Economics Bulletin

Volume 37, Issue 2

Board independence and a shareholder's commitment

Masanori Orihara
Waseda University

Abstract

Our model shows that it is optimal for shareholders to choose boards of directors whose preferences do not align with those of the shareholders. Such a board composition works as the shareholders' commitment to providing an incentive for risk-averse CEOs.

I am grateful to Jeffrey Brown, Dhammika Dharmapala, Heitor Almeida, and Scott Weisbenner for valuable advice. I also wish to express my gratitude to Makoto Hasegawa for helpful comments.
Citation: Masanori Orihara, (2017) "Board independence and a shareholder's commitment", *Economics Bulletin*, Volume 37, Issue 2, pages 846-852
Contact: Masanori Orihara - m_orihara@aoni.waseda.jp.
Submitted: September 27, 2016. **Published:** April 22, 2017.

1. Introduction

In economic theory, it is puzzling that shareholders choose boards of directors whose preferences depend on their CEOs. We provide a new theoretical explanation for this puzzle.

A crucial assumption we make is that CEO compensation contracts may or may not be enforced. Tirole (2001) employs a static principal-agent framework with hidden action, where the principal is a shareholder and the agent is a CEO. In this framework, contracts are assumed to be complete; therefore, the principal can write a contract that conditions on every possible state of the world. In contrast, the incomplete contract approach (Grossman and Hart 1986, and Hart and Moore 1988) assumes that players cannot write such contracts. Thus, our framework is a combination of the complete contract and incomplete contract approach.

Our assumption reflects the reality of corporate governance practices. For example, a New York Times article ("Bargain Rates for a C.E.O.?", April 5, 2010) reported that U.S. Bancorps CEO, Richard K. Davis, did not receive his $1 million cash bonus partly because of the negative economic circumstances in 2008. This observation suggests that CEO compensation contracts may not be enforced due to unforeseeable contingencies. Given that the CEO should have received the bonus without the economic shock, this example supports our claim that contracts may or may not be enforced.

Our model shows that shareholders optimally choose boards whose utility depends on the CEOs. Such boards compensate their CEOs to motivate them even when the initial contracts are not enforced ex post. In other words, the boards low independence from their CEOs works as the shareholders commitment to providing an incentive to the CEOs.

The New York Times article also reported that the board of directors paid the bonus in the end. This consequence is consistent with the prediction from our model. In contrast, the static complete contract approach cannot explain this ex post bonus payment, because the CEO had already taken his action and an incentive problem did not exist. One interpretation that can reconcile this example with theory is that the board valued the long-term relationship with the CEO and therefore paid the ex post bonus. This paper shows that a static framework can also provide a rationale for the bonus payment. Thus, our finding implies that CEOs may receive ex post compensation even under the economic circumstances where CEO tenure is relatively short and the long-term relationship is less important.

Several papers discuss various roles of boards of directors, as extensively surveyed in Adams *et al.* (2010). Adams and Ferreira (2007) show that high independence prevents the CEO from revealing private information which is complementary to the boards expertise. Kumar and Sivaramakrishnan (2008) show that a highly independent board incurs a small loss from a failure in monitoring the CEO, which leads to a decrease in the boards monitoring efforts. We contribute to this literature by highlighting the importance of ex post limited enforceability of contracts.

The rest of this paper is organized as follows. Section 2 presents the model. We solve the model in Section 3. We present our conclusion in Section 4.

2. The model

There are three players: a shareholder, a board of directors, and a CEO. The CEO undertakes one project. The shareholder's preference is represented by equation (1):

$$E[V] - E[W] = p_e v - [(1-\varepsilon)p_e w + \varepsilon p_e w^{\varepsilon}]. \tag{1}$$

$E[V]$ represents the expected profit from the project. $E[W]$ represents the expected wage of the CEO. p_e represents the probability of success of the project. This probability depends on the CEO's effort level, $e \in \{0, 1\}$, which is observable only by the CEO. Assume that $1 > p_1 > p_0 > 0$ and define $\Delta p \equiv p_1 - p_0$. All players know the distribution of p_e. $v > 0$ represents the profit when the project succeeds. The profit is zero if the project fails. $\varepsilon \in (0, 1)$ represents the probability that an initial contract is not enforced. A strictly positive value of ε implies the existence of the limitation on the enforceability of an ex ante contract. All players know the value of ε. w represents the ex ante wage contract. w^{ε} represents the ex post wage contract. Both contracts are offered by the board.

The CEO's preference is represented by equation (2):

$$E[u(W)] - ec = (1-\varepsilon)p_e u(w) + \varepsilon p_e u(w^{\varepsilon}) - ec. \tag{2}$$

$u(\cdot)$ represents the CEO's utility function. Assume that $u'(\cdot) > 0$, $u''(\cdot) < 0$, $\lim_{w\to+0} u'(w) = \infty$, $\lim_{w\to v} u'(w) = 0$, and $u(0) = 0$. Thus, the CEO exhibits risk-aversion. c represents the CEO's marginal cost of effort. Assume that the CEO is protected by limited liability, and thus wages must be positive.

The board's preference is represented by equation (3):

$$IE[V - W] + E[u(W)]. \tag{3}$$

$I \in \mathbb{R}_{++}$ represents the board independence chosen by the shareholder. In other words, I captures board composition. This form of the utility function follows Adams and Ferreira (2007) and Kumar and Sivaramakrishnan (2008). If high board independence does not have disadvantages, shareholders keep raising I, and we cannot obtain an interior solution. We normalize the board's weight on the CEO's utility to be one. Putting $(1 - I)$ as the weight on the CEO's utility yields the qualitatively same results.

The timing of the game is as follows. First, the shareholder chooses the board independence I. Second, the board offers an initial contract w. If the CEO accepts the offer, the game proceeds to the third stage. If the CEO rejects the offer, the game ends, and all players obtain zero utility. Third, the CEO chooses effort level $e \in \{0, 1\}$. Then, the outcome is realized, and all players observe the outcome. If the ex ante contract is enforced with probability $(1 - \varepsilon)$, the initial wage w is paid to the CEO. The game proceeds to the fourth stage with probability ε. In this stage, the board chooses an ex post wage w^{ε}.

3. Equilibrium

3.1 Fourth stage: The board offers w^{ε}

The board's problem is represented by (4):

$$\max_{w^{\varepsilon}} I(v - w^{\varepsilon}) + u(w^{\varepsilon}) \quad \text{s.t. } w^{\varepsilon} \geq 0. \tag{4}$$

Constraint (4) does not bind by the assumption on $u(\cdot)$. The first order condition is given by equation (5):

$$I = u'(w^{\varepsilon *}). \tag{5}$$

We define $w^{\varepsilon *} = w^{\varepsilon *}(I)$. We obtain equation (6) from equation (5):

$$1 = u''(w^{\varepsilon *})w^{\varepsilon *\prime}(I) \Leftrightarrow w^{\varepsilon *\prime}(I) = 1/u''(w^{\varepsilon *}). \tag{6}$$

Inequality (7) holds from the concavity of $u(\cdot)$:

$$w^{\varepsilon *\prime}(I) < 0. \tag{7}$$

As I becomes larger, the board puts more weight on shareholder value. Thus, $w^{\varepsilon *}(I)$ is a decreasing function in I. This benefit from high board independence for a shareholder is the same as that in Kumar and Sivaramakrishnan (2008).

3.2 Third stage: The CEO chooses e

We consider the case where the CEO implements $e = 1$. The CEO's incentive compatibility (IC) constraint is given by (8):

$$(1-\varepsilon)p_1u(w)+\varepsilon p_1u(w^{\varepsilon*}(I))-c \geq (1-\varepsilon)p_0u(w)+\varepsilon p_0u(w^{\varepsilon*}(I)). \tag{8}$$

Inequality (8) is simplified to (9):

$$(1-\varepsilon)u(w)+\varepsilon u(w^{\varepsilon*}(I)) \geq c/\Delta p. \tag{9}$$

This inequality shows that, as I becomes larger, the CEO's IC constraint becomes tighter from (7).

We define the wage level $w^\dagger$ in such a way that it makes the IC constraint binding. That is, $w^\dagger$ satisfies equation (10):

$$u(w^\dagger)=\frac{1}{1-\varepsilon}\left(\frac{c}{\Delta p}-\varepsilon u(w^{\varepsilon*}(I))\right). \tag{10}$$

We define $w^\dagger = w^\dagger(w^{\varepsilon*}(I))$. We obtain equation (11) from (10):

$$u'(w^\dagger)w^{\dagger\prime}(w^{\varepsilon*})w^{\varepsilon*\prime}(I)=-\frac{\varepsilon}{1-\varepsilon}u'(w^{\varepsilon*})w^{\varepsilon*\prime}(I) \Leftrightarrow w^{\dagger\prime}(w^{\varepsilon*})=-\frac{\varepsilon}{1-\varepsilon}\frac{u'(w^{\varepsilon*})}{u'(w^\dagger)}. \tag{11}$$

We obtain relationship (12) from equations (6) and (11):

$$\frac{dw^\dagger(w^{\varepsilon*}(I))}{dI}=w^{\dagger\prime}(w^{\varepsilon*})w^{\varepsilon*\prime}(I)=-\frac{\varepsilon}{1-\varepsilon}\frac{u'(w^{\varepsilon*})}{u'(w^\dagger)}\frac{1}{u''(w^{\varepsilon*})}>0. \tag{12}$$

The positive sign above comes from two observations. First, the ex post wage becomes lower as I becomes larger. Second, when I is larger, the ex ante wage must be higher to compensate for a reduction in the ex post wage to satisfy the CEO's IC constraint.

3.3 Second stage: The board chooses w

The board's problem at the second stage is represented by (13):

$$\max_w I[p_1v-(1-\varepsilon)p_1w-\varepsilon p_1w^{\varepsilon*}(I)]+(1-\varepsilon)p_1u(w)+\varepsilon p_1u(w^{\varepsilon*}(I)), \tag{13}$$

s.t.

$$w \geq 0, \tag{14}$$

$$(1-\varepsilon)u(w)+\varepsilon u(w^{\varepsilon*}(I)) \geq c/\Delta p, \tag{15}$$

$$(1-\varepsilon)p_1u(w)+\varepsilon p_1u(w^{\varepsilon*}(I))-c \geq 0. \tag{16}$$

Constraint (14) does not bind, as we have previously discussed. Inequalities (16) and (17) are the CEO's IC constraint and participation constraint, respectively. We rewrite the inequality (16) as (17):

$$(1-\varepsilon)u(w) + \varepsilon u(w^{\varepsilon *}(I)) \geq c/p_1. \tag{17}$$

The left-hand sides of inequalities (15) and (17) are the same. The right-hand side of inequality (17) is smaller than that of inequality (15) because $c/\Delta p - c/p_1 > 0$. Thus, condition (15) is stricter than condition (16). Therefore, we consider only constraint (15).

We define board independence $\hat{I}$ in such a way that $\hat{I}$ makes both ex ante and ex post wages the same. In other words, $\hat{I}$ satisfies equation (18):

$$w^{\varepsilon *}(\hat{I}) = w^{\dagger}(w^{\varepsilon *}(\hat{I})). \tag{18}$$

Since $w^{\varepsilon *\prime}(I) < 0$ and $[w^{\dagger}(w^{\varepsilon *}(I))]' > 0$ from (7) and (12), the following relationship (19) holds:

$$\begin{cases} w^{\varepsilon *}(I) > w^{\dagger}(w^{\varepsilon *}(I)) & \text{if } I < \hat{I}, \\ w^{\varepsilon *}(I) = w^{\dagger}(w^{\varepsilon *}(I)) & \text{if } I = \hat{I}, \\ w^{\varepsilon *}(I) < w^{\dagger}(w^{\varepsilon *}(I)) & \text{if } I > \hat{I}. \end{cases} \tag{19}$$

We consider two cases separately below. We describe the case where the IC constraint binds as case I. We describe the case where the IC constraint does not bind as case II. Cases I and II respectively correspond to when $I < \hat{I}$ and $I \geq \hat{I}$. This is because $\hat{I}$ is the level of board independence that binds the IC constraint, and $w^{\varepsilon *\prime}(I) < 0$ and $[w^{\dagger}(w^{\varepsilon *}(I))]' > 0$ from (7) and (12).

3.3.1 Case I

In case I, the board does not consider the CEO's incentive. Therefore, the board solves the same problem as that at the fourth stage. The optimal ex ante wage w^* satisfies equation (20):

$$I = u'(w^*). \tag{20}$$

From equations (20) and (5), $w^*(I) = w^{\varepsilon *}(I)$ holds for $I < \hat{I}$.

3.3.2 Case II

In case II, the board chooses a wage level that satisfies the CEO's IC constraint with equality. Thus, the optimal ex ante wage w^* is $w^* = w^{\dagger}(w^{\varepsilon *}(I))$ for $I \geq \hat{I}$.

The results from these two cases are summarized in (21):

$$w^*(I) = \begin{cases} w^{\varepsilon *}(I) & \text{if } I < \hat{I}, \\ w^{\dagger}(w^{\varepsilon *}(I)) & \text{if } I \geq \hat{I}. \end{cases} \tag{21}$$

Recall that $w^{\varepsilon *\prime}(I) < 0$ and $[\hat{w}^{\dagger}(w^{\varepsilon *}(I))]' > 0$ from (7) and (12). Thus, $w^{*}(I)$ exhibits a V-shaped function in I.

3.4 First stage: The shareholder chooses I

The shareholder's problem is represented by (22):

$$\max_{I} p_1 v - (1-\varepsilon) p_1 w^{*}(I) - \varepsilon p_1 w^{\varepsilon *}(I). \tag{22}$$

Problem (22) can be written as in (23) by using (21):

$$\min_{I} \mathbb{I}_{I<\hat{I}}(1-\varepsilon) w^{\varepsilon *}(I) + \mathbb{I}_{I\geq\hat{I}} \varepsilon w^{\dagger}(w^{\varepsilon *}(I)). \tag{23}$$

$\mathbb{I}$ is an indicator function, where $\mathbb{I}_{I<\hat{I}}$ equals one if $I < \hat{I}$ and it equals zero otherwise. $\mathbb{I}_{I\geq\hat{I}}$ is interpreted in the same way.

The shareholder does not choose a board independence that is strictly lower than $\hat{I}$, because $w^{\varepsilon *\prime}(I) < 0$ from (7) when $I < \hat{I}$. Intuitively, the shareholder can reduce economic rents to the CEO by increasing I.

The shareholder does not choose a board independence that is strictly larger than $\hat{I}$ either, because the risk-averse CEO prefers that the ex ante and ex post wages be the same. The shareholder can create this situation by choosing $I = \hat{I}$ from (19).

Based on these arguments, it is optimal for the shareholder to choose $I = \hat{I}$. This finding implies that we have obtained an interior solution for the optimal board independence.

4. Conclusion

We have shown that shareholders optimally choose board members whose utility depends on the CEO. Such a board helps shareholders make a commitment to providing an incentive to the CEO.

References

[1] Adams, R.B. and D. Ferreira (2007) "A Theory of Friendly Boards" *Journal of Finance* **62**, 217-250.

[2] Adams, R.B., B.E. Hermalin, and M.S. Weisbach (2010) "The Role of Boards of Directors in Corporate Governance: A Conceptual Framework and Survey" *Journal of Economic Literature* **48**, 217-250.

[3] Grossman, S.J. and O.D. Hart (1986) “The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration” *Journal of Political Economy* **94**, 691-719.

[4] Hart, O. and J. Moore (1988) “Incomplete Contracts and Renegotiation” *Econometrica* **56**, 755-785.

[5] Kumar, P. and K. Sivaramakrishnan (2008) “Who Monitors the Monitor? The Effect of Board Independence on Executive Compensation and Firm Value” *Review of Financial Studies* **21**, 1371-1401.

[6] Tirole, J. (2001) “Corporate Governance” *Econometrica* **69**, 1-35.