

POWER DISTRIBUTION AND BOARD INDEPENDENCE: A GAME THEORETIC APPROACH

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ABSTRACT

Members of the board of directors (BOD) are expected to play an active role in shaping the firm's strategic direction through their influence on the decision-making processes. However, the question remains whether this objective can be realized through the effective engagement of *all* board members in the decision-making. To answer this question, we employ a game-theoretic analysis that explores all possible equilibrium dominant-coalitions that emerge among BOD members and the associated distribution of power to influence decision-making. We show that, under plausible governance design settings, it is impossible to achieve an effective influence of all directors on the decision-making process. Specifically, under CEO duality, while all board members participate in the emerged dominant coalition, non-CEO directors have negligible power to influence decision-making. Furthermore, under CEO/Chairperson role separation, while the extreme power of the CEO is somewhat mitigated by the Chairperson, the power to influence decision-making of all non-CEO/Chairperson directors is even further diminished. Moreover, we show that, when the CEO and Chairperson are hypothetically assumed to have no peculiar role-power in the firm, a minimal majority dominant coalition is formed, where directors outside this coalition have null power over decision-making. Our analysis thus delineates the impossibility of realizing an equilibrium in which all BOD members effectively influence the decision-making process.

Keywords: Power distribution, corporate governance, board of directors, CEO, Chairperson, board decision-making, behavioral theory of the firm.

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CAN ALL DIRECTORS EFFECTIVELY INFLUENCE BOARD DECISION-MAKING?

1 Introduction

Members of the board of directors (BOD) are expected to actively participate in the decision-making processes that shape the strategic direction of the firm (Masulis and Mobbs, 2011). As board members commonly have equal voting rights, their *formal* power to influence board decision-making process is structured to be evenly distributed (Hermalin and Wiesbach, 1998). However, how power to influence decision-making is *effectively* distributed among the CEO, Chairperson, and the other directors has yet to receive sufficient rigorous investigation in the literature. This burgeons the question whether indeed all directors can influence the decision-making process. To address this issue, we use a game-theoretic approach to examine the equilibrium distribution of power to influence BOD decision-making among board members. Our examination demonstrates that under plausible assumptions about the firm governance design setting, there is no equilibrium outcome in which all BOD members effectively influence the decision-making process.

Specifically, following the game-theoretic approach of Aumann and Myerson (1988), we delve into the cooperation tie structures that endogenously emerge among BOD members. That is, the ties formed between any two board members—representing direct collaboration in decision-making—in order to enhance individual power to influence the decision-making process above and beyond the formal power entailed by voting rights.¹ Based on Myerson (1977), the power (to influence decision-making) construct captures one's *ex ante* capacity to serve as a pivotal player—given the tie structure among all players—in turning a potential group of board members into a

¹ On the motivation and inherent struggle over power among BOD members in management literature, see, e.g., Combs et al. (2007); Finkelstein (1992); Hambrick (2007); Ocasio (1994); and Westphal and Zajac (1995).

decision-making majority coalition. The distribution of power to influence decision-making among the directors is an equilibrium outcome of three factors: formal voting rights, CEO and Chairperson peculiar role position in the firm, and the ties and coalitions that are endogenously formed among the board members.

We examine a number of firm governance design settings. First, we model a CEO duality setting in which we assume that the CEO role position entails that any board decision-making requires her support. We show that in all attained equilibria, the CEO enhances her capacity to influence decision-making by forming ties with all other BOD members such that the obtained (dominant) majority coalition comprises all board members. At the same time, non-CEO directors either form or not form ties with one another. As a result, the power to influence decision-making in the board is concentrated in the hands of the CEO, whereas all other non-CEO board members bear insignificant individual capacity to influence the decision-making process.

Next, we examine the CEO–Chairperson role separation governance design in which we assume that the CEO and Chairperson role position entails that any board decision-making requires the support of both executives. We show that under all possible attained equilibria, the CEO and the Chairperson tie with one another, whereas all other non-CEO/Chairperson board members tie with either the CEO or Chairperson (or both). Non-CEO/Chairperson directors either tie or not tie with one another. Hence, once again, as in the case of CEO duality, the dominant coalition that is formed within the BOD comprises all board members. However, because the CEO and Chairperson depend on one another for decision-making, their individual power to influence decision-making under role separation falls short of that attained by the CEO under CEO duality.² At the same time, however, their combined power to influence decision-making substantially

² This outcome is consistent with the empirical findings of Adams et al. (2005).

exceeds the power of the CEO under CEO duality. This, in turn, leaves all other non-CEO/Chairperson directors in an even weaker position to influence board decision-making processes, as compared to the CEO duality setting.³

We complement the above results, considering a hypothetical firm governance design case, where we assume that neither CEO's nor Chairperson's support is necessary for board majority decision-making; that is, all board members are *ex ante* equal in their ability to influence decision-making.⁴ We show that under all possible attained equilibria, some board members form ties with others such that a minimal majority coalition is attained, leaving all other directors outside of this coalition with no power to influence decision-making. In other words, no member of the minimal majority coalition ties with any board member outside this coalition. The resulting distribution of power is such that members of the minimal majority group share equal power to influence decision-making processes, whereas the power to influence decision-making of all other board members is null. Altogether, our findings thus indicate the impossibility for all board members to have effective influence on the decision-making process of the BOD.

Our work advances theory and research regarding board function and its power structure in a number of ways. First, consistent with Adams et al. (2010) assertion that board dynamics “are typically modeled as a single decision-maker” (p. 100), we show that under the two common firm governance design structures—CEO duality and CEO–Chairperson role separation—indeed the CEO (under CEO duality) or the CEO and Chairperson (under role separation) concentrate the vast majority of the power to influence board decision-making, where all non-CEO/Chairperson BOD

³ There is one exception to this set of equilibria outcomes in which all non-CEO/Chairperson board members tie to both the CEO or Chairperson while the CEO and Chairperson do not tie with one another. Importantly, however, the distribution of power to influence board decision-making maintains identical to that attained under all other equilibria.

⁴ While this setting diverges from most real-world governance designs, it serves as a benchmark to complete our argument on the impossibility of having all directors influencing board decision-making.

members attain only marginal individual power to influence decision-making. Moreover, we show that, even under the hypothetical assumption that the CEO and a Chairperson do not hold any peculiar role position in the firm, some directors lack any power to influence decision-making.

Second, our study contributes to the understanding of the dynamics underlying the BOD (Adams et al., 2010). Our game-theoretic approach allows us to investigate rational coalition formation and its implied power distribution to affect decision-making in the board. In so doing, we respond to the call to promote the understanding of the dynamics within boards (e.g., Pye and Pettigrew, 2005), where each board member endogenously chooses whether to cooperate (tie) with other members in order to increase individual power to influence decision-making. Furthermore, previous studies on CEO power have largely expanded on agency theory (e.g., Fama 1980). In particular, as CEO duality concentrates management power and board leadership in the hands of one person (Jensen, 1993), agency theorists suggest that this excessive power exacerbates potential conflicts of interest (Jensen and Warner, 1988; Hermalin and Weisbach, 1998; Bebchuk and Fried, 2003); leads to an extraction of personal benefits (Abernethy et al., 2015); and decreases the effectiveness of monitoring (Hermalin and Weisbach, 1998; Finkelstein et al., 2009; Krause et al., 2014). Our work extends this stream of research by demonstrating that while CEO–Chairperson role separation somewhat dismantles the extreme power attained under CEO duality, neither setting provides all board members with the power to influence the decision-making process. In fact, Our analysis reveals that under CEO–Chairperson role separation, non-CEO/Chairperson board members have even less influence on decision-making compared to the CEO duality setting. Overall, our study thus extends our understanding of board dynamics and, in particular, of the individual mechanism underlying the decision-making process in BODs.

Finally, management theorists (Tang et al., 2011) have explored how “relative power and relationships” among major firm stakeholders influence the firm’s decision-making strategy (Van Ees et al., 2009, p. 315). For example, Kakabadse et al. (2006) and Walton (2011) advanced research on CEO–Chairperson relationships; Ocasio (1994) and Ocasio & Kim (1999) studied CEO–Chairperson power distribution; Man Zhang & Greve (2019) studied how CEO’s ability to form coalitions within the BOD generates power; and Westphal & Zajac (2001) explored implications of this power emergence on corporate governance issues. Our work augments this line of research on the supreme entities of the firm and the power distribution within the BOD, offering insights on board design (Boivie et al. 2016) and, specifically, demonstrating that it is always the case that some BOD members cannot effectively influence the decision-making process. Further, by adopting a game-theoretic framework and rigorously exploring the equilibrium ties and coalitional group formations within the BOD, our approach allows us to quantify the corresponding distribution of individual power to influence decision-making among the CEO, Chairperson, and the other board members.

The remainder of the paper proceeds as follows: Section 2 describes the model and presents a series of propositions regarding the formed coalitions and the distribution of power to influence decision-making among BOD members under various governance design settings. Section 3 provides a summary and concluding remarks.

2 The Model

Following Aumann and Myerson (1988), our game-theoretic method allows us to integrate voting rights and peculiar role position of the CEO and Chairperson to examine the endogenous formation of ties among BOD members under CEO duality and CEO-Chairperson role separation.

Moreover, this approach allows us to quantify the resulted BOD members' power to influence board decision-making under equilibrium coalitional configurations. Our model considers three settings: CEO duality, CEO–Chairperson role separation (respectively granting the CEO and CEO/Chairperson with peculiar role power), and a third (hypothetical) case in which neither the CEO nor the Chairperson hold ex ante a unique role position that provides any extra power in board decision-making.

Setting I: CEO Duality

We assume that the unique role position of a CEO who also serves as the Chairperson entails that her support is required in any board decision-making. To examine the equilibrium board coalitional configuration and distribution of power to influence decisions, we begin with a simplified setting that includes a three-member BOD in which the directors maintain equal voting rights and where decisions are reached by a simple majority. In order to pass future decisions in the board, the CEO must form ties with at least one other board member in order to generate a majority group. However, if the CEO forms ties with another board member (denoted by i), each of them then attains power that is equal to $1/2$.⁵ Will the CEO be further incentivized to form ties with the third board member (denoted by j)? Note that such a move would increase the CEO's power from $1/2$ to $2/3$, and at the same time increase j 's power from zero to $1/6$ (at the expense of decreasing i 's power from $1/2$ to $1/6$). This new power distribution is generated regardless of whether i and j tie with one another, as due to the CEO's role position, a decision-making majority group cannot be formed without her support. Hence, we conclude that under CEO duality and role

⁵ In what follows, we interchangeably use the terms “power to influence decision-making” and “power.” Also, all power computations in this paper follow from Myerson (1977) and Aumann and Myerson (1988). For brevity, the detailed computations of our numerical examples are omitted but are available upon request.

position, all three board members are connected in equilibrium, such that the CEO forms ties with the other two board members, whereas the other two (non-CEO) board members may or may not form ties with one another, as these ties will have no impact on their power.⁶ Furthermore, under the obtained equilibrium, the CEO attains power equal to $2/3$, while the remaining power is equally divided between the other two board members ($1/6$ each).

We argue:

Proposition 1: In an N -member BOD with CEO duality and CEO role position, the tie structure (and the coalitional structure) under all possible equilibria sustains the following: (a) the CEO is tied with each of the other board members (hence, all BOD members are connected and a grand coalition is formed); and (b) non-CEO board members either form or not form ties with one another. The individual power of the CEO is equal to $(N+1)/2N$, while the power of each of the other BOD members is equal to $1/2N$.⁷

Proof: To explore the attained coalitions and power distribution among BOD members in equilibrium, we follow the approach of Aumann and Myerson (1988) and Myerson (1977). (In this proof and the following ones, we refer to the common case of an uneven number of board members. The resulting equilibrium coalitions under an even number of members is identical to the uneven case, whereas the power distribution for the case of an even number of board members closely resembles that of the uneven case and is thus omitted for brevity, but available from the authors

⁶ Recall that a group of players is said to be in coalition if it is connected, that is, when any two players in the group are either directly tied with one another or indirectly tied via third party(ies) (including one or more board members) with whom they both maintain ties. That is, in a (connected) coalition, one can always bridge from any one member to another via direct or indirect ties within the coalition.

⁷ In fact, there is also another case that maintains equilibrium conditions, in which $N \geq 4$ and all but one (say, director k) of the non-CEO board members are tied to the CEO, and where k is tied to all other non-CEO board members. Importantly, however, in this case, the distribution of power to influence decision-making is identical to that obtained under Proposition 1 (for brevity, the analysis of this equilibrium outcome is omitted, but available upon request).

upon request.) For an N -member BOD ($N=3,5,7,\dots$), note that in order to generate positive power, the CEO and at least $(N-1)/2$ other board members must form ties among themselves in a way that they are connected, thus forming a minimal majority coalition M , $|M|=(N+1)/2$; otherwise the power of each of them is zero. In fact, the CEO has an incentive to form ties with each of the $(N-1)/2$ board members in this minimal majority coalition so that she would be able to (further) increase her power by also forming ties with another board member j ($j \notin M$). That is, after forming ties with each of the $(N-1)/2$ board members of the minimal majority coalition, the CEO is better off now forming ties with any board member j ($j \notin M$), because after forming ties with j , there are now new additional orderings among BOD members in which the CEO is a pivot [e.g., in any ordering of size N , in which the CEO was a pivot before she formed ties with j , replacing j with any of the $(N-1)/2$ board members in this ordering maintains the CEO in the pivotal position after forming ties with j , while it did not put the CEO in a pivotal position before she formed ties with j]. And, moreover, in any ordering in which j appeared before the CEO and in which the CEO was a pivot before forming ties with j , the CEO also maintains the pivotal position after forming ties with j , as there cannot exist a majority group without the CEO. These arguments hold for any new tie between the CEO and a board member who is not in M . It follows that the CEO is thus better off forming ties with all board members. Note further, that at the same time, each non-CEO board member is better off forming ties with the CEO as this allow him to act as a pivot in *all* of the cases in which his place in the ordering is $(N+1)/2$ and the CEO precedes him in the ordering. That is, each non-CEO board member (a) is always better off when he ties with the CEO, as this increases his power from zero to a positive value; and (b) having been tied with the CEO, is indifferent whether to tie with any other board member, as this tie generates null marginal power. Finally, based on Myerson (1977), to compute the CEO's power in an N -member BOD, note that the CEO

is a pivot as long as she appears in the $(N-1)2+i$, $i=1, \dots, (N+1)/2$, place of the ordering. However, the probability that the CEO will appear in any place of the ordering is $1/N$. Hence the total probability that the CEO is a pivot is equal to $\sum_{i=(N+1)/2}^N (1/N)$, where the latter can be expressed as $(N+1)/2N$. Finally, as all other board members are symmetric players and the sum of all board members' powers is equal to one, the power of a non-CEO board member is equal to $[1 - (N+1)/2N] / [(N-1)/2] = 1/2N$. ■

Proposition 1 presents important implications for the design of corporate governance vis-à-vis the endeavor to establish “appropriate checks and balances in the governance structure” (Cadbury, 2000 p. 9; see also Cuervo-Cazurra and Aguilera 2004). On one hand, we find that role power under CEO duality leads to an expanded majority group that includes all BOD members. This could have been interpreted as a participative leadership in which all board members may effectively influence decision-making. On the other hand, however, we show that at the same time, the vast majority of the power to influence decision-making remains with the CEO and the participative space that could have been envisioned from the resulting expanded majority group in the board is considerably stifled, as each of the non-CEO board members bear very limited capacity to influence the decision-making process.

Figure 1 illustrates the distribution of power to influence decision-making among BOD members as a function of the number of board members.⁸ Specifically, the complete lines depict the power distribution in the case of CEO duality. While the power of all BOD members moderately decreases with the number of board members, the power of the CEO exceeds 50% over the entire range, reaching roughly 57% and 53% for a 7- and 17-member BOD, respectively. At

⁸ As in Proposition 1, Figure 1 refers to the common case of an uneven number of board members. The resulting power distribution for the case of an even number of BOD members closely resembles that of the uneven case and is omitted for brevity, but available from the authors upon request.

the same time, for a 7- and 17-member BOD, each of the other non-CEO board members attains power that ranges from about 7% to just below 3%, respectively. That is, non-CEO directors have marginal effective individual capacity to influence the decision-making process.

Setting II: CEO–Chairperson Role Separation

We explore the resulting tie structure (and coalitional configurations) and the distribution of power to influence board decision-making that attain in equilibrium, where we now assume a role separation between the two main executive functions—CEO and Chairperson. Due to their peculiar role position, we assume that the support of both the CEO and Chairperson is required for any board decision-making. As before, we consider a BOD whose members maintain equal voting rights and where decisions are reached by a simple majority.⁹

We begin once again with a simplified, three-member BOD (including the CEO and Chairperson) setup. From an ex ante perspective, in order to pass future decisions, the CEO and Chairperson will opt to directly form ties with one another rather than indirectly connect via the third board member. This stems from the fact that by forming ties with one another, the CEO and Chairperson will each generate power equal to $1/2$; whereas if each of them forms ties with the third board member (without forming ties with one another), their individual power drops to $1/3$ (because, in this case, the other board member also draws power equal to $1/3$). Also, note that after forming ties with one another, the CEO and Chairperson are indifferent about whether to tie with the third board member (and the latter is indifferent about whether to tie with the CEO and/or the

⁹ We also explored a role separation setting in which the support of *either* the CEO *or* the Chairperson is required for board decision-making. This is consistent with the control approach to boards wherein chairpersons act as the “ultimate internal monitor (function)” (Fama 1980, p. 294) and more rigorous system of checks and balances is cultivated (Rechner and Dalton 1991). The resulting majority coalitional configuration in the attained equilibrium that is presented below is robust to this change (for any BOD that comprises 5 or more members), whereas the combined power of the CEO and Chairperson is, as could be expected, smaller. For the sake of brevity, this analysis is not presented but is available upon request.

Chairperson), as this tie will not alter the power distribution (because the support of both the CEO and Chairperson is required for decision-making). We therefore conclude that in a three-member BOD, the attained equilibria are such that the CEO and Chairperson tie with one another and each of them may or may not tie with the third board member. Moreover, under the obtained equilibria, the power to influence decision-making of the CEO and Chairperson is equal to $1/2$ each, whereas the power of the other board member, whether tied or not with either the CEO or the Chairperson, is null.

We argue:

Proposition 2: In an N -member BOD with CEO–Chairperson role separation, where each holds a role position, the tie structure (and the coalitional structure) under all possible equilibria is characterized by the following: (a) the CEO and Chairperson tie with one another; (b) all non-CEO/Chairperson board members are tied to either the CEO or Chairperson (or both; hence all BOD members are connected); and (c) non-CEO/Chairperson board members either form or not form ties with one another. Furthermore, the equilibrium individual power of both the CEO and Chairperson is equal to $(3/4) \times (N+1)/2N$, while the power of each of the other board members is equal to $(N-3)/(4N^2-8N)$.¹⁰

Proof: For an N -member BOD ($N=3,5,7,\dots$), note that in all situations in which the CEO and Chairperson are not tied—either directly or indirectly via a third party—their power is zero, as both their supports are necessary in any majority decision-making. Moreover, the CEO and Chairperson are always weakly better off forming direct ties with each other than tying via a third

¹⁰ In fact, there is also a case that maintains equilibrium conditions, in which the CEO and Chairperson do not form ties with one another and all non-CEO/Chairperson directors form ties with *both* the CEO and Chairperson. Importantly, however, in this case, the distribution of power to influence decision-making is identical to that obtained under Proposition 2 (for brevity, the analysis of this equilibrium outcome is omitted, but available upon request).

party (as their dependence on connectivity via a third party may only decrease their power and may never increase it). Furthermore, having formed ties with one another, the CEO and/or Chairperson must also connect with a total of at least $(N-3)/2$ other board members in order to generate a positive power (by forming a minimal majority coalition); otherwise their power is null. In fact, following the argumentation in the proof of Proposition 1, there is an incentive for each member of the minimal majority coalition to form ties such that each non-CEO/Chairperson director is tied with either the CEO or Chairperson (or both). Let us now focus on the Chairperson's new tie formation after having formed ties with the CEO and after she and/or the CEO formed ties with $(N-3)/2$ other board members. Note that for any minimal majority group M , $|M|=(N+1)/2$, that includes both the CEO and Chairperson, if neither the CEO nor the Chairperson are tied with board member j (i.e., $j \notin M$), the Chairperson can increase her power by forming new ties with j . This stems from the fact that in any ordering in which j appeared before the Chairperson and in which the Chairperson was a pivot before forming ties with j , the Chairperson maintains the pivotal position after forming ties with j , as there cannot exist a majority group without the Chairperson (due to her role position). However, after forming ties with j , there are now new additional orderings in which the Chairperson is a pivot [e.g., in any ordering in which the Chairperson was a pivot before she formed ties with member j , member j —after forming ties with the Chairperson—can replace any of the other non-CEO/Chairperson board members that appear before the Chairperson in the ordering, while maintaining the Chairperson's pivotal position]. Hence, the Chairperson is better off forming ties with any board member j with whom she and the CEO are not tied for any majority group M , $|M| \geq (N+1)/2$, that includes both the CEO and Chairperson. In contrast, note that for any majority group M , $|M| \geq (N+1)/2$, that includes both the CEO and Chairperson, if *the CEO* has already tied with the additional board member j (i.e., $j \notin M$), then for

the Chairperson to tie with j generates no increase in power, as the Chairperson is already indirectly tied (via the CEO) to j (and the CEO can never form a majority group without the Chairperson). It follows that the Chairperson's maximum power is attained when she is tied with the CEO, and either she or the CEO (or both) are tied to all other non-CEO/Chairperson board members. Also, as the CEO and Chairperson are symmetric players, the CEO's power is maximized under the exact same tie structure. Finally, note that all other non-CEO/Chairperson board members (a) are always better off when they tie with either the CEO or Chairperson (or both); and (b) having been tied with either the CEO or Chairperson (or both)—who are tied to one another—are indifferent about whether to tie with any other non-CEO/Chairperson board member, as this tie generates zero marginal power. Finally, based on Myerson (1977), we compute the resulting power of each board member in equilibrium. To compute the Chairperson's power in a BOD with an uneven number (N) of members, note that the Chairperson is a pivot as long as she appears in the $(N-1)/2+i$ for $i=1, \dots, (N+1)/2$ place of the ordering, while at the same time the CEO appears in any place j , $j=1, \dots, (N-1)/2+i-1$ of the ordering. However, the probability that the Chairperson appears in any place $(N-1)/2+i$ of the ordering is $1/N$, while the probability that the CEO is in place j , $j=1, \dots, (N-1)/2+i-1$ is $[(N-1)/2+i-1]/(N-1)$. Hence the total probability that the Chairperson is a pivot is equal to $\sum_{i=0}^{(N-1)/2} [(1/N) \times [(N-1)/2 + i]] / (N-1)$. This, however, reduces to $(3/4) \times (N+1)/(2N)$. As the CEO and Chairperson are symmetric players, the same power is attained by the CEO. Finally, as all other non-CEO/Chairperson board member are symmetric players, and the sum of all board members' powers is equal to one, the power of a non-CEO/Chairperson board member is equal to $[1 - 2 \times (3/4) \times (N+1)/(2N)] / (N-2) = (N-3)/(4N^2-8N)$.¹¹ ■

¹¹ In Proposition 2 the distribution of power refers once again to the common case of an uneven number of board members. The resulting power distribution for the case of an even number of BOD members closely resembles that of the uneven case and is omitted for brevity, but available from the authors upon request.

Proposition 2 demonstrates that while CEO–Chairperson role separation, as compared to CEO duality, shifts power from the CEO to the Chairperson, it concentrates the power to influence decision-making in the hands of these two executive functions at the expense of further marginalizing the other non-CEO/Chairperson BOD members. Recalling Figure 1, the dashed lines depict the power distribution to influence decision-making in the case where there is role separation between the CEO and Chairperson (where both hold role position). As shown, while the power of all BOD members under CEO–Chairperson role separation moderately decreases with the number of board members, the CEO and Chairperson attain considerable power in the BOD, far beyond the trivial power that is left in the hands of the other board members. Note that unlike the CEO duality case, the individual power of the CEO and Chairperson falls short of 1/2. Specifically, both the CEO and Chairperson reach individual power of roughly 43% and 40% in a 7-r and 15-member BOD, respectively. Their combined power, however, respectively amounts to 80% and 86% (in a 7- and 15-member BOD)—highlighting their powerful position as a leading team under the role separation setting. Importantly, at the same time, each of the other board members attains power equals to roughly 3% and just below 1% in a 7- and 15-member BOD, respectively—which is even less significant than their individual power under the CEO duality case. Overall, while CEO–Chairperson role separation somewhat dismantles the extreme CEO power obtained under CEO duality by transferring power to the Chairperson, it decreases the power of all other BOD members, thereby further marginalizing their ability to fulfill their role in leading the direction and strategy of the firm and overseeing its management’s operation.

Setting III: CEO and Chairperson with No Peculiar Influence on Decision-Making

Consider once again a BOD in which all members have equal voting rights and decisions are reached by a simple majority. We now assume that the role position of the CEO and Chairperson does not imply any peculiar influence on BOD decision-making process beyond that of other non-CEO/Chairperson board members. As per above, we begin with a simplified example, examining the tie formation and the associated equilibrium distribution of power to influence decision-making under a three-member BOD setting. We then extend this framework to include any number of BOD members.

Consider a BOD that consists of three members— i , j , and k —who maintain equal voting rights and where decisions are attained by a simple majority. Clearly, from an ex-ante perspective, in order to reach a majority in any future decision-making, a couple of board members, say i and j , must form ties with one another in order to generate a majority group; otherwise, no future decisions can be reached, and each board member will hold null power. Indeed, if i and j form such ties with one another, each of them attains power equal to $1/2$. At the same time, the third board member, k , who is tied to neither i nor j , holds null power, as she/he is excluded from the majority coalition. Would ties emerge between k and the other board members (i and/or j)? Suppose that i and k now also form ties with one another. In this case, both i and k immediately generate increased power, as i 's power rises from $1/2$ to $2/3$, and k 's power rises from zero to $1/6$ (while at the same time the power of j drops from $1/2$ to $1/6$). These follow from the fact that i has ties with both j and k , whereas j and k do not have ties with one another. Nonetheless, it would now be beneficial for j and k to form ties with one another, as this would also increase the power of each of them from $1/6$ to $1/3$. However, this new tie between j and k would also lead to a decrease in i 's power from $2/3$ to $1/3$. The latter is, of course, lower than the power (of $1/2$) that i possessed prior to forming ties with k . In other words, i 's formation of ties with k after already having such

ties with j ultimately decreases i 's power from $1/2$ to $1/3$. It therefore follows that, after forming ties with j , i will *not* opt to further tie with k . This same conclusion symmetrically holds for j , who will not form ties with k after forming ties with i . In sum, the tie structure that will attain in equilibrium under a three-member BOD setting is such that two of the three board members tie with one another, each holding power equal to $1/2$, while both lack ties with the third board member, who thus holds null power.

We argue:

Proposition 3: In an N -member BOD in which the CEO and Chairperson role position does not provide any influence of board decisions beyond that of all other board members, the tie structure under all possible equilibria sustains the following: (a) a minimal coalition connected majority group is attained; (b) no member within the minimal majority group is tied with any board member outside this group; and (c) members of the minority group may either form or not form ties with one another. The power of each board member in the minimal majority group is equal to $2/(N+1)$, whereas the power of all other board members is null.

Proof: For an N -member BOD ($N=3,5,7,\dots$), note first that for any coalitional group M , where $|M| \leq (N-1)/2$ and no member in M is connected with members outside of M , the power of all board members is zero, independently of the tie structure in M . If, instead, $|M| = (N+1)/2$, and there exists connectivity among the members of M , then a majority can be attained, and each member in M attains positive power equal to $2/(N+1)$. Hence, equilibrium requires that there exists at least a minimal majority group of $(N+1)/2$ board members who maintain connectivity. Now consider board members i and j in M , where $|M| = (N+1)/2$ and members of M maintain connectivity among themselves, while no member in M has ties with members not in M . Suppose that i and j do not tie

with one another (i.e., they are connected via some other members of M). Note that forming ties between i and j will not increase nor decrease their power, as M is a minimal majority group and thus no majority can be attained without i and j , independently of whether or not they hold ties with one another. Moreover, note that, independently of whether i and j in M hold ties with one another, if i forms ties with board member l who is not in M , her/his power will eventually decrease, because such a step will lead other members in M to also form ties with l . To see this, when i and l form ties, the power of both of them increases because i may now become a pivot in new orderings that include l , while l , unlike before, may become a pivot under some orderings, as she/he is now connected with coalitional group M . However, note that after i and l tie with one another, any member in M will be similarly incentivized to tie with l , while l will be similarly incentivized to tie with any member in M . However, if all members in M now tie with l , the power of each member of M decreases from $2/(N+1)$ to $2/(N+3)$. Hence, no member in M will form ties with l . It follows that equilibrium attains when M includes $(N+1)/2$ members, where members of M maintain connectivity. Moreover, the power is equally distributed among members of M , each of whom holds power equal to $2/(N+1)$, while the power of all member not in M is null. Finally, note that any pair of BOD members in the minority group (i.e., those not in M) may either form or not form ties with one another, as these ties (or lack thereof) will have no effect on the distribution of power.¹² ■

It follows from Proposition 3 that the minimal majority coalition that is formed in equilibrium may comprise anyone of the board members, either including or excluding the CEO and/or Chairperson. This outcome follows, among others, from the assumption that the CEO's and

¹² Proposition 3 refers to the common BOD with an uneven number of board members. While the described tie structure in equilibrium also holds for an even number of board members, the distribution of power somewhat changes, though insignificantly. For brevity, the solution for the even number of board members case is omitted but available upon request.

Chairperson's role position does not *ex ante* provide them with any influence on board decisions beyond that of all other board members. While the directors in the minimal majority coalition equally share the power to influence decision-making, those excluded from the minimal majority coalition attain null power to influence board decision-making—thus once again demonstrating the impossibility of achieving an effectively participative board decision-making.

3 SUMMARY

This paper we examine a key issue in corporate finance concerning power distribution in boards and the extent of board members' influence in leading the direction and strategy of the firm and overseeing its management's operation. We adopt the game-theoretic approach à la Aumann and Myerson (1988) to delve into the tie structure, the coalition formation, and the distribution of power to influence decision-making endogenously attained among BOD members under CEO duality and CEO–Chairperson role separation. We show that under these two common governance design settings, the attained tie structure among BOD members is such that all directors are connected and thus no board member is excluded from the majority coalition. Specifically, under CEO duality, the CEO forms ties with each of the other board members, where the latter either form or do not form ties among one another. Similarly, under CEO–Chairperson role separation, the CEO and Chairperson form ties with each other, whereas all other non-CEO/Chairperson BOD members form ties with either the CEO or Chairperson (or both), but are either tied or not with one another. Furthermore, given these tie structures and the special role position of the CEO and Chairperson, we show that, under all attained equilibria, CEO duality generates an unbalanced distribution of power to affect board decision-making, including an extremely powerful CEO. Moreover, while role separation reduces the individual CEO power under CEO duality by shifting

power to the Chairperson—creating an impression of a more power-balanced board—in practice, it concentrates the power to influence decision-making in the hands of the CEO and Chairperson at the expense of even further marginalizing the power of the other non-CEO/Chairperson BOD members. Finally, we show that even under a hypothetical case in which the CEO and Chairperson have no unique role position, some BOD members have null power to influence decision-making.

All in all, our analysis demonstrates a subtle tradeoff among the BOD design elements: either (a) all BOD members participate in the majority coalition but, effectively, non-CEO/Chairperson directors bear little capacity to influence decision-making—as in the cases of CEO duality and CEO-Chairperson role separation; or (b) members of the minimal majority coalition bear equal and meaningful capacity to influence decision-making, however, other BOD members (minority group) are excluded from the decision-making circles—as in the hypothetical case in which the CEO and Chairperson have no role power. All in all, the prevailing configurations of corporate governance frameworks fail to empower all BOD members to exert meaningful influence over the board’s decision-making processes.

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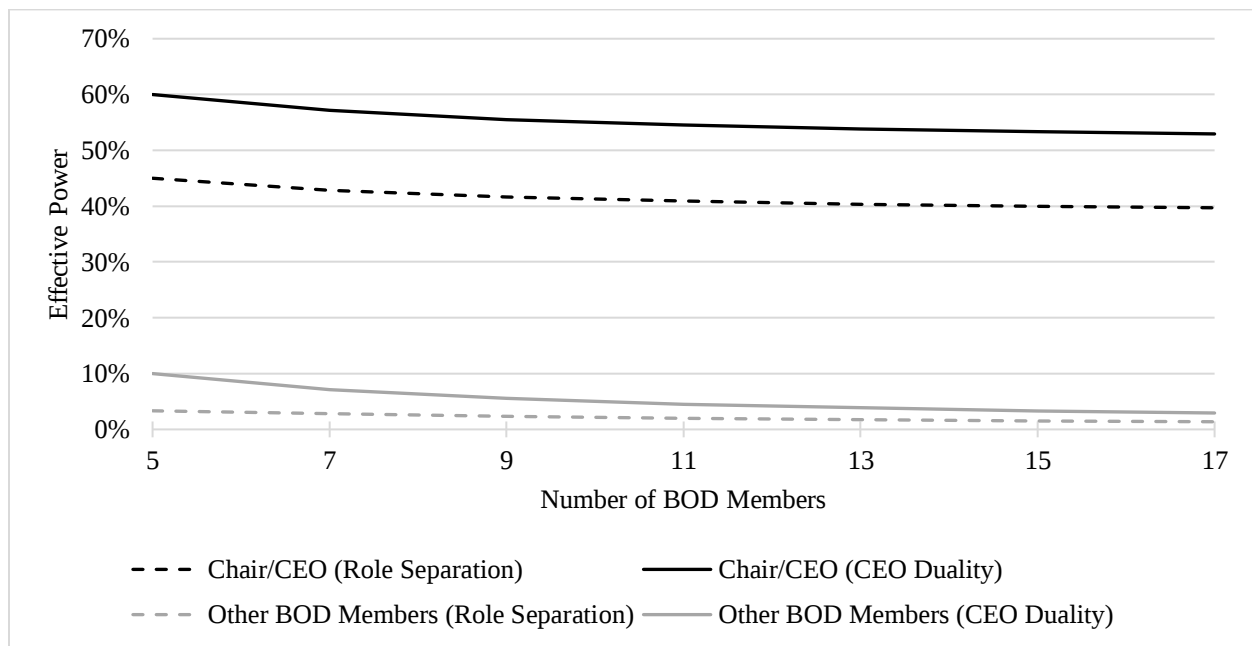
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Figure 1: Distribution of Power to Influence Decision-Making Among Members of the BOD as a Function of the Number of Board Members: CEO Duality and CEO–Chairperson Role Separation



Notes: Figure 1 presents the equilibrium distribution of power to influence BOD decision-making under CEO duality and CEO–Chairperson role separation.