi)n_a$.

Taking the partial derivatives $\frac{\partial c^*}{\partial \phi}$, $\frac{\partial c^*}{\partial k}$ generates the result $\frac{\partial c^*}{\partial \phi} = -(n_a/2)$ and $\frac{\partial c^*}{\partial k} = 0$ when $(W/\gamma) \geq (2k-1)(1-\phi)n_a$.

This completes the proof.

Proof of Proposition 2

The proof requires comparison of the shareholder surplus derived using the results from Lemma 2 for the board's endogenous entrenchment level and the theoretical benchmark entrenchment. This comparison generates two cases:

Case 1: When $(W/\gamma) < (2k-1)(1-\phi)n_a$, and bargaining power $k > 1/2$: Substitute the values of $c_S^* = 0$ and $c^* = kW/\left((2k-1)\gamma\right)$ in to generate the difference in the benchmark surplus and the surplus from the board's endogenous entrenchment $\Delta E[S_S] = \left(E[S_S \mid c = c_s^*]\right) - \left(E[S_S \mid c = c^*]\right)$. Taking the first derivative of this difference with respect to informedness, we obtain:

$$\frac{\partial \Delta E[S_S]}{\partial \phi} = k(W/\gamma)^2 / \left(2(2k-1)(1-\phi)^2 n_a\right)$$

It is readily seen that the derivative is always positive. Therefore, the difference is increasing with informedness.

Case 2a: When $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, and bargaining power $k \leq 1/2$: Substitute the values of $c_S^* = (1-\phi)n_a/2$ and $c^* = (W/2\gamma) + \left((1-\phi)n_a/2\right)$ in to generate the difference in the benchmark surplus and the surplus from the board's endogenous entrenchment $\Delta E[S_S]$. Taking the first derivative of this difference w.r.t. informedness, we obtain:

$$\frac{\partial \Delta E[S_S]}{\partial \phi} = (W/\gamma)^2 / \left(4(1-\phi)^2 n_a\right)$$

It is readily seen that the derivative is always positive. Therefore, the difference is increasing with informedness.

Case 2b: When $(W/\gamma) \geq (2k-1)(1-\phi) n_a$, and bargaining power $k > 1/2$: Substitute the values of $c_S^* = 0$ and $c^* = (W/2\gamma) + \left((1-\phi) n_a / 2\right)$ in to generate the difference in the benchmark surplus and the surplus from the board's endogenous entrenchment $\Delta E[S_S]$. Taking the first derivative of this difference w.r.t. informedness, we obtain:

$$\frac{\partial \Delta E[S_S]}{\partial \phi} = \left(\frac{W}{\gamma}\right)^2 \left(\frac{1}{(1-\phi)^2 n_a} - (2k-1) n_a\right) / 4$$

It can be seen that the derivative is positive when $k > k_1 = \left(1 + \left((W/\gamma) / \left((1-\phi) n_a\right)\right)^2\right) / 2$. It is readily seen that $k_1 \geq 1/2$ Therefore, the difference is increasing with informedness $1/2 \leq k < k_1$, and decreasing with informedness when $k \geq k_1$.

This completes the proof.

Proof of Proposition 3

Shareholder surplus is computed from the results of Lemma 2, and there are two cases to be considered.

Case 1: When $(W/\gamma) < (2k-1)(1-\phi) n_a$, and bargaining power $k > 1/2$: Substitute the value of $c^* = kW / \left((2k-1)\gamma\right)$ in to derive the expected shareholder surplus:

$$E[S_S] = \frac{k}{2}\left((1-\phi) - \left(\frac{W}{\gamma}\right)^2 \frac{1}{(2k-1)(1-\phi) n_a}\right)$$

Expected shareholders surplus conditional on a takeover is derived by dividing the expression in by the probability of a takeover:

$$P_{DG} = \int_{c^*}^{(1-\phi) n_a} \left(\frac{1}{(1-\phi) n_a}\right) d\hat{n}_a = 1 - \frac{kW}{(2k-1)\gamma(1-\phi) n_a}$$

Dividing by provides shareholder surplus conditional on a takeover:

$$E[S_S \mid takeover] = \frac{k\left((2k-1) L^2 - W^2\right)}{2\gamma\left(k(2L-W) - L\right)}, \quad L = \gamma(1-\phi) n_a$$

The derivative of is as follows:

$$\frac{\partial}{\partial k}E[S_S \mid takeover] = \frac{L\left((1-2k)^2 L^2 - 2k^2 LW + W^2\right)}{2\left(kW-(2k-1)L\right)^2 \gamma}$$

Examining to derive the conditions on bargaining power when this slope is negative provides two quadratic roots: $k = \frac{L}{(2L-W)} \mp \frac{(L-W)\sqrt{2LW}}{2L(2L-W)}$. Considering the solution $k = \frac{L}{(2L-W)} - \frac{(L-W)\sqrt{2LW}}{2L(2L-W)}$ it is immediately clear that $k < \frac{L}{(2L-W)}$ because the second term is negative. We can also restate the Case 1 condition as $k > \frac{(L+W)}{2L}$ and we must have $\frac{(L+W)}{2L} < k < \frac{L}{(2L-W)}$. Therefore, we must have $\frac{(L+W)}{2L} < \frac{L}{(2L-W)}$, and this requirement reduces to $L < W$. This is a contradiction because we also must have $k > 1/2$ which in turn requires $L > W$. Hence, the solution $k = \frac{L}{(2L-W)} - \frac{(L-W)\sqrt{2LW}}{2L(2L-W)}$ is not feasible and is eliminated leaving the only feasible solution $\hat{k} = \frac{L}{(2L-W)} + \frac{(L-W)\sqrt{2LW}}{2L(2L-W)}$. We confirm directionality using parameter values $\{n_s = 1, n_a = 1, W = 0.25, \gamma = 2, \phi = 0.5\}$ and we have the feasible solution $\hat{k} = 0.7230$ and we evaluate above and below $\hat{k}$ using the values $\hat{k} = 0.7230 \pm .1$ and we obtain $\frac{\partial}{\partial k}E[S_S \mid takeover]\Big|_{\hat{k}+0.1} = 0.1820 > 0$ and $\frac{\partial}{\partial k}E[S_S \mid takeover]\Big|_{\hat{k}-0.1} = -2.1854 < 0$, and we obtain the result $\frac{\partial}{\partial k}E[S_S \mid takeover] < 0$ when $k < \hat{k}$.

We can restate the results in expanded form as follows:

$$k < \frac{\gamma(1-\phi)n_a}{\left(2\gamma(1-\phi)n_a - W\right)} + \frac{\left(\gamma(1-\phi)n_a - W\right)\sqrt{2W\gamma(1-\phi)n_a}}{2\gamma(1-\phi)n_a\left(2\gamma(1-\phi)n_a - W\right)} = \hat{k}$$

The next part is to determine the point at which the results switch from Case 1 to Case 2, to determine the threshold of bargaining power $k > 1/2$ above which Case 1 is in force. We obtain this threshold by

comparing the case1 and case 2 optimal entrenchment level c^* from the result in Lemma 2 expressed in equation and solving for bargaining power.

$$kW/\left(\left(2k-1\right)\gamma\right) < \left(W/2\gamma\right) + \left(\left(1-\phi\right)n_a/2\right)$$

Solving for bargaining power k generates the result $k > \left(\frac{1}{2} + \frac{W}{2\gamma\left(1-\phi\right)n_a}\right) = k_1$

Case 2: When $\left(W/\gamma\right) \geq \left(2k-1\right)\left(1-\phi\right)n_a$ substitute the value of $c^* = \left(W/2\gamma\right) + \left(\left(1-\phi\right)n_a/2\right)$ in to derive expected shareholder surplus:

$$E[S_S] = \frac{n_a\left(1-\phi\right)}{4} - \left(\frac{W}{2\gamma}\right)^2 \frac{1}{\left(1-\phi\right)n_a}$$

Expected shareholders surplus conditional on a takeover is derived by dividing the expression in by the probability of a takeover:

$$P_{DG} = \int_{c^*}^{(1-\phi)n_a} \left(\frac{1}{\left(1-\phi\right)n_a}\right) d\hat{n}_a = \frac{1}{2}\left(1 - \frac{W}{\gamma\left(1-\phi\right)n_a}\right)$$

It can be readily seen that and are independent of bargaining power. Hence, we have:

$$\frac{\partial}{\partial k} E[S_S \mid takeover] = 0$$

Therefore, in this case expected shareholder surplus conditional on a takeover does not change with bargaining power.

This completes the proof.

Proof of Lemma 3

Informed about the random draw of the parameter $\hat{n}_s$, a rational acquirer will always bid $q \times \hat{n}_s$ provided $\hat{n}_a \geq q \times \hat{n}_s$. The expected shareholder surplus is therefore

$$E[S_s] = \int_0^{(1-\phi)n_s} \left(\int_{q\hat{n}_s}^{(1-\phi)n_a} \left(q\hat{n}_1\right) \frac{1}{\left(1-\phi\right)n_a} d\hat{n}_a \right) \frac{1}{\left(1-\phi\right)n_s} d\hat{n}_s = \left(1-\phi\right) q n_s \left(3n_a - 2qn_s\right)/6n_a$$

Solving the shareholders' maximization problem generates the optimal voting rule:

$$\underset{q}{Max}\left\{\left(1-\phi\right) q n_s \left(3n_a - 2qn_s\right)/6n_a\right\} \Rightarrow q^* = \begin{cases} 3n_a/4n_s & , \quad n_a < 4n_s/3 \\ 1 & , \quad n_a \geq 4n_s/3 \end{cases}$$

Applying this optimal voting rule to provides the result

$$E[S_s] = \begin{cases} 3\left(1-\phi\right)n_a/16 < \left(1-\phi\right)n_s/2 & , \quad n_a < 4n_s/3 \\ \left(1-\phi\right)n_s\left(1/2 - n_s/3n_a\right) \geq \left(1-\phi\right)n_s/2 & , \quad n_a \geq 4n_s/3 \end{cases}$$

Similarly, the expected acquirer surplus is

$$E[S_a] = \int_0^{(1-\phi)n_s} \left(\int_{q^*\hat{n}_s}^{(1-\phi)n_a} \left(\hat{n}_a - q^*\hat{n}_s \right) \frac{1}{(1-\phi)n_a} d\hat{n}_a \right) \frac{1}{(1-\phi)n_s} d\hat{n}_s$$

$$= \begin{cases} 7(1-\phi)n_a / 32, & n_a < 4n_s / 3 \\ (1-\phi)\left(n_a / 2 - n_s(1/2 - n_s / 6n_a) \right) \geq 7(1-\phi)n_a / 32, & n_a \geq 4n_s / 3 \end{cases}$$

Joint surplus is

$$E[S_t] = E[S_s] + E[S_a] = \begin{cases} 13(1-\phi)n_a / 32, & n_a < 4n_s / 3 \\ (1-\phi)\left(n_a / 2 - n_s^2 / 6n_a \right) \geq 13(1-\phi)n_a / 32, & n_a \geq 4n_s / 3 \end{cases}$$

This completes the proof.

Proof of Proposition 4

The proof of Proposition 4 is available in the online Appendix 2.

Proof of Proposition 5

The probability of a takeover under owner-governance is computed as follows:

$$P_{OG} = \int_0^{(1-\phi)n_s} \left(\left(\int_{q^*\hat{n}_s}^{(1-\phi)n_a} \left(\frac{1}{(1-\phi)n_a} \right) d\hat{n}_a \right) \frac{1}{(1-\phi)n_s} \right) d\hat{n}_s$$

The probability of a takeover under delegated-governance is computed as follows:

$$P_{DG} = \int_{c^*}^{(1-\phi)n_a} \left(\frac{1}{(1-\phi)n_a} \right) d\hat{n}_a$$

(i) Substituting the values for c^* and q^* from Lemmas 2 and 3 into and respectively we obtain:

$$P_{OG} = \begin{cases} 5/8, & n_a < 4n_s / 3 \\ 1 - \dfrac{n_s}{2n_a}, & n_a \geq 4n_s / 3 \end{cases}$$

$$P_{DG} = \begin{cases} 1 - \dfrac{kW}{(2k-1)\gamma(1-\phi)n_a}, & (W/\gamma) < (2k-1)(1-\phi)n_a \\ \dfrac{1}{2}\left(1 - \dfrac{W}{\gamma(1-\phi)n_a} \right) & (W/\gamma) \geq (2k-1)(1-\phi)n_a \end{cases}$$

It is immediately clear that $\frac{\partial P_{OG}}{\partial \phi} = 0$ and we also obtain:

$$\frac{\partial P_{DG}}{\partial \phi}=\begin{cases}-\dfrac{kW}{(2k-1)\gamma(1-\phi)^2 n_a}<0\,, & (W/\gamma)<(2k-1)(1-\phi)n_a \\ -\dfrac{W}{2\gamma(1-\phi)^2 n_a}<0, & (W/\gamma)\geq(2k-1)(1-\phi)n_a\end{cases}$$

(ii) Next, compare the probability of a takeover between the governance structures.

Case 1a: $(W/\gamma)<(2k-1)(1-\phi)n_a$, $n_a<4n_s/3$. The difference in the probability of a takeover between owner-governance and delegated-governance from and is expressed as:

$$\frac{kW}{(2k-1)\gamma(1-\phi)n_a}-\frac{3}{8}$$

Solving for to be positive such that $P_{OG}>P_{DG}$ generates the result: $\phi\geq 1-\dfrac{8kW}{3(2k-1)\gamma n_a}$.

Case 1b: $(W/\gamma)\geq(2k-1)(1-\phi)n_a$, $n_a<4n_s/3$. The difference in the probability of a takeover between owner-governance and delegated-governance from and is expressed as:

$$\frac{1}{8}+\frac{W}{2\gamma(1-\phi)\gamma n_a}$$

This difference is always positive and hence $P_{OG}>P_{DG}$.

Case 2a: $(W/\gamma)<(2k-1)(1-\phi)n_a$, $n_a\geq 4n_s/3$. The difference in the probability of a takeover between owner-governance and delegated-governance from and is expressed as:

$$\frac{kW}{(2k-1)\gamma(1-\phi)n_a}-\frac{n_s}{2n_a}$$

Solving for to be positive such that $P_{OG}>P_{DG}$ generates the result: $\phi\geq 1-\dfrac{2kW}{(2k-1)\gamma n_s}$.

Case 2b: $(W/\gamma)\geq(2k-1)(1-\phi)n_a$, $n_a\geq 4n_s/3$. The difference in the probability of a takeover between owner-governance and delegated-governance from and is expressed as:

$$\frac{1}{2}-\frac{n_s}{2n_a}+\frac{W}{2(1-\phi)\gamma n_a}$$

This difference is always positive because $n_a\geq 4n_s/3$ and hence $P_{OG}>P_{DG}$.

This completes the proof.

Proof of Proposition 6

The proof consists of taking the difference in shareholder surplus between the two governance regimes and solving for informedness. Shareholder surplus under delegated-governance is obtained by substituting the endogenous board entrenchment level from into the expressions for shareholder surplus given by

and . Shareholder surplus under owner-governance is obtained from Lemma 3 and the expression in . This comparison gives rise to four conditions that are analyzed below.

Case 1a: $(W/\gamma) < (2k-1)(1-\phi)n_a$, $n_a < 4n_s/3$. The difference in shareholder surplus between owner-governance and delegated-governance is as follows:

$$\left(\frac{3(1-\phi)n_a}{16}\right) - \frac{1}{2}\left(k(1-\phi)n_a - \left(\frac{W}{\gamma}\right)^2 \frac{k}{(2k-1)(1-\phi)n_a}\right)$$

Solving for informedness ϕ in generates only one feasible solution when $\phi < 1$:

$$\phi \geq 1 - \frac{2W\sqrt{2k}}{\gamma n_a \sqrt{(2k-1)(8k-3)}}, \quad (W/\gamma) < (2k-1)(1-\phi)n_a \ , \ n_a < 4n_s/3$$

Directionality is readily verified using parameter values $\{n_s = 1, n_a = 1, W = 0.25, \gamma = 1, k = 0.8\}$ to show that owner-governance provides greater acquirer surplus than delegated-governance when

$$\phi \geq 1 - \frac{2W\sqrt{2k}}{\gamma n_a \sqrt{(2k-1)(8k-3)}} .$$

Case 1b: $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, $n_a < 4n_s/3$. The difference in shareholder surplus between owner-governance and delegated-governance is as follows:

$$\left(\frac{3(1-\phi)n_a}{16}\right) - \frac{1}{4}\left((1-\phi)n_a - \left(\frac{W}{\gamma}\right)^2 \frac{1}{(1-\phi)n_a}\right)$$

Solving for informedness ϕ in generates only one feasible solution because $\phi < 1$:

$$\phi \geq 1 - 2W/(\gamma n_a), \qquad c^* \geq k(1-\phi)n_a \ , \ n_a < 4n_s/3$$

Directionality is readily verified using parameter values $\{n_s = 1, n_a = 1, W = 0.25, \gamma = 1, k = 0.55\}$ to show that owner-governance provides greater acquirer surplus than delegated-governance when $\phi \geq 1 - 2W/(\gamma n_a)$.

Case 2a: $(W/\gamma) < (2k-1)(1-\phi)n_a$, $n_a \geq 4n_s/3$. The difference in shareholder surplus between owner-governance and delegated-governance is as follows:

$$(1-\phi)n_s\left(\frac{1}{2} - \frac{n_s}{3n_a}\right) - \frac{1}{2}\left(k(1-\phi)n_a - \left(\frac{W}{\gamma}\right)^2 \frac{k}{(2k-1)(1-\phi)n_a}\right)$$

Solving for informedness ϕ in generates only one feasible solution because $\phi < 1$:

$$\phi \geq 1 - \frac{W\sqrt{3k}}{\gamma\sqrt{(2k-1)\left(2n_s^2 - 3n_s n_a + 3kn_a^2\right)}},\ c^* < k(1-\phi)\,n_a\ ,\ n_a \geq 4n_s/3$$

We have already seen from Case 1a that owner-governance always provides greater shareholder surplus than delegated-governance when informedness is sufficiently high and $n_a < 4n_s/3$. In this case, the only difference with Case 1a is that we have the changed condition $n_a \geq 4n_s/3$. From Lemma 3 expression we know we know that shareholder surplus under owner-governance with condition $n_a \geq 4n_s/3$ is equal to or greater than the shareholder surplus under condition $n_a < 4n_s/3$. Hence, based on the result in Case 1a, directionality is such that increasing informedness shifts shareholder preference towards owner-governance.

Case 2b: $(W/\gamma) \geq (2k-1)(1-\phi)\,n_a\ ,\ n_a \geq 4n_s/3$. The difference in shareholder surplus between owner-governance and delegated-governance is as follows:

$$(1-\phi)\,n_s\left(\frac{1}{2} - \frac{n_s}{3n_a}\right) - \frac{1}{4}\left((1-\phi)\,n_a - \left(\frac{W}{\gamma}\right)^2 \frac{1}{(1-\phi)\,n_a}\right)$$

Solving for informedness ϕ in generates only one feasible solution because $\phi < 1$:

$$\phi \geq 1 - \frac{W\sqrt{3}}{\gamma\sqrt{\left(4n_s^2 - 6n_s n_a + 3n_a^2\right)}},\ c^* \geq k(1-\phi)\,n_a\ ,\ n_a \geq 4n_s/3$$

We have already seen from Case 1b that owner-governance always provides greater shareholder surplus than delegated-governance when informedness is sufficiently high and $n_a < 4n_s/3$. In this case, the only difference with Case 1b is that we have the changed condition $n_a \geq 4n_s/3$. From Lemma 3 and expression we know that shareholder surplus under owner-governance with condition $n_a \geq 4n_s/3$ is equal to or greater than the shareholder surplus under condition $n_a < 4n_s/3$. Hence, based on the result in Case 1a, directionality is such that increasing informedness shifts shareholder preference towards owner-governance.

This completes the proof.

Proof of Proposition 7

The proof consists of taking the difference in acquirer surplus between the two governance structures and solving for informedness. Expected acquirer surplus under owner-governance is given in from Lemma 3. Expected acquirer surplus under delegated-governance is obtained as follows:

$$E[S_A]=\int_{c}^{c/k}\frac{(\hat{n}_a-c)}{(1-\phi)\,n_a}d\hat{n}_a+\int_{c/k}^{(1-\phi)n_a}\frac{(1-k)\,\hat{n}_a}{(1-\phi)\,n_a}d\hat{n}_a=\frac{(1-k)\left(k\left((1-\phi)\,n_a\right)^2-c^2\right)}{2k(1-\phi)\,n_a},\quad c<k(1-\phi)\,n_a$$

$$E[S_A]=\int_{c}^{(1-\phi)n_a}\frac{(\hat{n}_a-c)}{(1-\phi)\,n_a}d\hat{n}_a=\frac{\left((1-\phi)\,n_a-c\right)^2}{2(1-\phi)\,n_a},\quad c\geq k(1-\phi)\,n_a$$

Substitute the endogenous board entrenchment level from into the expression for acquirer surplus given by and for delegated-governance in the following comparisons:

Case 1a: $(W/\gamma)<(2k-1)(1-\phi)\,n_a$, $n_a<4n_s/3$. The difference in acquirer surplus between owner-governance and delegated-governance is as follows:

$$\frac{7(1-\phi)\,n_a}{32}-\frac{(1-k)}{2(1-\phi)\,n_a}\left((1-\phi)^2n_a^2-\frac{k}{(2k-1)^2}\left(\frac{W}{\gamma}\right)^2\right)$$

Solving for informedness ϕ in generates only one feasible, real-valued solution when $\phi<1$.

$$\phi>1-\left(\frac{4W}{\gamma(2k-1)\,n_a}\right)\sqrt{\frac{(1-k)\,k}{(9-16k)}},\quad \frac{W}{\gamma}<(2k-1)(1-\phi)\,n_a,\ n_a<\frac{4n_s}{3},\ k\in\left(0.5,\ \frac{9}{16}=0.5625\right)$$

Note that the condition $k\in(0.5,\ 0.5625)$ is necessary because a non-negative value is needed under the square root sign in for a real-valued threshold of informedness. Directionality is readily verified using parameter values $\{n_s=1,n_a=1,W=0.1,\gamma=5,k=0.55\}$ to show that owner-governance provides greater acquirer surplus than delegated-governance when $\phi>1-\left(\frac{4W}{\gamma(2k-1)\,n_a}\right)\sqrt{\frac{(1-k)\,k}{(9-16k)}}$. In other words, delegated-governance provides greater acquirer surplus when $\phi\leq1-\left(\frac{4W}{\gamma(2k-1)\,n_a}\right)\sqrt{\frac{(1-k)\,k}{(9-16k)}}$ and $k\in(0.5,\ 0.5625)$.

Case 1b: $(W/\gamma)\geq(2k-1)(1-\phi)\,n_a$, $n_a<4n_s/3$. The difference in acquirer surplus between owner-governance and delegated-governance is as follows:

$$\frac{7(1-\phi)\,n_a}{32}-\frac{\left(W-\gamma(1-\phi)\,n_a\right)^2}{8\gamma^2(1-\phi)\,n_a}$$

Solving for informedness ϕ in produces two quadratic roots $\phi=1+\frac{2\left(2\pm\sqrt{7}\right)W}{3n_a\gamma}>1$ for informedness

which do not satisfy the feasibility requirement $\phi < 1$. It is readily verified using parameter values $\{n_s = 1, n_a = 1, W = 0.25, \gamma = 1, \phi = 0.5, k = .55\}$ that owner-governance provides greater acquirer surplus than delegated-governance in the feasible region characterized by $\phi < 1$.

Case 2a: $(W/\gamma) < (2k-1)(1-\phi)n_a$, $n_a \geq 4n_s/3$. The difference in acquirer surplus between owner-governance and delegated-governance is as follows:

$$(1-\phi)\left(\frac{n_a}{2} - n_s\left(\frac{1}{2} - \frac{n_s}{6n_a}\right)\right) - \frac{(1-k)}{2(1-\phi)n_a}\left((1-\phi)^2 n_a^2 - \frac{k}{(2k-1)^2}\left(\frac{W}{\gamma}\right)^2\right)$$

Solving for informedness ϕ in generates one feasible, real-valued solution when $\phi < 1$.

$$1 - \left(\frac{W}{\gamma(2k-1)}\right)\sqrt{\frac{3(1-k)k}{(3n_s n_a - 3kn_a^2 - n_s^2)}}, \quad (W/\gamma) < (2k-1)(1-\phi)n_a, \; n_a \geq 4n_s/3$$

We have already seen from Case 1a that owner-governance always provides greater acquirer surplus than delegated-governance when informedness is sufficiently high and $n_a < 4n_s/3$. In this case, the only difference with Case 1a is that we have the changed condition $n_a \geq 4n_s/3$. From Lemma 3 and expression we know that acquirer surplus under owner-governance with condition $n_a \geq 4n_s/3$ is equal to or greater than the acquirer surplus under condition $n_a < 4n_s/3$. Hence, based on the result in Case 1a, directionality is such that increasing informedness shifts the acquirer's preference towards owner-governance. In other words, delegated-governance provides higher acquirer surplus when

$$\phi \leq 1 - \left(\frac{W}{\gamma(2k-1)}\right)\sqrt{\frac{3(1-k)k}{(3n_s n_a - 3kn_a^2 - n_s^2)}}.$$

Case 2b: $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, $n_a \geq 4n_s/3$. The difference in acquirer surplus between owner-governance and delegated-governance is as follows:

$$(1-\phi)\left(\frac{n_a}{2} - n_s\left(\frac{1}{2} - \frac{n_s}{6n_a}\right)\right) - \frac{\left(W - \gamma(1-\phi)n_a\right)^2}{8\gamma^2(1-\phi)n_a}$$

We have already seen from Case 1b that owner-governance always provides greater acquirer surplus than delegated-governance when $n_a < 4n_s/3$. In this case, the only difference with Case 1b is that we have the changed condition $n_a \geq 4n_s/3$. From Lemma 3 and expression we know that acquirer surplus under owner-governance with condition $n_a \geq 4n_s/3$ is equal to or greater than the acquirer surplus under condition $n_a < 4n_s/3$. Hence, based on the result in Case 1b, owner-governance always provides greater

acquirer surplus than delegated-governance in this Case 2b.

This completes the proof.

Proof of Proposition 8

The proof consists of taking the difference in joint surplus between the two governance structures and solving for informedness. Joint surplus is obtained by adding the shareholder surplus and acquirer surplus from the proofs for Proposition 5 and Proposition 6. The entrenchment level applied is the endogenous board entrenchment level from . Joint surplus for owner-governance is obtained from Lemma 3. Directionality with respect to increasing informedness for the preference for owner-governance has been established in the proofs for Propositions 6 and 7. Hence joint surplus must have the same directionality because it is the sum of shareholder surplus and acquirer surplus. This comparison gives rise to four conditions that are analyzed below.

Case 1a: $(W/\gamma) < (2k-1)(1-\phi)n_a$, $n_a < 4n_s/3$. The difference in joint surplus between owner-governance and delegated-governance is as follows:

$$\frac{13(1-\phi)n_a}{32} - \frac{1}{2}\left(\left(\frac{W}{\gamma}\right)^2 \frac{k^2}{(2k-1)(1-\phi)n_a}\right)$$

Solving for informedness ϕ in generates only one feasible solution because $\phi < 1$:

$$\phi \geq 1 - \frac{4kW}{\sqrt{3}(2k-1)\gamma n_a}, \quad (W/\gamma) < (2k-1)(1-\phi)n_a \ , \ n_a < 4n_s/3$$

Case 1b: $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, $n_a < 4n_s/3$. The difference in joint surplus between owner-governance and delegated-governance is as follows:

$$\frac{(1-\phi)n_a}{32} + \left(\frac{W}{8\gamma}\right)\left(2 + \left(\frac{W}{\gamma}\right)\frac{1}{(1-\phi)n_a}\right) > 0$$

It is immediately apparent that is always positive.

Case 2a: $(W/\gamma) < (2k-1)(1-\phi)n_a$, $n_a \geq 4n_s/3$. The difference in joint surplus between owner-governance and delegated-governance is as follows:

$$\frac{1}{6n_a}\left(\left(\frac{kW}{(2k-1)\gamma}\right)^2 \left(\frac{3}{(1-\phi)}\right) - n_s^2(1-\phi)\right)$$

Solving for informedness ϕ in generates only one feasible solution because $\phi < 1$:

$$\phi \geq 1 - \frac{\sqrt{3}kW}{(2k-1)\gamma n_s}, \quad (W/\gamma) < (2k-1)(1-\phi)n_a \ , \ n_a \geq 4n_s/3$$

Case 2b: $(W/\gamma) \geq (2k-1)(1-\phi)n_a$, $n_a \geq 4n_s/3$. The difference in joint surplus between owner-

governance and delegated-governance is as follows:

$$\frac{\left(3n_a^2-4n_s^2\right)\left(1-\phi\right)}{24n_a}+\frac{W\left(W+2\gamma n_a\left(1-\phi\right)\right)}{8\gamma^2 n_a\left(1-\phi\right)}>0$$

It is immediately apparent that is always positive.

This completes the proof.