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Exploring the Organizational Effects of Directors' Embeddedness in Board Networks

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by

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Abstract

In this dissertation, I explore how top executives' and directors' embeddedness in corporate elite networks within and between organizations' boards of directors influence organizational strategy and policy. In the first study, I conduct a comprehensive review of the governance literature using both a traditional narrative approach as well as a bibliometric main path analysis, which traces the development and diffusion of scholarly knowledge on corporate elite networks. In the second study, drawing from network theory and behavioral governance research, I introduce a methodology that allows researchers to model intraboard networks by measuring the strength of ties among members of boards of directors based on objective formative indicators of the constructs of social similarity, social status, social exchange, and social history. Next, I use this technique to explore the antecedents and consequences of intraorganizational network characteristics of boards. Finally, in the third study, I examine the joint influence of interlocking directorates and intraorganizational networks of boards of directors on interorganizational imitation of corporate strategic activity. Results show that directors' centrality within a focal organization's board and those of its alters are important predictors of interorganizational imitation of corporate strategic activity. I contribute to the strategic management and organization theory literatures by advancing our understanding of the relationship of corporate elite networks with organizational strategy and policy, and by introducing a new approach to modeling directors' networks in corporate governance research.

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Dedication

To my parents, family, wife, friends, and colleagues. To all those who believe in the power of scientific inquiry.

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I. Introduction

As a species, humans are intrinsically motivated to form relationships and bond with others. In the context of work organizations, relationships are believed to present individuals with opportunities for achievement, promotion, and advancement, with those who are embedded in, hold prominent positions within, and are motivated to leverage their networks reaping the greatest benefits. Network relationships are valued because they allow individuals to develop and maintain a sense of social identity. Even at the highest level of organizations, networks help access, acquire, move, distribute, and put into use existing resources, all the while helping generate new resources for production or consumption.

In this three-chapter dissertation, I build on this axiom to explore how executives' and directors' embeddeness in inter- and intraorganizational network relationships (forged within and between boards of directors) influence organizational strategy and policy decisions. In *Chapter I*, I take stock of the extant literature on corporate elite networks by conducting both a traditional narrative review and a bibliometric main path analysis. In the first part of Chapter I, I develop a framework that helps organize extant research that has utilized network theoretic concepts and methods in the context of corporate governance, specifically corporate elite networks. In so doing, I help move the field toward developing a more coherent understanding of the relationship between corporate elite networks and organizational strategy. In the second part of Chapter I, I conduct a main path analysis on bibliographic citation data to uncover the key publications and citation links that have played a bridging role in the diffusion of scholarly knowledge on corporate elite networks since the early 1980s. Moreover, this systematic review allows me to identify key research themes in research on corporate elites and the main turning points in the management field's emphasis on corporate elite networks. The analysis suggests that there has

been a gradual movement from outwardly focused networks of boards of directors, which was traditionally concentrated on interlocking directorates, to inwardly focused board networks (i.e., within-board relationships), with most recent research jointly exploring the influence of inwardly and outwardly focused network ties on organizational strategy and policy. Nevertheless, Chapter I further documents that the antecedents and consequences of directors' embeddedness within *intraorganizational* networks of boards of directors remains underdeveloped in comparison to research on *interorganizational* relationships in corporate governance. One of the most important implications of the disproportionate attention allocated to external networks of boards of directors is an incomplete understanding of the relationship between intraorganizational network relationships of directors and organizational agency problems.

To address this important issue in governance research, in *Chapter II*, I introduce a methodology to infer intraorganizational social relationships of boards of directors. I build on prior research on tie formation in social networks, behavioral governance theory, and recent theoretical work in corporate governance research, to develop a composite measure of dyadic tie strength in boards of directors using objective formative indicators of the following latent constructs: social similarity, social influence, social exchange, and social history. Next, based on functional and sociological perspectives in corporate governance, I develop a theoretical framework that outlines the antecedents and consequences of structural equivalence and cohesion within intraorganizational networks of boards of directors. Conceptualizing the board as an information processing unit that help mitigate agency problems and advise on organizational strategy decisions, I explore the relationships among the organizational environment, organizational characteristics, and intraorganizational network characteristics that are associated with 'social contagion' and 'diffusion of information', and finally, organizational

outcomes that have been linked to agency problems. Specifically, I test a) the relationship between environmental uncertainty and structural equivalence on the board, b) firm centrality and structural cohesion on the board, and c) the relationship of equivalence and cohesion with CEO compensation, firm diversification, and strategic risk-taking. The results suggest that structural equivalence on the board curtails agency problems via lower levels of total and unrelated diversification, while cohesion exacerbates agency problems by reducing the level of strategic risk-taking. The results also show that organizations that are central in their interlocking directorate networks have more cohesive intraorganizational board networks, providing some support for the intraclass perspective on corporate elite networks.

To further document the utility of the inferred intraorganizational networks of boards of directors, in *Chapter III*, I explore the joint influence of directors' embeddedness within and between board networks on organizational strategy. Past research on interorganizational imitation and diffusion has shown evidence that when confronted with competitive uncertainty, organizations adopt decisions of other organizations (alters) in their networks. Based on recent theoretical and empirical work in corporate governance research, which has begun to explore the circumstances under which interlocked directors' experiences in other organizations more strongly influence organizational outcomes, I examine how corporate expansion decisions of interlocked organizations influence a focal organization's subsequent expansion decisions, specifically its corporate acquisition activity. Conceptualizing directors' preferential access to and control over knowledge flows within boards of directors in network terminology (i.e., structural embededdness), I explore how director centrality within the focal organization's intraboard network and that of its alters influence the extent to which alters' prior acquisition activity influences the focal organization's subsequent acquisition activity. Furthermore, I

empirically test whether interoganizational imitation of corporate acquisition activity is contingent on the strength of ties among directors both on the focal organization's board and on its alters' boards. The results suggest that while centrality is an important predictor of the extent to which directors can enable interorganizational imitation of corporate acquisition activity, tie strength does not have an observed statistically significant effect on interorganizational imitation.

Taken together, *Chapters I, II,* and *III* contribute to research on corporate elite networks, in particular, and corporate governance research, in general, by developing a more nuanced and coherent understanding of the antecedents, consequences, and contingencies of directors' embeddedness in networks. Chapter I presents one of the few known examples of main path analysis conducted in the management literature. Chapter II introduces an important methodological approach that helps overcome one of the important limitations of corporate governance research—which is the lack of access to primary data on intraorganizational board network relationships—by inferring social relationships among directors based on objective formative indicators. Chapter III provides a test of the notion that directors' access to and control over knowledge-based flows within and between boards of directors is an important determinant of the extent to which interorganizational mimicry of corporate strategic activity occurs.

Throughout the dissertation, I discuss the implications of my findings for corporate governance theory as well as offer new directions for researchers and practitioners, who are interested in managerial conduct and the social context within which it is embedded.

II. Chapter I: The Application of Network Theoretic Concepts and Analytic Methods in Research on Corporate Elites: A Narrative and Main Path Analytic Review

A. Abstract

Understanding the social structure of directors' networks has long been of interest to scholars in management theory. A set of network attributes and social processes has been shown to influence organizational actions. The purpose of this paper is to review research that has utilized network theoretic concepts and methods in the context of executives and board of directors. In doing so, I lay the groundwork for a more coherent theoretical perspective on corporate elite networks, while identifying important theoretical and empirical advances and providing new directions for future research. In a narrative review, I outline changes in the field's emphasis on various issues pertaining to social relationships among members of the corporate elite. I supplement my narrative review with a main path analysis of the literature, a social network analytic technique applied to bibliographical citation data, with the intention of exploring the main paths of knowledge codification and knowledge diffusion at the intersection of network theory and the literature on corporate elites.

B. Introduction

Network theory has become an important theoretical and empirical paradigm in organizational research in recent decades (Borgatti & Foster, 2003). Widespread use of network theoretic concepts and methods in management research has helped develop a vast literature on interorganizational relationships that encompasses a broad range of social, financial, and political ties among organizations (Galaskiewicz, 1985). At the epicenter of this literature is the economic conduct of business organizations embedded in social institutions (Granovetter, 1985). In a dynamic nexus of multilevel and multilayered relationships, individual organizations continually form, dissolve, and reconstitute ties with other organizations (Kenis & Knoke, 2002; Mizruchi & Galaskiewicz, 1993). Interorganizational relationships developed through institutional affiliations of members of the corporate elite (Pettigrew, 1992) are among the most prominent network ties that have been studied to-date (Davis & Greve, 1997; Haunschild & Beckman, 1998; Mizruchi, 1996)[1]. This prolonged interest is not surprising given the central role of corporate directors and executives in shaping organizational policy and strategy (Pettigrew, 1992).

Extant research on corporate executives and directors has provided important insights into our understanding of functions of institutional agents in corporate governance (Johnson, Daily, & Ellstrand, 1996). While director networks have been of interest to research in sociology (Mizruchi, 1996) and in organizational theory (Haunschild, 1993; Davis, 1996) throughout the 1990s, it is with the rise of the concept of board capital — specifically social capital — in the

[1] The term corporate elite (or managerial elite) is used as an umbrella term that encompasses executives and directors in a social network. This use of this term also helps maintain consistency with prior research. By using this term, I do not mean to glorify or otherwise praise these social actors — an issue that has been discussed in strategic leadership research (see Hambrick, 2007).

early 2000s (Hillman & Dalziel, 2003) that more mainstream corporate governance research began to emphasize directors' relationships. Meanwhile, an independent stream of research grounded in behavioral governance theory has begun to explore the socio-psychological mechanisms that operate within the corporate elite's internal and external networks (Westphal & Zajac, 2013). From a theoretical standpoint, research in both of these domains remains fragmented and disconnected, as social network theory concepts have continued to be used in a piece-meal fashion across these domains, with scholars mostly focusing on the instrumental aspects of corporate actors' social capital. Moreover, the board capital and behavioral governance theory literatures have grown along separate lines, which constitutes an important problem in governance research. Governance research explores a complex organizational phenomenon — stakeholders' insurance of return on their investments (Shleifer & Vishny, 1997) — and theoretical silos that rarely engage in cross fertilization make it difficult to make accurate inferences about the effectiveness of governance mechanisms. Motivated by this important contradiction, the purpose of this paper is to provide a comprehensive analysis of research on corporate elite networks, and in doing so, lay the groundwork for a more coherent theoretical perspective on this topic and provide new directions for future research.

In a narrative review of the literature, I first explore how the field's emphasis on various issues pertaining to social relationships within corporate elite networks has developed over time. Next, I conduct a main path analysis to identify patterns of knowledge transfer among researchers that have utilized network theoretic concepts and methodologies in the context of corporate elite relationships. Main path analysis is the application of social network analytic methods to bibliographical citation data with the purpose of visualizing the key paths and patterns of knowledge codification and diffusion in a given research field (Liu & Lu, 2012). I use

main path analysis to retrospectively construct the paths that detail the evolution of the network theory and corporate elite literatures.

In the first part of the paper, I outline the methodology that I use in my narrative review for constructing the sample of studies that focus on network theory in the context of corporate elites. In this section, I review the types of network ties and processes that have been explored to-date and the network theory concepts that have been most frequently examined, while discussing the major implications of this line of research for our understanding of corporate elites. I begin the second part of the paper with a discussion of the main path analytic technique and briefly explain how it has been used in scholarly research to-date. I conclude with a discussion of the contributions to the management field derived from using a sociometry-based methodological approach to analyzing bibliographical citation data.

C. A Narrative Review of the Literature on Corporate Elite Networks

The purpose of this review is to assess the use of network theoretic concepts in the context of corporate elite networks. To accomplish this, I focus on exemplary empirical work that has been published in the six most prestigious journals in the field of management: *Academy of Management Journal, Administrative Science Quarterly, Journal of Management, Journal of Management Studies, Organization Science,* and *Strategic Management Journal* since 1992. I selected Pettigrew's (1992) review article as my starting point, given the importance of this article in setting up an agenda for the study of corporate elites in management research. It is evident that research on corporate elite networks began to flourish in the early 1990s. While my focus is on empirical research published in this domain, where applicable, I also include articles that have been published elsewhere (e.g., Academy of Management Review) based on my

knowledge of the field to better capture the significance of research on social networks in the context of corporate elites.

First, I conducted a search on EBSCO using the following keyword combination: [interlock*, "social capital", network*, connect*, "ties", affili*] in the abstract field, and ["board of directors", CEO, "chief executive"] anywhere in the text of an article. This resulted in 298 studies. Second, I conducted a search using the following keyword combination: [director*, "board of directors", "CEO"] with [social capital] in article titles. This search retrieved 6 additional articles. Finally, I used the following keyword combination: ["corporate elite", "power elite", "business elite", "organizational elite"] in the abstract/title of an article, finding a total of 17 articles.

I carefully examined the abstracts of these articles and excluded studies that were irrelevant to my research question— *how has the management field's emphasis on social relationships within corporate elite networks developed over time*? After deleting duplicate results, book reviews, and other unrelated search results, my final sample of empirical studies that reflect *the application of network theoretic concepts in the context of corporate elites* consisted of 137 articles that have been published in one of the top-six management journals in the period between 1992 and 2016. The search parameters used in this paper are provided in Appendix A.

Content of Relationships in Corporate Elite Networks

The literature on corporate elites is impressive in volume, such that multiple research streams have contributed to governance scholars' understanding of theoretically and practically interesting relational phenomena observed within and between organizations (Pettigrew, 1992). This diversity is also reflected in the types of network ties that have been examined in prior

research utilizing network theoretic concepts. At the level of interpersonal relationships, prior network studies have typically treated expressive and instrumental ties as separate forms of social relationships (Fombrun, 1982; Ibarra, 1993; Umphress, Labianca, Brass, Kass, & Scholten, 2003). Instrumental ties tend to be developed on the basis of resource exchanges, as in the case of advice relationships (Ibarra, 1993); whereas expressive ties are developed based on some form of interpersonal affect, as in the case of friendship ties (Krackhardt, 1992). The same categorization can be applied to network studies in corporate elite research that focuses on relationships of members of boards of directors and corporate executives. Some researchers have focused on interpersonal social relationships among directors, executives, and their personal contacts in the form of friendship ties (e.g., Batjargal & Liu, 2004; Bell & Zaheer, 2007; Luo & Chi-Nien, 2005; McDonald, Khanna, & Westphal, 2008; McDonald & Westphal, 2003, 2010; 2011; Park & Westphal, 2013; Shani & Westphal, 2016; Westphal & Bednar, 2005; Westphal, Boivie, & Chng, 2006; Westphal & Shani, 2016; Westphal & Stern, 2006). Other researchers have paid attention to instrumental, primarily task-oriented relationships, such as joint membership on boards of directors with other members of the board (e.g., Haunschild & Beckman, 1998; Kang, 2008; Shipilov, Greve, & Rowley, 2010), or directors and executives' other business-related and/or political ties (e.g., Acquaah, 2012; Chizema, Liu, Lu, & Gao, 2015; Gargiulo, 1993; Lester, Hillman, Zardkoohi, & Cannella Jr., 2008; Li & Atuahene-Gima, 2001; Li, Poppo, & Zhou, 2008; Li & Liang, 2015; Siegel, 2007; Wang & Qian, 2011; Zhu & Chung, 2014).

Among instrumental ties, interlocking directorates, which occur among two organizations when a director sits on both boards (Mizruchi, 1996), are arguably the most commonly examined relationships in management research. Intercorporate ties established through director

appointments entail not only director-to-director, but also organization-to-organization relationships. As such, board interlocks have been examined as both an interorganizational and an intraclass phenomenon (Ornstein, 1984; Palmer, 1983; Richardson, 1987). As Palmer (1983) explains, the intraclass perspective diverges from the interorganizational approach by conceptualizing directors as a distinctive social class who enact their economic interests via relationships that constitute a nexus of organizations.

A range of empirical relationships involving board interlocks and other major corporate governance mechanisms, practices, and policies have been examined, including but not limited to: the market for corporate control and takeovers (Davis & Stout, 1992), firms changing affiliations with stock exchanges (Rao, Davis, & Ward, 2000), executive compensation (Westphal, Seidel, & Stewart, 2001), executive (Williamson & Cable, 2003) and director appointments (Hillman, Shropshire, & Cannella, 2007; Hillman, Shropshire, Certo, Dalton, & Dalton, 2011), investor reactions to new CEO appointments (Tian, Haleblian, & Rajagopalan, 2011), structural changes such as the establishment of investor relations departments at firms (Rao & Sivakumar, 1999), the adoption of governance reforms (Shipilov, Greve, & Rowley, 2010b), and the establishment of compensation committees responsible for determining CEO compensation (Markóczy, Li Sun, Peng, Shi, & Ren, 2013). With respect to organizational strategy and outcomes, research to-date has focused on the relationship between board interlocks and acquisitions (Beckman & Haunschild, 2002; Haunschild, 1993, 1994; Haunschild & Beckman, 1998; Palmer & Barber, 2001; Westphal et al., 2001), joint ventures (Gulati & Westphal, 1999), international expansion (Connelly, Johnson, Tihanyi, & Ellstrand, 2011; Tuschke, Sanders, & Hernandez, 2014), resource allocations to organizational functions (i.e.,

business strategy) (Westphal et al., 2001), change in resource allocation patterns (Haynes & Hillman, 2010), and finally, organizational performance (Kor & Sundaramurthy, 2009).

One of the main themes in this literature is that interlocking directorates are conduits for knowledge transfer among organizations (Howard, Withers, & Tihanyi, 2016) and an organization's embeddedness in these networks increases the likelihood that it will model itself after tied-to organizations in its network (Haunschild, 1993). Novel strategies are often deemed risky. The adoption of novel practices and strategies by tied-to organizations in the network sends the focal organization a legitimizing signal under uncertainty (Haunschild & Beckman, 1998). Research also suggests that organizations become increasingly more receptive to experience-based knowledge that directors with other board memberships bring to the focal firm when the director or tied-to organization (i.e., interlocked organization) is of higher status (Shropshire, 2010). This contention is corroborated by findings that organizations with interlock ties to other organizations, closer to the core of the interlocking directorate network, are more likely to adopt diffusing strategies (Connelly et al., 2011).

In contrast, behavioral governance research that focuses on close interpersonal relationships and mechanisms in the context of corporate elite networks has explored the influence of expressive ties on a variety of subjects, including positive interpersonal outcomes such as CEOs' advice seeking (McDonald & Westphal, 2003) and their provision of social support to fellow CEOs (McDonald & Westphal, 2011), as well as venture capitalists' investments in entrepreneurial firms (Batjargal & Liu, 2004), biases in group decision-making, such as 'pluralistic ignorance' (Westphal & Bednar, 2005), business group performance (Luo & Chi-Nien, 2005), and other interpersonal processes associated with directors/executives, including the use of social influence tactics (Westphal & Stern, 2006), and social identification

with the corporate elite (McDonald & Westphal, 2010; McDonald & Westphal, 2011; Shani & Westphal, 2016). Recent research in this domain has also began to explore more negative forms of interpersonal contact such as social distancing from the corporate elite (Shani & Westphal, 2016; Westphal & Khanna, 2003), and discrimination of corporate elite members and journalists (Park & Westphal, 2013).

One of the distinguishing characteristics of behavioral governance research is that it largely departs from the classic governance theory's conception of relationships among corporate elite members, which suggests that strong, intrafirm, interpersonal ties among executives and directors create opportunities for collusion, induce conflicts of interest, and thus could be detrimental to firms. For instance, Daily and Dalton (1994) show that firms that appoint a greater number of affiliated directors to their boards suffer from agency problems, evidenced by an increased likelihood of these firms filing for bankruptcy. Similarly, firms that appoint a greater number of affiliated directors are more likely to adopt controversial governance practices, such as classified board provisions (Sundaramurthy, Rechner, & Wang, 1996), and thus become targets of shareholder discontent in the form of withholding votes during director selection (Hillman et al., 2011). Drawing from the social psychology literature, behavioral governance research challenges this contention, suggesting that interpersonal ties, or directors' social capital, could be beneficial to firm conduct.

Prior research has provided evidence of the positive effect of social capital, in the form of external advice networks of executives, on acquisition of competitive capabilities (McEvily & Marcus, 2005). Similarly, strong intrafirm ties of top managers have been shown to have a positive relationship with firm performance (Collins & Clark, 2003). Furthermore, Gulati and Westphal (1999) have shown that cooperative ties (e.g., advice seeking) among CEOs and

interlocking board members enhance the likelihood of tie formation among firms in the form of joint ventures between the focal and interlocked firms. Nevertheless, it should be noted that the idea that strong interpersonal ties have a positive influence on firm effectiveness has not been uniformly supported in behavioral governance research. On the one hand, demographic homogeneity among directors on a focal board reduces the likelihood that group polarization, a decision-making bias that can result in erroneous strategic choices, will occur (Zhu, 2013). Similarly, dense friendship ties among directors may counter pluralistic ignorance, a decision-making bias that can also result in erroneous strategic choices and poor firm performance (Westphal & Bednar, 2005). On the other hand, McDonald and Westphal (2003) have shown that executives seek advice from their strongly connected alters when confronted with poor performance, which reduces the likelihood of implementing effective strategic changes and enhancing firm performance.

The mixed results presented above may, to some extent, be attributable to methodological differences with respect to operationalizations of social capital in the context of boards of directors and strategic leadership of firms, as both survey-based and archival measures of demographic indicators have been used in the construction of network ties. Internal social capital or interpersonal ties among members of a focal board have typically been captured by using organizational tenure such as average tenure on the board (Kor & Sundaramurthy, 2009), co-working experience (Tian et al., 2011), and overlap in tenure among directors on a focal board (Sauerwald, Zhiang, & Peng, 2016) (see Johnson, Schnatterly, & Hill, 2013 for a comprehensive review of operationalizations of internal and external social capital). Beyond these methodological differences, however, exploring contingencies surrounding the relationship between intraorganizational ties of corporate elite members with organizational level outcomes

remains a fruitful research area. For instance, does strong governance design mitigate the presumed negative effects of high internal social capital, while exacerbating the proposed positive effects? Furthermore, while the relationships that imply positive affect (e.g., friendship) have been studied to a certain degree, we know relatively little of the antecedents and consequences of negative interpersonal relationships among executives and directors (Westphal & Zajac, 2013) and how these relationships coexist in a network with positive relationships. The field's understanding of the role of power, dependency, and affect-based interpersonal relationships at the apex of organizations can be significantly enhanced by simultaneously focusing on the positive and negative relationships in corporate elite networks.

Social Processes in Corporate Elite Networks

Research on corporate elite networks is highly eclectic in terms of its focus on the social processes underlying network dynamics. While majority of this research has focused on the effects of tie presence (e.g., maintenance of existing relationships) on important board and organizational level phenomena, there has been a growing emphasis on outlining other network processes such as formation and dissolution of ties and the socio-psychological mechanisms that create change in networks (see Westphal & Zajac, 2013 for a review). Research on board interlocks, with its emphasis on board appointments, constitutes the key research stream that concentrates on network tie formation and dissolution. Zajac and Westphal (1996) have shown that board appointments are a function of power contests among directors, such that boards with strong governance practices tend to appoint directors that are associated with other strong boards, while boards with weak governance tend to appoint directors that are associated with weak boards. The authors suggest that this mechanism of homophilic reproduction (i.e., dense local clusters of ties among actors with similar attributes— see McPherson, Smith-Lovin, & Cook,

[2001] for a review of the homophily literature) has contributed to a fragmented interlock network over time wherein powerful boards have developed few interlocking directorate relationships to boards with powerful CEOs and vice versa. These results are also consistent with the literature on interpersonal influence and board appointments.

As reviewed above, the use of interpersonal influence tactics, such as ingratiation and opinion conformity, is positively related to top management team members gaining board seats at firms to which their CEO is directly or indirectly connected (Westphal & Stern, 2006). Hillman, Cannella, and Harris (2002) have also documented the importance of demographic characteristics to tie formation. Specifically, the authors found that, while minority and majority directors do not differ in the number of board seats they hold, minority directors tend to advance more quickly from their second to third board appointments in comparison to majority directors. The authors discuss that the effect may be attributed to minority directors' motivation to solidify their position in the intercorporate network by gaining more central positions. In the context of entrepreneurial CEOs, Vissa (2011) found that (entrepreneurial) CEOs tend to form ties with new contacts based on dyadic social similarity and task complementarity. The results also show that social similarity is less predictive of tie formation at lower levels of task complementarity, demonstrating that expressive ties may be less important as a selection criterion when instrumental ties are weak. These findings are also consistent with research evidence concerning politically connected boards, such that both breadth and depth of human and social capital of politically connected directors increase their likelihood of being appointed to other boards (Lester et al. 2008). Finally, moving beyond corporate interlocks, Westphal, Boivie, and Chng (2006) found that dissolved friendship ties among CEOs are more likely to be reconstituted when the tied-to firm is a financial institution, or involved in a resource exchange relationship with the

focal firm, or the focal firm is challenged by high levels of competitive uncertainty. Westphal and colleagues' study remains one of the few studies that theorize about how instrumental and interpersonal ties collectively determine organizational outcomes — an area of governance research that is in need of significant development in the future.

I present Table 1 as a general framework for organizing research in corporate elite networks and as a guide to help identify areas that need further development. The rows represent the form of relationships that can be examined. Expressive network ties could develop based on positive and negative interpersonal affect. External instrumental ties at the director level are largely composed of interlocking directorates, and internal instrumental ties involve task- or hierarchy-based relationships within boards of directors (e.g., interlocking board committee ties). The columns show four sequential processes in network dynamics: tie formation, presence (or maintenance), dissolution, and reconstitution. Each cell demonstrates a representative research topic that has already been or can be studied using a network theoretical lens in the context of corporate elite networks. It should be noted that the table is presented for illustrative purposes and is not meant to represent a comprehensive list of concepts and relationships that can be studied, yet it constitutes an important step toward developing a more organized research paradigm in this area.

In the following section, I review the network concepts that have been explored in corporate governance research. It will become clear that prior research has been mainly focused on the 'tie presence' column both in expressive and instrumental networks within corporate elite circles.

Network Concepts used in Research on Corporate Elite Networks

The concept of board capital has received important attention in management research in recent years. Board capital encompasses both human and social capital of directors (Hillman & Dalziel, 2003). Human capital broadly refers to directors' expertise and skills, whereas social capital relates to directors' resources embedded in social relationships (Nahapiet & Ghoshal, 1998). Following social capital theory (Adler & Kwon, 2002), the literature on board capital suggests that directors who hold favorable positions in intercorporate networks are better positioned to access important network resources. As a testament to this contention, financial institutions such as banks, due to their criticality to firms' capital structures, were once among the most interlocked firms (Gerlach, 1992; Mariolis & Jones, 1982). As firm's dependence on banks for capital has reduced, banks' centrality in networks has also decreased significantly (Davis & Mizruchi, 1999), suggesting that directors from financial institutions are no longer uniformly regarded as resource-rich directors.

Researchers' understanding of corporate governance actors' 'importance', 'prominence', or 'connectivity' is analogous to network centrality (Freeman, 1978) in many ways; however, the measurement of centrality has typically been constrained to degree centrality, which is the total number of interlocking directorate ties of boards, the average of directors with multiple board memberships, etc. The measurement approach to centrality has not been consistent in the sense that some researchers do not account for duplicate ties (e.g., two focal members serving on the same board) and account only for insiders' ties (e.g., Haunschild, 1993), while others have included all directors on the board (Westphal et al., 2001). Palmer and Barber (2001)

distinguished between received and sent interlocks,[2] denoting in-degree (total number of ties received) and out-degree (total number of ties sent) centrality in network terminology. The authors found evidence that ties sent increases a firm's propensity to pursue acquisitions; whereas ties received reduces this tendency.

In one of the more elaborate treatments of network centrality, Geletkanycz, Boyd, and Finkelstein (2001) measured centrality in terms of degree, betweenness, and closeness centrality. In Freeman's (1978) terms degree, betweenness, and closeness centrality refer to a) an actor's total number of connections, b) the number of times the actor is positioned on the shortest paths that connect other actors to each other, and c) the actor's distance to all other actors in the network, respectively. The results of the study showed that CEOs' external networks are valuable resources for firms, thus CEOs with greater centrality in their networks are more generously compensated. The positive effect of centrality on compensation is stronger when the firm is diversified, that is, it is relatively more complex to manage. Eigenvector centrality has been used in the context of organizational adoption of network partners' strategies. A greater eigenvector centrality score distinguishes firms that are closer to the core of the network from peripheral firms (Connelly et al., 2011). Given the heterogeneity in definitions and operationalizations of centrality and types of relationships (e.g., direct, indirect, directional, reciprocal, non-directional, etc.) developing a typology of board interlocks remains a task to be addressed in future governance research.

[2] In Palmer and Barber's (2001) terminology, a sent interlock is a network relationship that is constructed when the focal organization's executive serves as an outsider on another organization's board. In contrast, a received interlock refers to the appointment of executives of other organizations on a focal organization's board.

While the influence of director's prominence in interorganizational networks on organizational strategy and performance is important in and of itself, it is also important to understand who occupies prominent positions in corporate elite networks. In a study of board interlocks, Sullivan, Haunschild, and Page (2007) showed that firms' interlocking networks change dramatically when they engage in unethical practices. The most significant of these changes is the decline in the prominence of network partners, as measured by Bonacich eigenvector centrality, and in network cohesion, as indicated by an indirect structural constraint measure. Organizations that experience network change following engagement in unethical practices are left with ties to "less prestigious actors", access to "less reliable information", "less trust in the network", and "weaker norms enforcement" (Sullivan et al., 2007: 67). Much work remains to be done in this area.

Another important concept that has been examined in prior research is network cohesion. Cohesion is generally viewed as a characteristic of relationships (rather than actors) and may refer to strength of ties (see Granovetter, [1973] for a discussion of strong vs. weak ties) or structural characteristics of networks such as connectivity or density. With respect to tie strength, Rao et al. (2000) showed that strong interlock ties to adopters (or non-adopters) have an influence on the social mobility of organizations (i.e., leaving one stock exchange to join another). In a study of the consequences of top management teams and knowledge workers in organizations, Smith, Collins, and Clark (2005) demonstrated that both network size and strength of ties among top management team members and their intrafirm contacts are positively related to firms' knowledge creation capabilities. The strength of ties among top managers; however, was not related to firm performance (Collins & Clark, 2003).

Network cohesion can also influence the behavior of firms as evidenced by the corporate philanthropic contributions of interlocked firms. Tilcsik and Marquis (2013) showed that corporate spending on philanthropy is positively affected by the occurrence of natural events in local communities and that this effect is positively moderated by cohesion of intercorporate ties, which signals enhanced pressure on firms toward conformity with institutional norms and societal expectations. Research that focuses on business groups has demonstrated that network density influences firms' competitive behaviors. For instance, Ayyagari, Dau, and Spencer (2015) found that in Indian business groups, despite a positive effect of density on corporate expansion, organizations that are involved in dense (i.e., more cohesive) interlocking directorates are less likely to announce corporate expansion plans as a response to multinational enterprises' foreign direct investment announcements that target their industries.

Interestingly, my review revealed that network theory concepts frequently appear in research on entrepreneurial executives. For instance, Stam and Elfring (2008) explored the positive effect of network centrality (closeness centrality) and bridging ties on organizations' entrepreneurial orientation. Vissa and Chacar (2009) showed that entrepreneurial teams' command of structural holes (measured as network constraint) is positively related to venture performance. Fang, Chi, Chen, and Baron (2015) investigated the influence of entrepreneurs' political skills on the formation of their personal networks. The findings of the study suggest that politically skilled entrepreneurial executives tend to have more extensive networks that have a stable core and a dynamic extended component. Furthermore, these entrepreneurs are more capable of facilitating prominent social ties and strong network connections in their personal networks, subsequently improving the performance of their ventures. Despite the common interest in strategic leadership and networks, however, entrepreneurship and governance research

have had little interaction to-date, an area that is open to significant development moving forward.

I report the results of a more systematic review of this literature in the following section. Specifically, I conduct a network analysis of bibliographic citation data of the corporate elite networks literature in order to supplement my narrative review, which focused on relationships between concepts, ideas, and theories. The main path analytic approach allows me to focus on relationships among scholarly publications. As has been noted in prior research, a main path analysis helps document "thematic or methodological transitions" in the gradual progression of a scientific inquiry in a field of interest (Lucio-Arias & Leydesdorff, 2008: 23). I use this technique to outline the main paths through which knowledge on corporate elite networks has developed and identify the citation links that play bridging roles in the diffusion of scholarly knowledge. The results of this analysis will identify key publications in the area of corporate elite networks.

D. A Main Path Analytic Review of the Corporate Elite Networks Literature

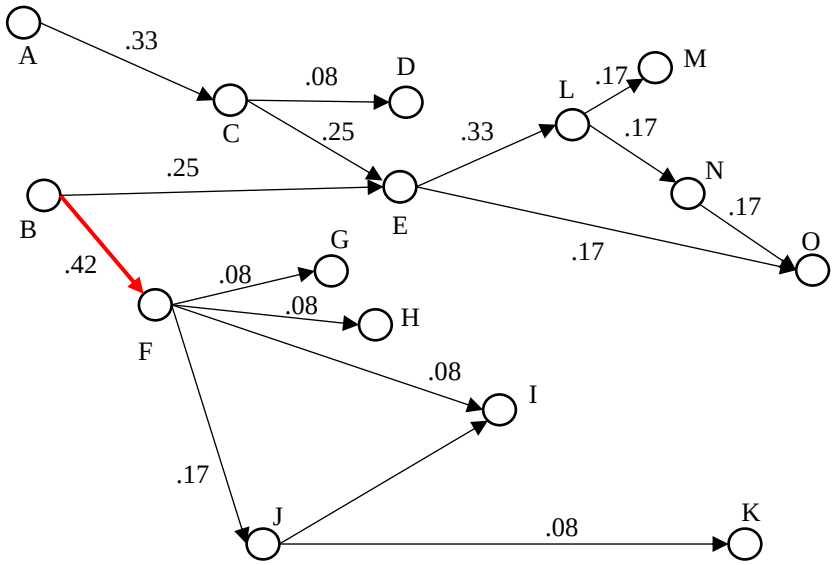
The main path analytic approach allows researchers to identify the paths through which knowledge has diffused in a field, especially when the field is characterized by a large body of research (Hummon & Doreian, 1989; Liu & Lu, 2012). Main path analysis concentrates on networks of publications, where publications are nodes and arcs (unidirectional ties) are citation links between publications. Despite its popularity in sociometry, the technique has not been utilized in the management literature except for Lu and Liu's (2013) study of the resource-based view. The authors analyzed a total of 2105 publications in the period between 1984 and 2010 and showed how research in the resource-based view tradition has evolved over time by identifying

the most influential publications, authors, and journals that have contributed to the development of this area.

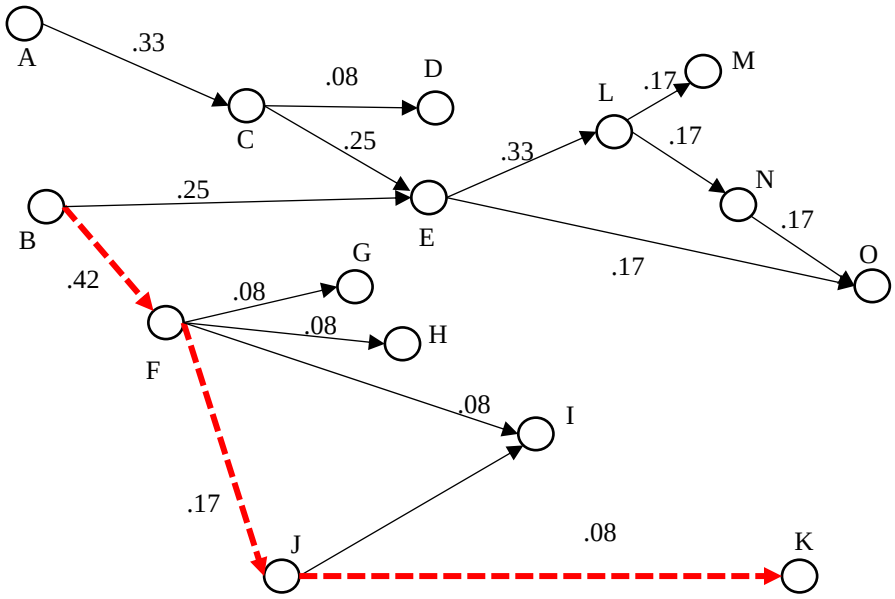
In the logic of main path analysis, scholarly knowledge flows from prior publications to subsequent ones in a historical progressive order (i.e., acyclic network) (Johnson, Ellstrand, & Kepes, 2006). Put a different way, the role of subsequent work in a field is to codify and build on knowledge developed in predecessor studies (Lucio-Arias & Leydesdorff, 2008). A source publication is one that precedes all other publications in a citation network, thus it does not cite any other publication in the network (i.e., no outgoing arcs). A sink article, on the contrary, is one that succeeds all other publications in a citation, thus it is not cited by any other publication in the network (i.e., no incoming arcs) (Nooy, Mrvar, & Batagelj, 2011). In the process of identifying the main path of a research domain, each link (citation) is assigned a weight based on a traversal count, which reflects the *bridging role* played by a particular publication in the citation network connecting source and sink articles (Nooy et al., 2011). Prior research has introduced three primary ways of calculating traversal counts, namely search path link count (SPLC), search path node pair (SPNP), and node-pair projection count (NPPC) (Batagelj & Mrvar, 1998; Hummon & Doreian, 1989). There are computational differences among these approaches; however, a fourth approach, search path count (SPC), has been recommended and commonly utilized in prior research (Batagelj & Mrvar, 1998; Liu & Lu, 2012; Nooy, Mrvar, & Batagelj, 2011). Using the SPC approach, a traversal weight is calculated by counting the number of citation paths that cross through a particular publication and dividing that number by the total number of possible paths between the source and sink articles in the network.

Following Liu and Lu's (2012) work, below I present an example of a citation network with two source nodes (A, B) and seven sink nodes (D, G, H, I, K, M, O) to help explain this

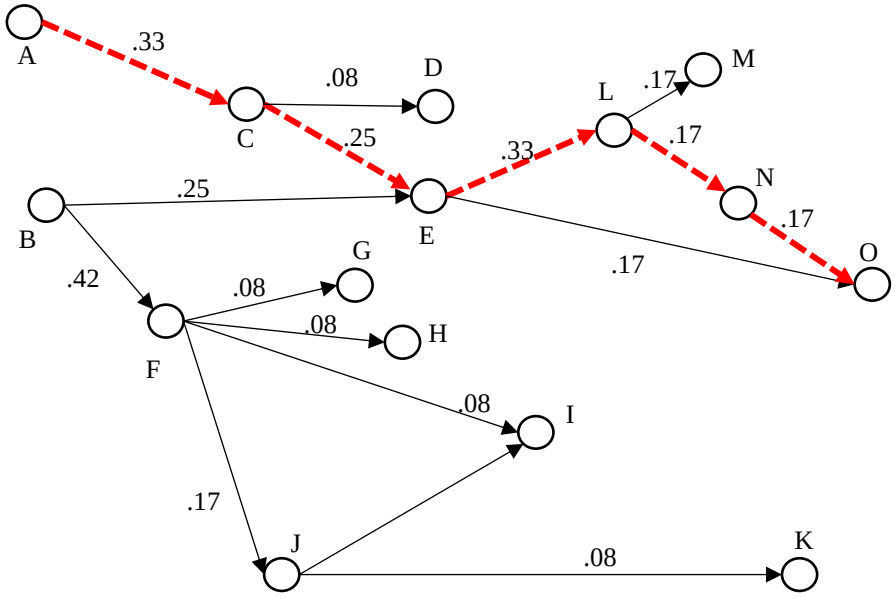
technique. The line values denote traversal weights; for instance, the arc from B to F is calculated by dividing the number of paths ($p_{BF} = 5$) that cross through the BF link by the total number of paths linking sources to sinks in the network ($P_{BF} = 12$). The distribution of traversal weights in the figure below also indicates that the BF link is the most influential bridge linking sources and sinks in the citation network.



The next step in the analysis is determining the main path of the network. There are three approaches to identifying the main path: local, global, and key-route (Liu & Lu, 2012). With the local approach the procedure is to select the arc with the highest traversal weight at every step of the main path search. In the figure below, the main path based on the local approach is depicted in red:



Alternatively, as shown below in red, the main path based on the global approach is the path with the largest sum of all traversal weights linking source to sink.



Finally, in the key-route approach the procedure begins with the selection of the arc with the largest traversal weight, and then from the end node of the arc, we search forward either by using a global or local approach, and then repeat the search, this time beginning from the start node of the arc going backward. Since in the figure above the arc with the highest traversal

weight stems from a source node (B), the procedure cannot go backward and will overlap with the local path. However, in a larger citation network the local, global, or key-route paths may or may not overlap. Researchers (Liu & Lu, 2012) recommend that all three approaches are used and the results interpreted separately to uncover different paths through which knowledge may have diffused. In my analysis, I focus on the global main path, and address major differences between this approach and results obtained by using a local approach in the discussion section.

Sample Construction and Data Analysis Strategy

In my analysis of directors' intra- and interorganizational networks, following prior research, I collected citation data using the Web of Science database. Data include comprehensive information on authors, publication sources, cited references, etc. The parameters I used in my data collection process are provided in Appendix A. I used the following Boolean search algorithm using samples from two different lists: a) actors (e.g., CEO, executive, top management team, etc.) and b) relationships (identification, interlock, social relationship, etc.). I constrained my literature search to the management field category as identified in the Web of Science database. The initial search resulted in a total of 870 articles. After a screening process, I eliminated 333 articles that were not associated with the topic of interest (e.g., "top management" and "nomological network"). The remaining 537 studies were included in the final analysis. It should be noted that the relatedness criterion that I used to include studies into my final analysis was relatively more relaxed in comparison to the one used in my narrative analysis. I maintained a broad evaluation criterion to construct a sufficiently large network of publications and explore patterns of relationships among influential papers that span different theoretical and phenomenological territories. To organize, analyze, and visualize the data, I used HistCite (Garfield, 2009), CitNetExplorer (Van Eck & Waltman, 2014), VOSviewer (Van Eck &

Waltman, 2010), Pajek (Batagelj & Mrvar, 1998), and NetDraw (under UCINET) software (Borgatti, 2002; Borgatti, Everett, Freeman, 2002). Below, I discuss the main findings of the main path analysis. I begin with a discussion of the global main path.

Interpretation of Results

As depicted in Figure 1, the global main path, calculated based on the SPC algorithm, shows the path with the largest sum of all traversal weights linking source to sink publications. The Burt (1980) → Palmer (1983) link, as evidenced by a traversal weight of .72, appears to be an important path in the codification of knowledge in the corporate elite networks literature. Burt's (1980) influential article marked an important step in the exploration of such network concepts as range and multiplexity and in the conception of interlocks as mechanisms of interorganizational cooptation that help manage environmental constraints and irregularities. Palmer's (1983) investigation of board interlocks has highlighted, in addition to the interorganizational cooptation approach, an alternative conception of interlocking directorates that views interlocks as a manifestation of intraclass cohesion. According to this view, directors, as a social class, form interpersonal relationships with one another to enact their economic objectives. The author examined whether multiplexity (i.e., multiple interlocks) and tie strength (i.e., directional ties vs. non-directional ties) are important determinants of broken interlock ties being reconstituted. Among others, one of the interesting results of the study is the rate at which broken ties were reconstituted. With a 15% reconstitution rate among 'accidentally broken' board ties (this rate is 8.9% among firms with only one interlocking directorate relationship), the results of the study do not offer strong support for the idea of interlocks being used for the purpose of cooptation. Following Palmer (1983), Ornstein (1984) similarly examined the determinants of reconstitution of broken ties (via retirement) among Canadian organizations. The

results of the study not only showed significantly higher reconstitution rates of broken ties among Canadian organizations (40%), lending equal credibility to both intraclass and interorganizational perspectives, but also indicated that tie characteristics (e.g., multiplexity) are stronger predictors of tie reconstitution than organizational characteristics (e.g., industry affiliation).

While interlocks have been viewed as mechanisms of cooptation, coordination, and information exchange in prior research (Palmer, 1983), Haunschild's (1993) study can be regarded as one of the first empirical research papers that has explored the phenomenon of organizational mimicry among firms that are connected through board interlocks. In a robust empirical analysis that teases out several competing explanations, the author's results showed that boards of directors' acquisition activities (e.g., number of acquisitions and types of acquisitions) are influenced by those of other firms that are in their local interlocking directorate network.

It is clear from these studies that members of the corporate elite networks are believed to occupy their positions for a multitude of reasons (e.g., financial, social, political cohesion, inter-organizational cooptation, information exchange, etc.). Building on this eclectic nature of governance research, Johnson, Daily, and Ellstrand (1996) provided a comprehensive review of the literature on boards of directors, focusing mainly on the *roles* that directors play in corporate governance, offering the multiplicity of director roles (e.g., monitoring, service, resource provision) as a potential explanation for the equivocal findings in research on corporate boards and organizational effectiveness. In addition, the authors highlight the key contributions that a social network analysis approach could offer to governance researchers:

> "Many social network algorithms may be used to model specific, individual relationships between not only the CEO and outside directors, but also between the directors

> themselves. From these models, coalitions and structurally defined roles may be identified, and individual measures of power, as well as network measures relevant to the board as a whole, may be calculated" (Johnson et al., 1996: 432).

It can be observed that until the late 1990s, network research on corporate directors had been outwardly focused, mostly concentrated on interlocking directorates. Westphal's (1999) research in this period marked an important shift towards the examination of social ties among directors within boards of directors. The results of the study showed that friendship ties among directors not only do not impede board's enactment of monitoring, but also facilitate the enactment of directors' advice and counsel roles more effectively, subsequently enhancing firm performance. The results also align with Johnson et al.'s (1996) conjecture that the enactment of different director roles may equivocally contribute to organizational effectiveness. As reviewed earlier in the paper, Gulati and Westphal's (1999) study extends this line of thinking by documenting that interdependence among directors (e.g., CEO and outside directors) through social ties can facilitate the formation of other forms of interorganizational ties, such as strategic alliances between CEOs of focal firms and those of outside directors. The interpublication linkages from Johnson et al. (1996) to Westphal (1999) and subsequently to Gulati and Westphal (1999) mark an important shift in the literature from an analysis of external to internal aspects of boards of directors and toward a better understanding of directors' functions in organizations.

The three studies that follow this stream—Westphal and Milton (2000), Hillman, Shropshire, and Cannella (2007), and Terjesen, Sealy, and Singh (2009)—are concerned with minority directors and their representation on boards of directors. One of the important observations of research in corporate governance is that white male executives largely dominate corporate elite circles. Demographic minority representation in corporate elite networks has, therefore, become an important topic as part of the ongoing efforts in governance reform.

Westphal and Milton's (2000) study examining demographic minorities highlights the importance of social capital in the likelihood of minority directors' involvement in the formulation and implementation of organizational policy and strategy. In the spirit of Haunschild (1993), Hillman et al. (2007) showed that organizations are more likely to employ female directors on the board when they are tied to organizations that have female director representation on their board. Taking stock of this research, Terjesen et al.'s (2009) review documents how demographic heterogeneity through minority representation (i.e., female directors) on boards of directors influences firm performance.

Figure 1 shows that the global main path of corporate elite networks literature signifies a shift in the literature, in the most recent decade, to a more comprehensive analysis of directors' social capital. Withers, Hillman, and Cannella's (2012) review focuses on the director selection literature, contributing significantly to our understanding of renewal and relationship formation in corporate elite networks. Similarly, Johnson and colleagues (2013) review of the board composition literature—with a special emphasis on organizational demography, human capital, and social capital approaches—contributes to an understanding of who occupies positions within corporate elite circles. More importantly, their research marks the beginning of an important methodological transition in board composition research by providing a comprehensive list of operationalizations that researchers have utilized to date. In fact, Barroso-Castro et al. (2016), who in their research simultaneously examine internal (i.e., co-working experience) and external social capital (i.e., interlocking directorates) of boards of directors, use some of the operationalizations that have been proposed by Johnson and colleagues (2013). Similarly, Shaw, Cordeiro, and Saravanan's (2016) research simultaneously explores the relationship of director's

human and social capital with firm performance, showing that independent outsiders influence firm performance via external social capital.

Overall, the main path analysis discussed herein shows that there has been a gradual theoretical transition from an investigation of external corporate elite networks to internal network ties within corporate boards as well as a change in the focus of attention to better understanding director roles within their respective social context (Johnson et al., 1996). Most recently, an emerging stream of research has begun to jointly explore the influence of inwardly (within-organization) and outwardly focused (between-organization) relationships in corporate elite networks on organizational outcomes. Empirically, organizational demography, indicators of human capital, and social capital have all been examined, both jointly and in isolation, in search of the 'unicorn' (Johnson et al., 1996: 433), that is, a practically significant and robust relationship between corporate elite characteristics and organizational outcomes.

The main path analytical approach allowed me to not only identify the key contributors to the literature and the main knowledge codification and diffusion paths, but also to document the theoretical and methodological progression of the field since the early 1980s to better predict the future evolution of the field. Table 2 supplements these analyses with a list of top 15 influential authors in the field based on global and local citation scores. With a series of publications on corporate elite networks in a short period of time, James (Jim) D. Westphal, stands out as one of the key contributors to this literature.

In the following section, I discuss the main implications of the study and offer directions for future research.

E. Discussion

The purpose of this paper was to take stock of the extant literature on corporate elite networks, and in doing so explore where the field has been, where it currently stands, and where it might be headed in the near future. I organized my review around three major areas: content of network ties, network processes, and network theoretic concepts. I constructed Table 1 with the purpose of providing an organizing framework around representative research areas. In the second half of the paper, I conducted a main path analytic review of research on corporate elite networks and identified the paths through which scientific knowledge in this field of study has been transferred since the early 1980s. The research presented herein makes important theoretical and methodological contributions to corporate governance research.

First, my review of the literature has shown that the management field has made great strides in explaining the sources and consequences of embeddedness of actors in corporate elite networks. A socially-informed (socialized) theory of corporate governance is still developing and it is my hope that the organizing framework developed in this paper will be helpful in integrating knowledge that has emerged from studies on corporate elite networks to provide a clearer picture of areas that need further development. In the context of boards of directors, researchers have already moved towards a socially-constructed view of directors and their roles (Johnson et al., 1996; Westphal & Zajac, 2013).

As identified, since the late 1990s, there has been a growing interest in exploring the intraorganizational networks of boards of directors, using both expressive and instrumental network ties. Nevertheless, this line of research remains significantly under-developed in comparison to work on external networks. Barroso-Castro et al.'s (2016) study, which examined both internal (i.e., co-working experience) and external social capital (i.e., interlocking

directorates) of boards of directors of directors, is an important attempt towards bridging the gap between inwardly and outwardly focused studies of corporate elite networks. One of the challenges that limit the comprehensive exploration of intraorganizational networks of corporate elite members is the difficulty that researchers face in accessing large longitudinal datasets on corporate elite ties. In this respect, as Johnson et al.'s (2013) work shows, it would be fruitful for researchers to find creative ways for modeling social relationships among directors in the absence of direct access to data collected using standard sociometric techniques. Johnson et al.'s suggestion for using network methods on archival data still maintains its relevance and validity for future research.

Furthermore, as expected, global and local approaches to main path analysis generated different results. Figures 2, 3, 4 and 5 show main paths that were constructed using global key-route, local backward, local forward, and local key-route algorithms, respectively. For the purpose of parsimony, I limit my discussion to the major differences between the results obtained from the global main path approach and those obtained from the local (backward) main path approach. As shown in Figure 3, the main body and the tail of the local (backward) main path (starting from Westphal and Zajac, [1997]) are identical to those in the global main path. The major difference involves the split paths that follow from Ornstein (1984) to Zajac and Westphal (1996), including the addition of the latter publication in the network. Zajac and Westphal's (1996) work can be considered one of the early studies that explored the interaction between internal and external dynamics of boards of directors. Specifically, the authors showed that the power dynamics within boards of directors have an influence on the process of the focal organizations' formation of interlocks. Interestingly, the path from Ornstein (1984) to Zajac and Westphal (1996) can be reached from two separate links: Ornstein (1984) → Palmer (1993) →

Haunschild (1993) → Zajac and Westphal (1996), on the one hand, and Ornstein (1984) → Richardson (1987) → Mizruchi and Stearns (1988) → Zajac and Westphal (1996), on the other hand. Given that both Palmer and Richardson share similar interests in their studies—testing hypotheses derived from interorganizational and intraclass approaches— the difference between these local paths can be attributed to divergent areas explored by Pamela Haunschild, an Organizational Behavior and Theory scholar, who in her paper emphasized the influence of interlocking directorates on the imitation of organizational strategy (Haunschild, 1993), and Mark Mizruchi, a Sociology scholar, who in his co-authored study with Linda Stearns explored the economic antecedents of director appointments and organizations' formation of interlocking directorates with financial institutions (Mizruchi & Stearns, 1988). As this example suggests, main path analysis, with its distinct network algorithms, is a versatile tool for identifying different paths of scientific progression in a given field of study. An interesting future direction would be to expand the categorical criteria used in this study to include Sociology and other related disciplines to explore the main contributions of the Management field to research in the area of interlocking directorates.

Second, and to the best of my knowledge, this study is the first to utilize main path analytic approach in a scientific review of research on corporate elite networks in management research. While the technique has been commonly used by researchers in other disciplines (e.g. Carley, Hummon, Harty, 1993; Calero-Medina & Noyons, 2008; Hummon & Doreian, 1989; Humman, Doreian, Freeman, 1990), there are two known examples that have used this approach in research topics related to the field of management research (see Johnson, Ellstrand, & Kepes, 2006; Lu & Liu, 2013). This study makes an important methodological contribution to strategic management and corporate governance research by applying main path analytic methodology in

the context of the corporate elite networks literature. Given that the main path analysis is most fruitful when analyzing large networks of publications, it would be interesting for future research to apply the method to agency theory and resource dependence theory, two dominant theoretical perspectives in corporate governance research, to identify key areas, research studies, authors, and interpublication linkages that have contributed to the evolution of these theoretical perspectives. I hope this paper, in addition to prior work using this technique (e.g., Lu & Liu, 2013), will provide a valuable template for researchers who wish to use the main path analytical technique to construct the paths of the evolution of other research domains.

F. Conclusion

I presented narrative and main path analytic reviews of the literature on corporate elite networks to more comprehensively examine the main implications of extant research, develop an organizing framework, identify key progression paths, and offer directions for future research. I hope that the research presented herein will stimulate future efforts that focus on the processes underlying network dynamics in the context of both internal and external networks of corporate elite members, which continues to be an important, interesting, and impactful research area in the field of corporate governance.

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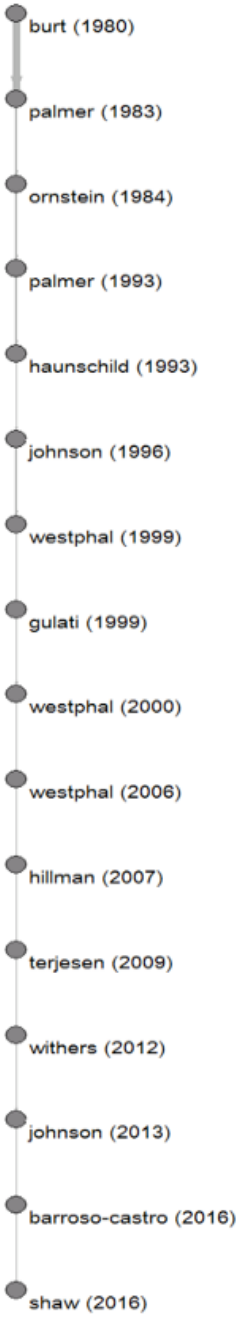
H. Figures and Tables[3]

Figure 1: Global Main Path – Standard



[3] *Note*: In some cases, the distances between the nodes were adjusted to enhance the visual representation of the main path.

Figure 2: Global Main Path – Key Route

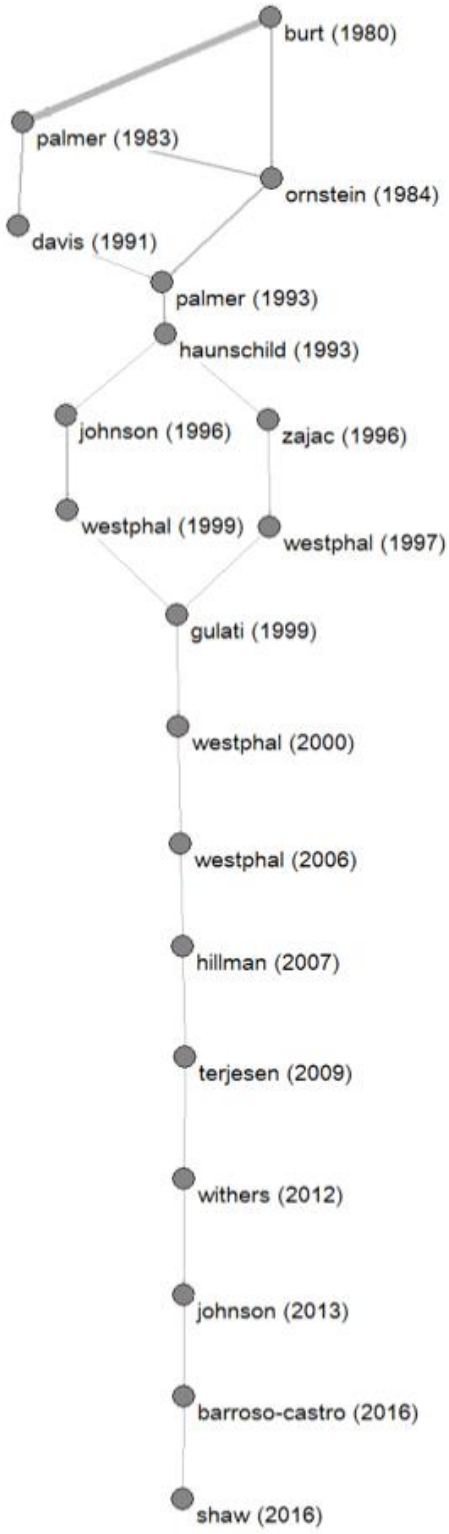


Figure 3: Local Main Path – Backward

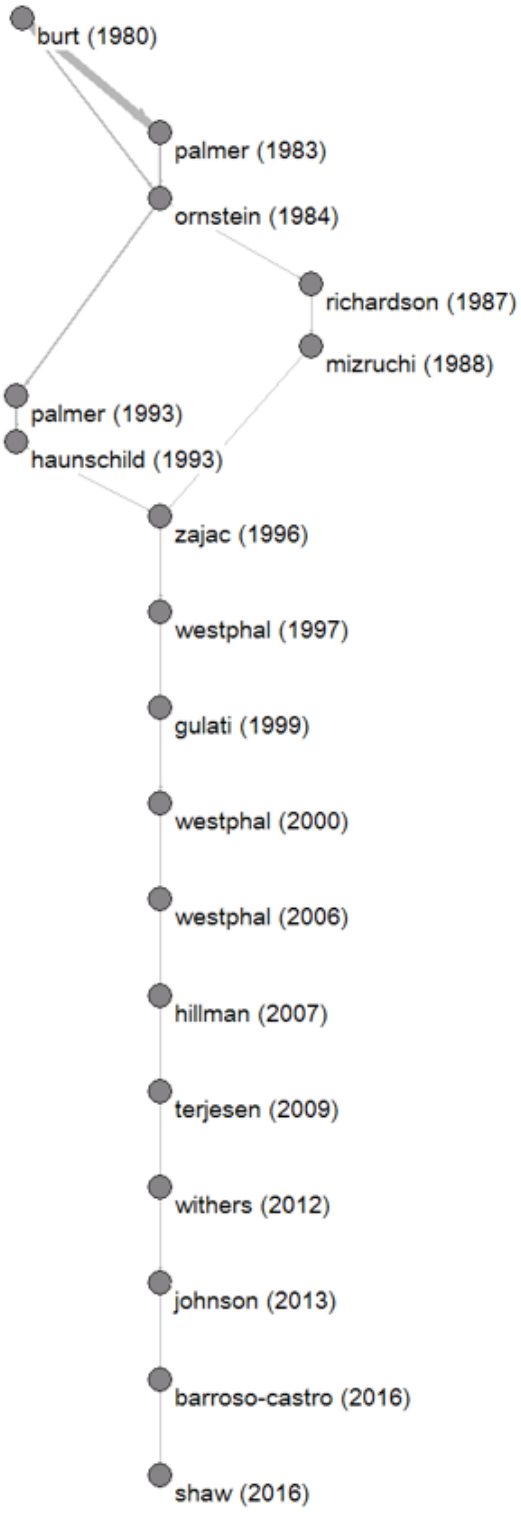


Figure 4: Local Main Path – Forward

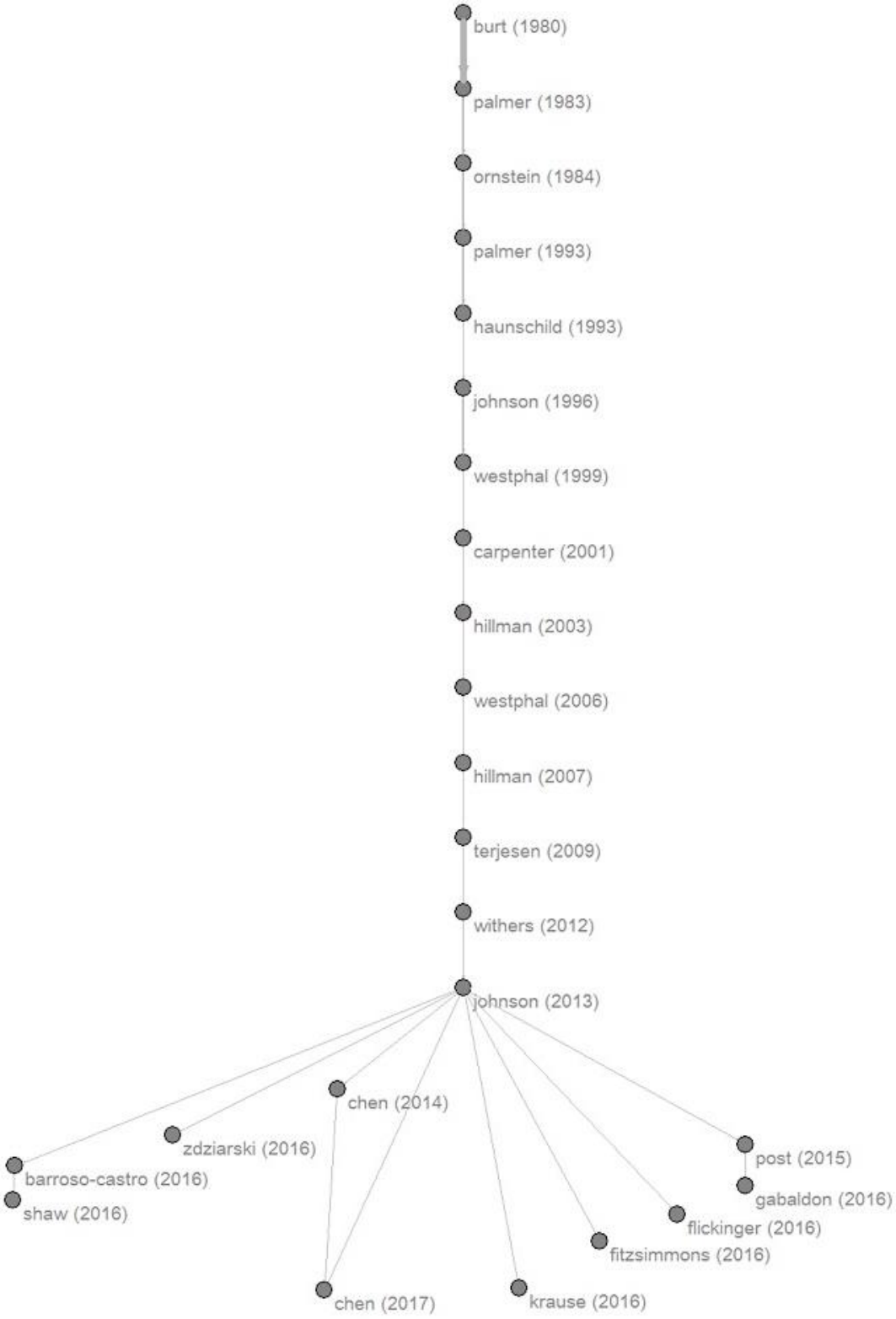


Figure 5: Local Main Path – Key Route

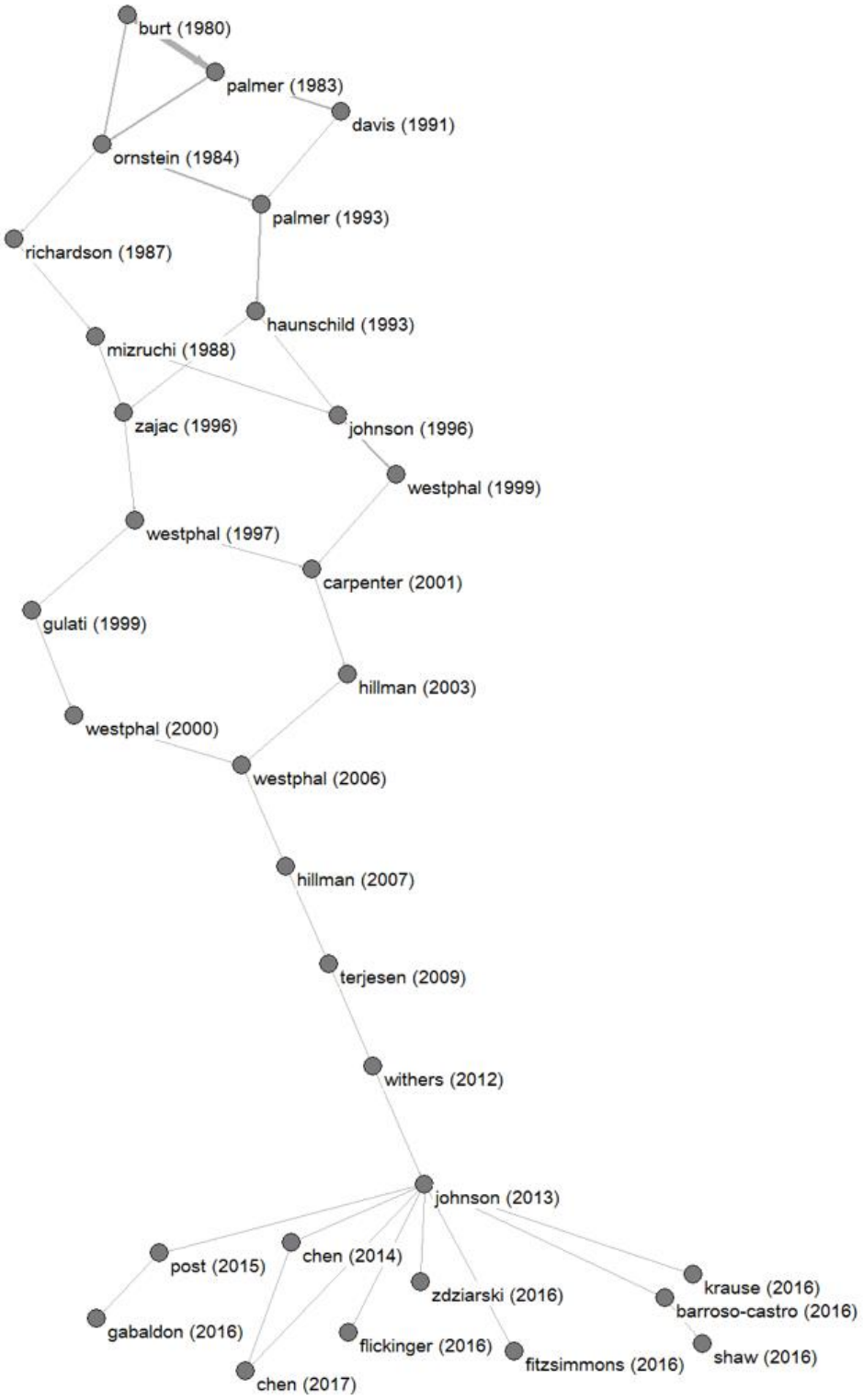


Table 1: A Framework for Organizing Research on Corporate Elite Networks

			Formation	Presence	Dissolution	Reconstitution
Instrumental Ties	**Internal**		Task interdependence as an antecedent to tie formation among directors	Influence of formal and status-based hierarchical relations among directors on board processes	Dissolution of board committees (e.g., ad hoc committees of the board)	Change in board leadership structure and tie reconstitution in formal board hierarchy
	External		Mutual dependence among firms as an antecedent to formation of board interlocks	Influence of strong vs. weak, direct vs. indirect interlocking directorate ties on interfirm imitation	Network predictors and consequences of board member turnover (e.g., jumping ship)	Environmental uncertainty as an antecedent to reconstitution of interlocking directorate ties
Expressive Ties	**Internal**	**Positive**	Effective use of social influence as a strategy for developing positive affective ties and the influence of ingratiation on negative tie formation	Structural characteristics of informal, intraorganizational networks of boards of directors	Organizational, board, and dyadic level affective events as antecedents of dissolution of positive and negative expressive ties among directors (e.g., demotion)	Affective tensions, cognitive consistency motives, and re-construction of balance within expressive networks of boards of directors
		Negativ		Influence of CEO social comparison processes on formation of negative ties with directors		
	External	**Positive**	Directors' degree of social identification with members of the corporate elite as an antecedent of positive tie formation	Positive/negative ties among corporate elite members as an antecedent of interfirm collaboration, competition, collusion, and co-opetition.	Executive centrality in friendship networks of corporate elite members as an antecedent to career promotion	Social affiliation networks (e.g., social clubs, business roundtable, etc.) as grounds for reactivation of dormant ties among members of the corporate elite
		Negative	The influence of social categorization and discrimination among members of corporate elite on negative tie formation		Reduced competitive rivalry as an antecedent of dissolution of negative ties among executives of firms with related task environments	

***Note*:** Cells demonstrate representative research topics that have already been or can be studied using a network theoretical lens. Some of this research has been reviewed in the paper. Table 1 is presented for illustrative purposes and is not meant to represent a comprehensive list of concepts and relationships that can be studied.

Table 2a: Top 15 Influential Authors in Research on Corporate Elite Networks based on Total Global Citation Score

#	Author	Number of Records	Record as a %	Total Local Citation Score	Total Local Citation Score per year	Total Local Citation Score excluding Self Citations	Total Global Citation Score	Total Global Citation Score per year	Total Local Cited References	Total Local Citation Score in the Beginning	Total Local Citation Score in the End
1	Westphal JD	17	3.2	370	23.2	318	1875	124.37	112	23	75
2	Hillman AJ	8	1.5	114	9.46	102	1019	76.5	74	8	33
3	Borgatti SP	2	0.4	13	0.85	13	961	63.19	13	1	3
4	Haunschild PR	4	0.7	111	5.37	105	876	48.04	21	3	19
5	Davis GF	6	1.1	83	3.67	81	820	40.52	11	5	8
6	Geletkanycz MA	3	0.6	84	4.54	80	819	50.01	17	2	19
7	Brass DJ	2	0.4	14	1.05	12	784	63.13	16	1	4
8	Foster PC	1	0.2	10	0.67	10	750	50	13	1	2
9	Galaskiewicz J	2	0.4	15	1.1	13	711	51.5	14	1	3
10	Ellstrand AE	3	0.6	72	3.92	71	704	35.86	23	1	12
11	Johnson JL	3	0.6	72	3.92	71	704	35.86	23	1	12
12	Carpenter MA	2	0.4	78	4.78	74	697	46.51	14	3	17
13	Clark KD	2	0.4	27	1.87	27	688	49.45	0	3	12
14	Collins CJ	2	0.4	27	1.87	27	688	49.45	0	3	12
15	Daily CM	2	0.4	67	3.21	66	688	33.57	13	0	8

Table 2b: Top 15 Influential Authors in Research on Corporate Elite Networks based on Total Local Citation Score

Author	Number of Records	Record as a %	Total Local Citation Score	Total Local Citation Score per year	Total Local Citation Score excluding Self Citations	Total Global Citation Score	Total Global Citation Score per year	Total Local Cited References	Total Local Citation Score in the Beginning	Total Local Citation Score in the End
Westphal JD	17	3.2	370	23.2	318	1875	124.37	112	23	75
Hillman AJ	8	1.5	114	9.46	102	1019	76.5	74	8	33
Haunschild PR	4	0.7	111	5.37	105	876	48.04	21	3	19
Geletkanycz MA	3	0.6	84	4.54	80	819	50.01	17	2	19
Davis GF	6	1.1	83	3.67	81	820	40.52	11	5	8
Carpenter MA	2	0.4	78	4.78	74	697	46.51	14	3	17
Dalziel T	2	0.4	72	5.41	68	574	41.24	17	4	23
Ellstrand AE	3	0.6	72	3.92	71	704	35.86	23	1	12
Johnson JL	3	0.6	72	3.92	71	704	35.86	23	1	12
Zajac EJ	4	0.7	69	3.91	58	375	28.3	36	4	9
Daily CM	2	0.4	67	3.21	66	688	33.57	13	0	8
Beckman CM	4	0.7	57	3.21	53	505	34.04	29	2	11
Hambrick DC	2	0.4	53	2.52	50	335	16.4	8	0	12
McDonald ML	4	0.7	48	4.04	39	249	21.59	25	8	12
Mizruchi MS	2	0.4	43	1.65	42	256	11.06	7	0	7

Appendix A: Search Parameters

Search Parameters: Ebsco Academic Source Complete

AB (interlock* OR "social capital" OR network* OR connect* OR "ties" OR affili*) AND TX ("board of directors" OR CEO OR "chief executive") AND (JN(Academy of Management Journal) OR JN(Strategic Management Journal) OR JN(Administrative Science Quarterly) OR JN(Journal of Management) OR JN(Journal of Management Studies) OR JN(Organization Science))

TI (director* OR "board of directors" OR "CEO" social capital) AND TI social capital AND (JN(Academy of Management Journal) OR JN(Strategic Management Journal) OR JN(Administrative Science Quarterly) OR JN(Journal of Management) OR JN(Journal of Management Studies) OR JN(Organization Science))

(TI ("corporate elite" OR "power elite" OR "business elite" OR "organizational elite") AND (JN(Academy of Management Journal) OR JN(Strategic Management Journal) OR JN(Administrative Science Quarterly) OR JN(Journal of Management) OR JN(Journal of Management Studies) OR JN(Organization Science))) OR (AB ("corporate elite" OR "power elite" OR "business elite" OR "organizational elite") AND (JN(Academy of Management Journal) OR JN(Strategic Management Journal) OR JN(Administrative Science Quarterly) OR JN(Journal of Management) OR JN(Journal of Management Studies) OR JN(Organization Science)))

Search Parameters: ISI Web of Science

TS=("CEO" OR "chief executive*" OR "director*" OR "executive*" OR "top management*" OR "top management team*" OR "board of director*" OR "corporate elite*" OR "managerial elite*") AND TS=("social capital*" OR "social similarity*" OR "inner circle*" OR "network*" OR "social network*" OR "social tie*" OR "network tie*" OR "interpersonal relation*" OR "social relation*" OR "board membership*" OR "interlocking directorate*" OR "interlock*" OR "board interlock*" OR "joint member*" OR "external tie" OR "internal tie*") AND WC=("Management")) AND DOCUMENT TYPES: (Article OR Editorial Material OR Review).

III. Chapter II: Constructing the Strength of Directors' Intraorganizational Ties and Modeling the Antecedents and Consequences of Board Network Characteristics

A. Abstract

Social interactions within *intra*organizational networks of boards of directors are difficult to observe. Accordingly, the number of studies that explore intraorganizational networks of boards of directors has been dwarfed by the volume of studies that investigate external ties of boards of directors (i.e., interlocking directorate ties). The purpose of this study is to introduce a methodological technique that allows researchers to infer tie strength of dyadic relations in intraorganizational director networks, which allows for the examination of larger board level social networks. Drawing on prior research on tie formation in social networks (Liben-Nowell & Kleinberg, 2007; McPherson, Smith-Lovin, & Cook, 2001; Monge & Contractor, 2001; Rivera, Soderstrom, & Uzzi, 2010), behavioral theory of corporate governance (Westphal & Zajac, 2013), and recent theoretical work in corporate governance research (Shropshire, 2010), I identify a set of constructs associated with positive tie formation and strength— social similarity, social influence, social exchange, and social history— in the context of boards of directors and the objective formative indicators of the latent constructs to construct a measure of dyadic tie strength. Using both functionalist and sociological lenses in corporate governance (Davis, 2005; Westphal, 1999), I explore the nomological network of inferred director ties by using organizational level criteria that are predictive of and predicted by the structural network characteristics of board intraorganizational ties.

B. Introduction

Since Jensen and Meckling's (1976) influential article that introduced the concept of agency costs, effective monitoring of organizational decision-makers has remained a subject of great interest in management, creating a vast literature that concentrates on corporate governance mechanisms (see Bebchuk & Weisbach, 2010; Dalton, Hitt, Certo, & Dalton, 2007; Durisin & Puzone, 2009; Shleifer & Vishny, 1997; Walsh & Seward, 1990 for reviews of this literature). In principal-agent relationships, agency costs refer to the sum of monitoring and bonding costs and residual losses that are incurred by firms' principals (Jensen & Meckling, 1976) when agents engage in opportunistic behaviors such as personal rent extraction, entrenchment, or shirking (Demsetz, 1983). Researchers have argued that investors minimize potential agency costs by taking advantage of formal governance mechanisms (e.g., regulations, institutional shareholders, market for corporate control, boards of directors, etc.) (Walsh & Seward, 1990). Arguably, none of these mechanisms have received more attention in management research than boards of directors. In addition, some of the most important empirical studies that corroborate the management discipline's major theories (e.g., resource dependence theory, agency theory) have been conducted by using boards of directors as a research context (Hillman, Withers, & Collins, 2009; Johnson, Daily, & Ellstrand, 1996). Still today, the economic paradigm on principal-agent relations pervades much of the contemporary thinking in the strategic management literature (Hillman & Dalziel, 2003).

Aside from the economic paradigm, a branch of governance research characterizes boards of directors as social institutions comprised of social actors. As Davis (2005) observed, this sociological view (as opposed to the economic view that centers on agency theory) has traditionally focused on the emergence of network ties, forged by members of boards of

directors. Interorganizational ties established through joint membership of corporate directors on company boards, namely interlocking directorates (Mizruchi, 1996), are viewed as channels that help distribute resources (e.g., power, control, decision rights, information, etc.) among organizations at one level (Pfeffer & Salancik, 1978), or as evidence for the existence of a cohesive social class of corporate elites at another level (Domhoff, 1967; Useem, 1979; 1980). Both of these research streams have made important contributions to our understanding of not only the meaning of social relationships between organizational decision makers, but also their antecedents and consequences. Nevertheless, recent assessments of this literature point out that there are a number of important unanswered research questions with respect to the social processes underlying the work of corporate directors (Hambrick, Werder, & Zajac, 2008). One major question concerns the internal social capital of boards of directors (i.e., social relationships among members of a focal organization's board); specifically, *what is the internal social capital of boards of directors, how does it help shape organizational outcomes, and what factors generate different types of board social capital*? An important objective of this paper is to provide answers to these questions.

Social capital is an emerging concept in research on boards of directors, yet researchers have paid disproportionate interest to external social capital in comparison to internal social capital of boards of directors (see Johnson, Schnatterly, & Hill, 2013 for a review of this literature). Social capital generally refers to resources embedded in social relationships (Nahapiet & Ghoshal, 1998). As such, internal social capital refers to resources that directors access via linkages to other members on the board (within-board), whereas external social capital refers to resources embedded in relationships with members of other boards (within-corporate elite network). Few researchers have been able to obtain access to boards of directors to collect

primary data on the social relationships among board members (exemplary research in this domain includes Gulati & Westphal, 1999; Stevenson & Radin, 2009; Westphal, 1999; Westphal & Bednar, 2005 — for a review of this literature see Westphal & Zajac, 2013). Beyond behavioral governance theory research, empirical studies that investigate internal social capital of boards of directors typically focus on co-working experience of directors in isolation (Kor & Sundaramurthy, 2009; Tian, Haleblian, & Rajagopalan, 2011 — see Belliveau, O'Reilly, & Wade, [1996] and Kim, [2005] for exceptions). A comprehensive investigation of boards' internal social capital is absent from the literature due to lack of data on boards' intraorganizational relationships (i.e., the social network that connects the directors on a board). Furthermore, the secrecy surrounding corporate strategy and that is at the center of formal and informal board discussions presents an important challenge for researchers to overcome in order to extend the management field's understanding of the role of social capital on the boards of directors.

In light of these limitations, another key objective of this study is to introduce a methodological technique that allows researchers to infer tie strength of dyadic relations in intraorganizational social networks of directors. Based on prior research on network tie formation (Liben-Nowell & Kleinberg, 2007; McPherson et al., 2001; Monge & Contractor, 2001; Rivera et al., 2010), behavioral governance theory (Westphal & Zajac, 2013), and recent theoretical work in corporate governance research (Shropshire, 2010), I identify a set of social mechanisms associated with positive tie formation and strength—social similarity, social influence, social exchange, and social history— in the context of boards of directors to construct a measure of dyadic tie strength, using objective formative indicators associated with these underlying latent constructs. Next, I outline and empirically test the antecedents and

consequences of the characteristics of board ties. In my model, following Westphal (1999), I focus on highlighting the complementarities and reconciling the differences between the functionalist and the sociological perspectives on board ties (Davis, 2005). The functionalist perspective characterizes the structural and compositional evolution of the board at the interorganizational level, whereas from the sociological perspective the board's evolution is conceived as an intraclass phenomenon. These two perspectives offer non-overlapping antecedents of board social capital and also help make predictions with respect to the relationship between intraboard social networks and firm level outcomes. To test the utility of my measurement model, I investigate the effects of structural equivalence (i.e., the extent to which network actors share similar connection patterns) and cohesion (i.e., the degree to which a network is strongly connected) on the board, as well as their antecedents. I focus on three organizational level outcomes, CEO compensation, risk taking, and diversification due to the importance of these constructs to management researchers and the central role they play in corporate governance research — an issue of major theoretical and practical importance as excessive CEO compensation, diversification, and risk aversion typically characterize organizations with agency problems.

In the following section, I discuss the processes that lead to the emergence of strong ties among members of the board.

C. Constructing the Intraorganizational Ties of Boards of Directors

> "Most intuitive notions of the "strength" of an interpersonal tie should be satisfied by the following definition: the strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" (Granovetter, 1973: 1361, parentheses and quotation marks in original).

Research on social networks makes an important distinction between strong and weak ties (Borgatti & Halgin, 2011). Arguably, the most recognizable and influential use of the strong versus weak ties argument is found in the work of Granovetter (1973). The author argued that weak ties that network actors possess, especially those that bridge otherwise disconnected social entities, are more influential than strong ties in terms of transmitting information to and engendering opportunities for the actor. The rationale for this effect is simple, yet powerful:

> "individuals with few weak ties will be deprived of information from distant parts of the social system and will be confined to the provincial news and views of their close friends. This deprivation will not only insulate them from the latest ideas and fashions but may put them in a disadvantaged position in the labor market" (Granovetter, 1983: 202).

It follows from these assertions that tie strength has an important influence on the amount and type of information that actors can obtain from their network, and the timeliness with which that information may be received. In the context of boards of directors, as in other team-like structures, information processing is fundamental to decision-making and its effectiveness is particularly important for board's involvement in strategy formulation and corporate governance. Accordingly, analyzing network properties of boards of directors based on a reliable and valid measure of tie strength could result in important contributions to research on boards of directors, specifically in the domain of organizational strategy and policy. In the next section, I outline the mechanisms that engender strong intraorganizational social network ties among members of boards of directors. In doing so, I draw from prior research that focuses on tie formation (Liben-Nowell & Kleinberg, 2007; McPherson et al., 2001; Monge & Contractor, 2001; Rivera et al., 2010) in social networks, a behavioral theory of corporate governance (Westphal & Zajac, 2013), and recent theoretical work in corporate governance research (Shropshire, 2010), to the extent that these mechanisms relate to formation of strong ties at the dyadic level in boards of directors and are in line with Granovetter's (1973) definition of strong ties.

Westphal and Zajac's recent literature review concentrated on the "social processes that commonly characterize the behavior of corporate leaders as they relate to each other and to their constituents," which are identified as "social influence", "helping behavior", "social learning", and "norms of reciprocity" (2013: 611). I draw from this research to the extent that these processes relate to the formation of strong ties in boards of directors and correspond with Granovetter's (1973) concept of strong ties. Overall, I consider tie strength as a function of four social mechanisms: social similarity, social influence, social exchange, and social history. These mechanisms are also consistent with Krackhardt's (1992) conception of strong ties, in which prior history, interaction, and affect undergird formation of strong ties. In addition, they are reflective of the three major classes of social network dynamics outlined in prior research: assortative, relational, and proximity-based mechanisms of tie formation (Rivera, Soderstrom, & Uzzi, 2010). For instance, social similarity is a well-known antecedent to tie formation (McPherson et al., 2001). Interpersonal use of social influence helps corporate elite members forge new relationships (Westphal & Zajac, 2013). Organizational research suggests that social exchange is a process that engenders relationships, which may "evolve over time into trusting, loyal, and mutual commitments" (Cropanzano & Mitchell, 2005: 875). Finally, common social history, in the words of Krackhardt (1992), is an antecedent to trust as it engenders behaviors of social actors predictable. I should note that I define common social history more than just experiences of actors to include physical propinquity or proximity, which have been proposed as an antecedent of tie formation (Dahlander & McFarland, 2013; Nahemow & Lawton, 1975; Reagans, 2010; Rivera et al., 2010) and knowledge exchange (Shropshire, 2010).

Social Similarity

Social similarity is defined as proximity of individuals in "sociodemographic dimensions that stratify society" or "internal states presumed to shape […their] orientation toward future behavior" (McPherson et al., 2001: 419). Prior research has shown that demographic similarity is an important predictor of the strength of social relationships in intraorganizational networks (Eisenhardt & Bourgeois, 1988; Reagans, 2005, 2010) and tie formation among individuals (Vissa, 2011). A principle of social interactions is the tendency of people to bond with and form ties to similar others, known as homophily (McPherson et al., 2001). Extant research differentiates between two types of homophily—status and value homophily (Lazarsfeld & Merton, 1954). Status homophily is the increased likelihood of contact among people that share similar demographic characteristics (e.g., age, gender, ethnicity, education, etc.). Value homophily is the increased likelihood of contact among people who converge on similar cognitive, emotional, or behavioral categories such as attitudes, beliefs, and values (Kossinets & Watts, 2009; McPherson et al., 2001).

Governance research suggests that social similarity is an important criterion in the formation of ties in the context of corporate elite networks, and it is regarded as an antecedent to cooptation among executives and directors. Powerful CEOs have been observed to select socially similar directors or otherwise influence the appointment of these directors, as demographic similarity is associated with feelings of sympathy and interpersonal attraction, which pave the way for enhanced cooptation of directors (Westphal & Zajac, 1995). Based on this literature and the 'robust' (McPherson et al., 2001: 418) research finding that similarity leads to formation of ties, I include social similarity on boards of directors as an important mechanism of strong tie formation on boards.

Proposition 1: *The likelihood that a positive interpersonal tie (e.g., liking) will form within a director dyad in a board network is positively related to the degree of social similarity between the directors.*

Social Influence

A branch of corporate governance research investigates the social influence processes in the context of boards of directors from the perspective of impression management theory (e.g., Westphal, 1998; Westphal & Stern, 2006, 2007). This literature suggests that directors in high status positions may become targets of social influence through ingratiation, opinion conformity, and flattery initiated by relatively lower status directors. One of the underlying motivations for the use of social influence tactics, enacted as conformity and compliance, is to develop and maintain social relationships (Cialdini & Trost, 1998). Lower status individuals may also defer to judgment of higher status individuals due to hierarchical relationships established within an institutional context. Several studies in corporate governance research have observed that CEOs may engage in social influence tactics to extract favorable outcomes, such as increased compensation (Belliveau et al., 1996) and the adoption of golden parachutes (Wade, O'Reilly, & Chandratat, 1990). Similarly, directors with high prestige power may exert influence on other directors with relatively lower prestige power.

As D'Aveni and Kesner explained: "an individual manager has prestige if he/she has interorganizational linkages and interpersonal affiliations that indicate high status. Status, in turn, refers to membership in (or social connections to) an elite circle" (1993: 125). Accordingly, social influence in the context of boards of directors may be a function of a director's status manifested in the number of external ties to other reputable organizations. In line with this logic, He and Huang (2011) operationalized board informal hierarchy by calculating a dispersion

measure of the number of outside board memberships of directors (i.e., Gini coefficient). Alternatively, Johnson, Schnatterly, Bolton, and Tuggle, (2011) conceptualized a director's status on a board as playing important roles in social, political, academic, military, and/or business communities.

Overall, research suggests that intraorganizational network ties of boards of directors may form as a result of social influence processes on boards of directors. Positive interpersonal affect elicited through flattery and opinion conformity aside (Westphal & Stern, 2007), actors' engagement in social influence processes enhances frequency of contact, which is an important prerequisite of positive tie formation (Granovetter, 1973; Krackhardt, 1992).

The designation of social similarity and social influence as differential network processes is also consistent with Lauman's observation that:

> "a dynamic tension [exists] between the "like-me hypothesis" (which postulates that people subjectively prefer to associate informally with people just like themselves on key status attributes) vs. the "prestige hypothesis" (which postulates that people would subjectively prefer to associate informally with persons of higher status than themselves because, among other things, higher-status persons control more useful and desirable resources than ego controls)" (2006: 66, parentheses and quotation marks in original).

In line with these arguments, it can be suggested that:

Proposition 2: *The likelihood that a positive interpersonal tie (e.g., liking) will form within a director dyad in a board network is positively related to the degree of social status difference between the directors.*[4]

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[4] A fair criticism of this proposition would be that in the presence of status homophily, similar-status directors would be more likely to form ties to one another. While there is certainly truth to this, drawing from the concept of structural equivalence, it can be argued that equivalent actors (i.e. same/similar status) may perceive one another in competition (Burt, 1992; Rothman, Pratt, Rees, & Vogus, 2016; Zou & Ingram, 2013), generating tensions in their interactions. In addition, prior research provides evidence of formation of heterophilous relationships (Rivera et al., 2010). In constructing this proposition, I also followed behavioral governance research

Social Exchange

The concept of social exchange has a long history in both micro- and macro-oriented research (Cropanzano & Mitchell, 2005; Emerson, 1976). From the social exchange theory perspective, individuals are expected to forge strong ties with those they believe are resourceful others (Liden, Wayne, Kraimer, & Sparrowe, 2003). Resource-rich directors can provide their alters with valuable domain-, organization-, or industry-specific knowledge and/or network connections to other organizations or institutions, among others. Prior research on social relationships within boards of directors shows that the norm of reciprocity, an important social exchange principle, is an underlying characteristic of relationships among members of the board (Westphal & Zajac, 2013), especially in the context of advice relationships. This is not surprising given that people seek advice from resourceful others. More importantly, Contractor and Monge state that "an individual will seek a knowledge network tie with another individual if the other can reciprocate and offer something in return" (2002: 251). In boards of directors, instrumental relationships among board members can emerge in areas of business transactions, knowledge exchange, and advice seeking/giving, among others.

As research on board interlocks suggests, an important motivation for directors to join new boards is to learn from the experiences of others (Mizruchi, 1996). Vissa's (2011) research on entrepreneurial networks has shown that task complementarity among individuals is an important driver of network tie formation. Furthermore, it is arguable that directors will have enhanced motivation to approach resourceful others on the board, value their partnership, and interact with them on a more frequent basis. In this case, tie formation could be driven by the

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(Westphal & Zajac, 2013), which shows strong evidence for the use of interpersonal influence tactics between individuals of different status as discussed above.

complementarity between the organizations with which the board members are affiliated. For instance, it can be suggested that Steve S. Reinemund, joint director of Wal-Mart and American Express, has become an important network partner to both companies' CEOs when American Express formed a partnership with Wal-Mart and its Sam's Club division immediately after the company broke its business ties with Costco. Considering this example in light of Westphal and Zajac's statement that "favors engender positive affect and instigate or perpetuate social exchange relationships that transcend mutual self-interest, and which gradually come to be perceived by parties to the relationship as a kind of friendship" (2013: 621-622), it can be argued that social exchange constitutes an important underlying mechanism of strong tie formation in the context of boards of directors.

> **Proposition 3:** *The likelihood that a positive interpersonal tie (e.g., liking) will form within a director dyad in a board network is positively related to the degree of social exchange potential between the directors.*

Social History

Individuals are considered to have social history when they have shared a social space that allows them to associate and interact with one another. Network theorists acknowledge prior social history, frequent interaction, and affect as fundamental dimensions of strong tie formation in particular (Krackhardt, 1992). Social history among directors can emerge as a result of not only kinship and friendship relations, but also joint involvement in affiliation networks such as clubs (Galaskiewicz, 1985), artistic groups or business communities (Werbel & Carter, 2002), and non-profit boards or governmental advisory committees (Moore, Sobieraj, Whitt, Mayorova, & Beaulieu, 2002). In addition, shared social history with a network member may lead them to become a part of another network (Hite, 2005). The underlying argument of affiliation networks

leading to new tie formation is that individuals that have a shared history or that have shared a social space become relationally embedded in their networks, sustaining these relationships over time. Proximate individuals who interact with one another often are also likely to develop similar attitudes (Browning, Beyer, & Shetler, 1995; Pastor, Meindl, & Mayo, 2002) and forge relationships over time (Rivera et al., 2010).

Shared social history may also engender tie multiplexity (Beckman, Haunschild, & Phillips, 2004) — having more than one type of relationship (e.g. advice, friendship, direct-report, etc.), which increases an actor's embededdness in the network, and his/her overall tendency to forge ties with the same actors in their network, a phenomenon often associated with network inertia (Kim, Oh, & Swaminathan, 2006). In addition, prior research has shown that not only social similarity, but also physical propinquity (i.e., closeness) can influence the emergence of strong ties (Dahlander & McFarland, 2013; Nahemow & Lawton, 1975; Reagans, 2010). In the context of boards of directors, Kim (2005) has demonstrated that family, university, and regional ties among CEOs are important predictors of organizational performance. Based on the arguments outlined above, I identify social history as an underlying mechanism of strong tie formation in the context of boards of directors.

> **Proposition 4:** *The likelihood that a positive interpersonal tie (i.e., liking) will form within a director dyad in a board network is positively related to the amount of social history between the directors.*

In summary, the social similarity perspective predicts that interpersonal ties form due to homophily effects; that is, people are attracted to and form ties with similar others (e.g., demographic similarity). The social influence perspective predicts that interpersonal ties form based on status differences between individuals—lower status individuals generally defer to

judgments of higher status individuals, which may generate interpersonal affect. The social exchange perspective suggests that individuals tend to form ties with those with whom they can reciprocally interchange resources that are embedded in social relationships. Finally, the social history perspective suggests that sharing common social space creates opportunities for individuals to frequently interact with one another and to form a sense of intimacy and affiliation with others, with whom they subsequently can forge strong ties.

Using objective formative indicators of the four mechanisms of social relationship formation that are outlined above, we can infer, albeit with measurement error, social ties among members of boards of directors. One of the purposes of this research inquiry is to demonstrate that measuring tie strength at a dyadic level provides opportunities for more fine-grained analyses of boards of directors than simple aggregations of these indicators could. The rationale is that classic aggregation techniques may result in the loss of valuable information on directors' interactions. Nevertheless, key responsibilities that boards enact (i.e., monitoring, resource provision, advice and counsel — Johnson et al., 1996) and that are of interest to governance scholars occur in a relational-interactive context, and thus, an examination of board networks provides a more comprehensive understanding of the effectiveness of the board as a social and functional entity. Classic analytic approaches to governance represent, in the words of Granovetter (1985), an undersocialized view of corporate governance, which underlies the motivation behind recent work in the behavioral governance domain toward developing a more socially-informed theory of corporate governance (Westphal & Zajac, 2013). This new direction helps not only examine traditional organizational agency outcomes through a socialized lens, but also explore new phenomena that may be of interest to agency researchers. In this respect,

network properties of boards of directors would be of interest in examining the social dynamics and structure of organizational agency.

In the following section, I outline my hypotheses, building on the conception of tie strength that I elaborated thus far.

D. Hypothesis Development

The conceptualization of tie strength provides numerous opportunities for analyzing the network properties of boards of directors. While a number of network characteristics could be explored, I am particularly interested in those mechanisms that may enable or constrain diffusion of information within the boards of directors and that may subsequently affect boards' strategizing and policy-making processes. Following prior research (Burt, 1978; 1987; 1992), I select structural equivalence (a form of network homogeneity) and cohesion (a manifestation of social capital) as two major network effects that have been proposed to influence information processing and decision-making in team-like structures, such as boards of directors. Network actors are considered structurally equivalent to one another when they have similar patterns of ties with the same actors in a network (Burt, 1978; Lorrain & White, 1971). Cohesion occurs when network actors are frequently interacting/socializing (Burt, 1978), have direct ties (Mizruchi, 1993), or have strong ties (Burt, 1992; Reagans & McEvily, 2003) with one another, as in the case of friendship ties among corporate elite members (Useem, 1980). Network cohesion in team-like structures (e.g., boards of directors) refers to the extent to which relationships are characterized by strong ties.

Both cohesion and structural equivalence have been investigated in the context of contagion (of ideas and innovation) (Burt, 1987, 1992) and thus, could have an important effect on the extent to which board members develop similar perceptions of and attitudes toward

particular strategies (Roberson & Colquitt, 2005). More importantly, both measures are instrumental in understanding the pattern of distribution of strong ties within a network. In the following section, drawing from both functionalist and sociological perspectives on corporate governance (Davis, 2005), I explore the environmental and organizational antecedents of these two characteristics of board network structure and their consequences for board decision-making with respect to CEO compensation, organizational diversification, and risk-taking.

Antecedents of Structural Equivalence on Boards

The functional perspective on board composition suggests that the compositional characteristics of boards of directors reflect environmental constraints/demands on the organization (Pfeffer, 1972; Pfeffer & Salancik, 1978; Zahra & Pierce, 1989). For instance, in highly regulated environments, boards of directors may be inclined to appoint members that have political connections in order to accrue informational social capital benefits (Hillman, 2005). Conversely, in deregulated environments firms may be more inclined to replace departing directors with 'community influentials' (e.g., faculty members) or 'business experts' (e.g., outsider-CEOs), rather than 'insiders' (e.g., firm's executives), or 'support specialists' (e.g., bankers) (Hillman, Cannella, & Paetzold, 2000: 240). As Lynall, Golden, and Hillman point out, "resource dependence theorists argue that boards are vehicles for coopting important external organizations. An implication of resource dependence theory, then, is that each director may bring different linkages and resources to a board" (2003: 418). As a result, tie strength will vary considerably among directors, and the likelihood of emergence of structurally equivalent board members (those with similar patterns of ties to similar others) will be reduced based on variability in the organization's task environment. Structural equivalence in boards of directors can be interpreted as the extent to which board members have similar responsibilities and serve

similar functions (Phillips & Phillips, 1998), that is, whether they are '*substitutable'* to one another in terms of their network ties (Sailer, 1978: 75). This is largely different from traditional conceptions of diversity or heterogeneity in boards of directors in the sense that structural equivalence is a property of relationships or networks, whereas diversity is a property of attributes of individuals constituting a collective entity. Accordingly, variance in actor attributes (e.g., diversity) and variance in the patterns of relationships (e.g., structural equivalence) denote distinct —and potentially additive— aspects of boards. A network may consist of diverse actors at a nodal level, but may constitute of a heterogeneously distributed pattern of relationships at a structural level.

I predict that boards of directors of organizations operating under environmental uncertainty are likely to have relatively fewer structurally equivalent actors in their intraorganizational board network. This may be a result of high turnover rates of directors under conditions of uncertainty (Miller, 1993). Director turnover could occur as a response to poor performance in changing environments or as an attempt to better align the needs of the organization with its environment. Second, organizations that are operating under uncertainty may need to appoint directors who bring differential social capital benefits to the board, thus creating a relatively heterogeneous board network wherein the strength of social relationships varies considerably. Finally, uncertain environments call for organic organizational structures that are characterized by relatively low degrees of functional specialization, formalization, and decentralized decision-making (Burns & Stalker, 1961). Thus, environmental uncertainty may result in the emergence of 'loosely coupled networks' (Brusoni & Prencipe, 2001: 1030; Sine, Mitsuhashi, & Kirsch, 2006: 122), heterogeneous patterns of relationships, or network subgroups with differential average tie strength in each subgroup. Accordingly, I argue that environmental

uncertainty (that occurs under conditions of high hostility, high dynamism, and/or high complexity) (Anderson & Tushman, 2001; Lukas, Tan, & Hult, 2001) is negatively related to the degree of structural equivalence on the intraorganizational network of boards.

Prior research on the organization-environment relationship suggest that dynamism, complexity, and hostility underline the three dimensions of environment (Miller & Friesen, 1983). Environmental dynamism concerns the degree of change/instability of the task environment of an organization (Dess & Beard, 1984). Heterogeneous task environments are more complex to manage, and thus create greater levels of uncertainty for organizations (Dess & Beard, 1984). For instance, in concentrated industries, wherein competition is reduced due to the presence of large organizations dominating the industry, environmental complexity for a focal organization is also reduced (Keats & Hitt, 1988) — though I do not assume that competition is the only source of complexity for firms, it is arguably the most important type for the majority of organizations. Finally, environmental hostility, is a lack of abundance/munificence of resources and/or growth opportunities in an organization's task environment (Covin & Slevin, 1989; Keats & Hitt, 1988). In summary, I expect environments that are dynamic, complex, and hostile, to have a negative influence on structural equivalence on the board network. Formally:

> **Hypothesis 1:** *Environmental uncertainty is negatively related to structural equivalence on the intraorganizational network of the board; that is, greater uncertainty results in more heterogeneous patterns of relationships within intraorganizational board networks.*

Antecedents of Social Cohesion on Boards

The sociological perspective in corporate governance research focuses on the network relationships of directors (Davis, 2005). Researchers' interest in the so-called 'inner-circle' of the business elites (Useem, 1979; 1980), as a distinct social class in American society, has

significantly contributed to the emergence and development of the sociological perspective on corporate governance. One of the core arguments of this literature is that board seats in some of the largest, most powerful corporations are occupied by a cohesive capitalist class of executives/directors, whose interlocking ties connect many organizations, including private and public sector organizations and non-profits (Scott, 1991; Useem, 1979; 1980; 1984). Accordingly, in contrast to the functionalist perspective, the presence of interlock ties is not driven by environmental constraints (e.g., resource dependencies), but rather by the desire to facilitate the realization of the objectives of the capitalist social class, subsequently resulting in "class integration" among capitalists (Mizruchi, 1996: 279).

While interlock research offers an important approach to understanding the existence of a presumably cohesive elite social class that is at the center of organizational networks, it does not consider the level of integration *within* boards of directors. By inferring the strength of ties among a focal board's members, I explore the factors that contribute to social cohesion among directors in intraorganizational networks rather than interorganizational interlocking directorate networks. In light of this, I predict that social cohesion among board members is more likely to occur within boards of directors of prominent organizations (i.e., central), for these organizations are attractive to members of the corporate elite as mechanisms for enhancing their social and economic interests.

For instance, it can be argued that large, publicly traded organizations—as powerful, key institutions in the economy—attract significant capital resources and play a central role in the functioning of the global economy, distribution of welfare, and creation of employment opportunities. Executives and directors who belong to the inner circle of the business elite are likely to be strongly associated with large organizations that have significant influence on the

flow of goods and services, and the total inputs and outputs associated with their respective industries. In fact, early research on board interlocks provided evidence that banks and insurance companies were central in interlocking networks of boards of directors (Mintz & Schwartz, 1981). In addition, large organizations offer a fertile ground for the capitalist class to exert their influence on political institutions by bringing forth the power of corporations through lobbying. The appeal of large corporations in furthering the interests of the capitalist class suggests that larger organizations should exhibit greater levels of social cohesion within intraorganizational networks of boards of directors, as directors representing the inner circle are likely to cluster in these organizations (Useem, 1980; 1984).

In addition, organizations that are embedded in their networks are likely to attract executive-directors or outsider directors who belong to the inner circle of the capitalist social class. Due to uniformity in their goals, it can be suggested that the inner-circle members of the corporate elite class will be more strongly identified with and tied to one another in a nexus of multilayered relationships (Useem, 1984). A positive relationship between organizations' centrality and social cohesion on boards is a natural extension of the social class perspective that was described above. The underlying idea is that boards of directors of organizations that are heavily connected will be comprised of directors who belong to the same social class, have similar affiliation networks, and converge on similar demographic characteristics. The potential overwhelming similarity among directors in terms of the characteristics of their capital may help engender strong network ties among them, facilitating the creation of social cohesion within boards of directors. Accordingly, I suggest that:

Hypothesis 2: *Organizational centrality is positively related to cohesion on the intraorganizational network of the board; that is, greater corporate centrality results in stronger connectivity within intraorganizational board networks.*

Structural Equivalence, Social Cohesion, and Organizational Agency

The relational perspectives on boards of directors have shown that network characteristics of boards predict important organizational level outcomes. Part of this literature focuses on how boards' external networks influence organizational outcomes in the domain of governance policy and organizational strategy. For instance, from the connectionist viewpoint, which focuses on the content of relationships, past research has shown that CEOs imitate interlocked organizations' strategic investments in R&D to a greater extent when they have long tenure as an outside director on the interlocked organization's board and when the interlocked organization's performance is high (Oh & Barker, 2015). From the structuralist viewpoint, which focuses on the configurational properties of networks, Connelly, Johnson, Tihanyi, and Ellstrand (2011) showed that organizations that are closer to the center of the interlocking directorate network are more likely to adopt strategies of other organizations (i.e., enter the Chinese market via greenfield investments).

Although not as prevalent as research on interorganizational networks, a branch of governance theory focuses on the effects of internal relationships within boards of directors on organizational outcomes. For instance, Westphal (1999) has shown that CEO-board social ties (i.e., friendship ties) enhance the likelihood of CEOs seeking advice from members of the board on issues related to strategy. Perhaps a more striking finding of the study is that boards' indirect involvement in strategy through social ties to CEOs may positively influence organizational performance. In fact, research has found this effect to be consistent in different performance

domains. For instance, exploring the effect of social ties (i.e., family and friendship) between CEOs and board members on organizational strategy, Wu (2008) found a curvilinear relationship between CEOs' social ties to board members and organization's innovation performance (i.e., percentage of annual sales associated with new products introduced to market in a three-year period). Gulati and Westphal (1999) found that cooperative ties increase the likelihood of CEO engagement in a strategic alliance with home organizations of those directors who sit on the focal organization's board, whereas board control reduces this tendency. Nevertheless, it is noteworthy that an important stream of research, consistent with the managerialism and agency perspectives, has demonstrated that intraorganizational networks of boards of directors may create opportunities for collusion among directors (e.g. Daily & Dalton, 1994).

In this study, I focus on network characteristics of directors that may be associated with organizational agency outcomes. Specifically, I explore how social cohesion and structural equivalence, two alternative mechanisms of social contagion in networks (Burt, 1987; 1992), influence governance policy and organizational strategy in the form of CEO compensation, diversification, and risk taking. A greater degree of structural equivalence on the board suggests that directors share similar patterns of network relationships. At the dyad level, two actors are considered structurally equivalent to the extent that there is strong overlap between their alters. The contagion literature suggests that actors who are structurally equivalent in a network tend to converge on similar ideas because of the perceived competition among them (Burt, 1987). In this regard, at a micro level, the high degree of convergence that arises from structural equivalence may have a negative impact on socio-cognitive processes of boards of directors. Homogenous networks with structurally equivalent positions may prevent alternative cognitive models from being used in decision processes. This increases the likelihood that organizational agency

problems that arise from group-think will be significantly more likely to occur when boards are characterized by a high degree of structural equivalence.

It should be noted that this argument is not uniformly adopted by prior research. An alternative case could be made that homogeneity in patterns of relationships within board networks may in fact curtail potential agency problems. Research evidence shows that structural equivalence, in line with the purported benefits of social similarity, is associated with enhanced cooperation at the dyadic level (Milton & Westphal, 2005). In a board network that is characterized by high levels of cooperation, agency problems are less likely to surface (Eisenhardt, 1989). When structurally equivalent positions (or equivocal network routes) are created in a network, the principle of checks and balances may be more strongly imposed, for power inherent in network positions is distributed more equally rather than being consolidated in one actor. Overall, there is strong theoretical rationale to expect the following competing hypotheses:

Hypothesis 3: *Structural equivalence on the intraorganizational network of the board will be negatively associated with organizational agency problems.*

Hypothesis 3_{alt}: *Structural equivalence on the intraorganizational network of the board will be positively associated with organizational agency problems.*

In contrast to structural equivalence, social cohesion captures the degree of overall connectivity in a social network. From a socio-cognitive point of view, it can be argued that cohesion may also lead to convergence among group members, as strong ties in a network are associated with greater frequency of interaction among network members (Burt, 1987). As argued above, the absence of network heterogeneity may result in directors having a limited field of vision and understanding of their environment, while creating the potential opportunity for

organizational problems to surface. In fact, building on prior social capital research, Nahapiet and Ghoshal suggested that "strong norms and mutual identification that may exert a powerful positive influence on group performance can, at the same time, limit its openness to information and to alternative ways of doing things" (1998: 245). This suggests that high levels of social cohesion may encourage agency problems through groupthink.

In addition, socially cohesive boards that are comprised of members of the inner-circle, who participate in a network of heavily tied organizations, may be more likely to favor internal governance policies that enhance their welfare as a social class. This intraclass perspective suggests that organizations with socially cohesive boards of directors may be more susceptible to potential agency problems. Prior research provides preliminary support for this prediction. First, evidence exists of active social support among members of the corporate elite (McDonald & Westphal, 2011). In this respect, socially cohesive boards may consider compensatory benefits as a form of social support or reciprocated exchange. Second, within socially cohesive boards, controversial aspects of CEO compensation may be overlooked. Fich and White study strong interlocking directorate ties (i.e., reciprocal ties), and suggest that "a reciprocal CEO interlock is more likely to be an instrument that enhances a CEO's private interests and is less likely to be a corporate governance feature for advancing the interests of the company's shareholders" (2005: 193).

In contrast to the drawbacks of social cohesion, greater levels of social cohesion on the board also imply that the board network is characterized by directors who command a strongly interconnected web of relationships. Sustained communication in cohesive networks tends to be relatively easier as the exit of one actor and dissolution of associated ties may be overcome by other (redundant) relationships in the network. Coleman (1988; 1990), who in network research

is generally considered as one of the proponents of cohesive (closed) networks, suggested that cohesiveness in social networks produces social capital benefits by imposing social norms and sanctions that facilitate coordinated activities. There is also research evidence that cohesive networks help transfer information more effectively (Reagans & McEvily, 2003). These arguments suggest that socially cohesive boards may be better positioned to curtail potential agency costs. Accordingly, I suggest the following competing hypotheses:

> **Hypothesis 4:** *Social cohesion in the intraorganizational network of the board will be negatively associated with organizational agency problems.*
>
> **Hypothesis 4_{alt}:** *Social cohesion in the intraorganizational network of the board will be positively associated with organizational agency problems.*

E. Method

Data and Sample

For this study, I construct a comprehensive dataset, based on secondary (archival) data, comprising information on boards of directors of publicly traded organizations, using the S&P 500 as my sampling frame. I retrieve industry and organizational level data from COMPUSTAT and CRSP databases (e.g., financial performance, diversification, risk-taking, etc.). I use COMPUSTAT, BoardEx, and Execucomp databases as well as the interindustry relationships table from the Bureau of Labor Statistics in order to construct the internal network characteristic of boards of directors and the characteristics of interlocking directorates.

Given the centrality of directors' networks in my study, I began my sample construction with the BoardEx dataset. First, I selected all organizations that were identified as part of the S&P 500 index in the period 2004–2015, inclusive. Second, I manually checked the correspondence between COMPUSTAT identifiers (e.g., company name) and those of BoardEx,

and included in the final statistical analysis only organizations that have an active 9-digit CUSIP code in the COMPUSTAT dataset.

Since the construction of tie strength within each director dyad requires a complete directors' attributes table with non-missing observations in each dimension, for the dimensions that were not readily (or fully) available (e.g., Related Interlocking Directorate, Vertical Interlocking Directorate, Gender, Age, etc.)[5] I used mean replacement, internet search, and decision heuristics to either retrieve data or impute the missing observations. For instance, in constructing the attribute list for each firm-year-director observation, I replaced missing observations for the director's age variable with mean values (mean age was calculated for all directors listed in the full dataset on a year-to-year basis). Other research in strategic management has similarly used mean-replacement to impute missing observations for executive age (e.g., Gamache, McNamara, Mannor, & Johnson, 2015). I retrieved missing information on director's gender via web search (e.g., Bloomberg database, proxy statements, etc.), and when necessary, inferred gender information from directors' names. Similarly, for organizations that did not have an SIC code in the attributes table, I conducted an online search to find the organization's designated SIC number. I mean-replaced total assets based on average asset size for organizations with similar SIC codes when observations were missing (other strategy research has used mean-replacement to impute missing observations related to organizational level variables such as executive compensation [Gamache et al. 2015] and acquisition premiums [Zhu, 2014]). When the firm did not have a designated NAICS code, I inferred classification

[5] An interlocking directorate is considered related when the organizations represented are matched at the 1-digit SIC level. In contrast, a vertical interlocking directorate occurs when represented organizations have an input-output relationship (i.e., industry A sells input to industry B). For more information on this subject matter please refer to Table 1b.

based on NAICS codes of organizations with the same SIC code. The resultant table included 486 S&P 500 firms and 59,627 year-firm-director observations over the 2004–2015 period. Next, I retrieved additional data from multiple databases (e.g., COMPUSTAT Financials, CRSP Historical Segments, Execucomp) to construct the final panel dataset. One firm was dropped from the final analysis because it did not have a corresponding CUSIP ID number. Due to missing data on some of the explanatory and dependent variables, the sample size differs for each of the regression analyses conducted. I report sample sizes and the number of firm-year observations in the corresponding tables.

Measurement

Dependent variables. I used three measures to capture the degree of organizational agency problems. *Organizational diversification* is an entropy measure of product diversification proposed by Jacquemin and Berry (1979). This measurement method is commonly utilized by strategy researchers (e.g., Kang, 2013; Su & Tsang, 2015). The entropy measure is:

$$\sum P_j \ln(\frac{1}{P_j})$$

where P_j is an organization's sales in a given year in each operating segment (4-digit SIC) divided by its total sales across all segments, as reported in COMPUSTAT CRSP dataset. For the purposes of my analysis, I selected only business segments and excluded geographic and operating segments. I also did not account for 'other', 'others', and 'all other' and 'corporate' categories, as these do not reflect segment sales (c.f., Lail, Thomas, & Winterbotham, 2014). In addition, I excluded segments with sales that are equal to or below 0 in order to compute market shares. Diversification scores in my sample range from 0 to ~3.16, with larger values denoting greater levels of diversification. I also excluded organizational segments that cannot be accurately classified due to the absence of SIC codes. Segments with an industrial classification

code equal to or above 9000, denoting establishments in the public sector, were also excluded from the analysis. The measure is computed as a lead variable (that is, measured at time *t+1*, while all other independent and control variables are measured at time *t*). In my robustness analysis, I explored the effects of network characteristics on related and unrelated diversification. Related diversification is computed using the same technique; however, this time by dividing sales at the 2-digit SIC level by total industry sales within the same 2-digit SIC (c.f., Hoskisson & Johnson, 1992). Unrelated diversification is the difference between total diversification and related diversification. Agency research suggests that organizational leaders typically engage in high levels of diversification to reduce their exposure to risk (Amihud & Lev, 1981). In this regard, high levels of diversification could be regarded as a potential agency problem, although the degree of unrelated diversification should also provide a more refined analysis of the board network and agency problems relationship.

Second, I used *strategic risk taking* as an alternative operationalization of organizational agency problems. I combined standardized measures of capital expenditures (capx), research and development expenses (xrd), and long-term debt (dltt) (c.f., Devers, McNamara, Wiseman, & Arrfelt, 2008; Kish-Gephart & Campbell, 2015). To ensure that the use of a composite index was appropriate, I ran a principal component factor analysis, which supported a single-factor solution with an eigenvalue of 1.48 that explains 49.47% of the variance. The factor loadings for capital expenditures, research and development, and long-term debt were .79, .62, and .70, respectively. Following prior research (e.g., Gomez-Mejia, Campbell, Martin, Hoskisson, Makri, & Sirmon, 2013), I replaced missing values of R&D expenditures with 0s. Risk taking was measured as a lead variable at time *t+1*. I consider low levels of risk taking, after controlling for firm, board, and CEO-specific effects, as a potential agency problem.

Following prior research (e.g., Boivie, Graffin, Oliver, & Withers, 2016), I measure *CEO compensation* as the natural logarithm of total CEO compensation (TCD1 in the Execucomp dataset), which includes salary, bonus, stock options, and stock grants obtained in a particular fiscal year (Zhu & Westphal, 2014). CEO compensation is also computed as a lead variable at time *t+1*. Similarly, I consider high levels of CEO compensation, after controlling for firm, board, and CEO-specific effects, a potential agency problem.

Independent variables. I capture *organizational centrality* via two proxies. The first of these measures is *'organizational size',* which is operationalized as the natural logarithm of total assets. I expect that because of their centrality in the economy larger firms will exert greater gravitational pull in interorganizational networks, attracting a more cohesive cluster of the corporate elite members. The second measure of organizational centrality is *'centrality in the interlocking directorate network',* which is operationalized as degree centrality of the organization in the interlocking directorate network (Freeman, 1978). Degree centrality was calculated using the igraph package in R (Csardi & Nepusz, 2006). It was measured based on the one-mode organization-to-organization projection of the two-mode director-to-organization network. Operationally, degree centrality denotes the number of organizations that a focal organization is tied-to in the interlocking directorate network. I included betweenness and closeness centrality as control variables to the extent that they were not highly correlated with degree centrality (or with one another) to capture the effects of conceptually distinct—albeit related—measures of organizational influence in interorganizational networks on organizational agency outcomes.

Following prior research, I operationalized environmental uncertainty via its three dimensions—*dynamism* (instability), *complexity*, and *hostility* (inverse of munificence) (Dess &

Beard, 1984; Miller & Friesen, 1983)—using a popular technique introduced by Keats and Hitt (1988) and the Herfindalh index (Boyd, 1990; 1995). For the purposes of computation of this variable, a firm's task environment is operationalized at the 3-digit SIC code. *Complexity* is measured as the degree of concentration of competitors in an industry (Cooper, Patel, & Thatcher, 2013). Following prior research, I measure complexity using the Herfindahl index, which is the sum of the squared market shares of all firms (Boyd, 1990; 1995), using non-transformed sales in a given 3-digit SIC industry. To get a more accurate representation of market share, I excluded firms with zero or negative sales in each year. When measuring dynamism and hostility, I regress log-transformed industry sales (for the last five years prior to any given data-year) on time. To log transform 0s, I added 1 to all values. This also means that negative sales were excluded from the computation. The regression coefficient—that is, the industry growth rate—represents munificence, which is the inverse of environmental hostility. I reverse code this variable, so that higher values indicate greater levels of environmental hostility. The standard error of the regression coefficient represents environmental dynamism (Keats & Hitt, 1988), wherein higher values indicate greater levels of environmental dynamism.

The indicator variables that are used in the computation of tie strength for dyadic intraorganizational relationships between members of the board and their descriptions are listed in Tables 1a and 1b. Tie strength is operationalized at the dyad level using a composite index that is computed by summing the standardized scores (Bellieveau et al., 1996) assigned to tie formation mechanisms—social similarity, social influence, social exchange, and social history. In order to use network algorithms to calculate equivalence and cohesion, I use a median split and dichotomized the variable such that a tie between two directors exists when tie strength is

above the median tie strength of all director dyads in the sample (see Borgatti, Everett, & Johnson, [2013] for a discussion of dichotomization of valued networks).

I computed *structural equivalence* based on Euclidian distance, which involves summing the squared differences between the columns representing each actor's relationships in the adjacency matrix (Burt, 1976). A lower Euclidean distance score indicates presence of similarity between the patterns of network connections of dyads, in which case the actors would be considered structurally equivalent. In other words, two actors are considered structurally equivalent to the extent that they are tied to similar alters. I compute degree of structural equivalence at the board level using the SNA package in R (Butts, 2007a; 2007b). This algorithm creates an n_{ij} by n_{ij} matrix for each firm-board-year where *n* is the number of nodes on the board network, *i* is an organization's identification number, and *j* is year. I calculated mean scores for each matrix (after excluding the diagonal) to get an average equivalence score in any given firm-board-year observation. To ease interpretation, I reverse coded equivalence, such that a higher value indicates lower average Euclidean distance; that is, higher levels of structural equivalence (or greater network homogeneity) on the board.

I compute *social cohesion* on the board of directors as the degree of vertex connectivity (Moody & White, 2003), using a network algorithm included in the igraph package in R (Csardi & Nepusz, 2006), and I also used average tie strength (McFadyen, Semadeni, & Cannella, 2009) for an alternative analysis. Vertex connectivity captures the robustness of a network to disruptions in the sense that it computes the number of nodes that need to be deleted from a graph to disconnect the network (Moody & White, 2003). Ceteris paribus, it would require more nodes to be deleted to disconnect a strongly connected network and as Moody and White suggest "a collectivity is structurally cohesive to the extent that the social relations of its members hold it

together" (2003: 106). Lastly, average tie strength is computed by taking the average of all vectors in the adjacency matrix for a given board in each year.

Control variables. In the regression models reported in Tables 3 and 4, I control for a set of variables that could potentially influence the agency-related dependent variables (i.e., CEO compensation, diversification, and risk taking). First, when testing Hypotheses 3 and 4, I control for environmental uncertainty (i.e., dynamism, hostility, and complexity) and organizational centrality measures (i.e., organization size and interlock centrality), which were specified as explanatory variables in testing Hypotheses 1 and 2. The rationale for the inclusion of these variables as controls is that strategy and policy decisions are influenced by both internal and external characteristics of organizations (Child, 1972). In addition to degree centrality, I included closeness centrality of organizations in the interlocking directorate to account for organizations' proximity to others in their network (Freeman, 1978). Strategy and policy decisions may also be influenced by the information that organizations can obtain from their alters and closeness centrality could be an important determinant of the type and amount of information that organizations can acquire.

Second, following meta-analytic reviews of the compensation literature, I control for prior year organizational performance, measured as Tobin's q [at – {(ceq + (csho*prcc_ft)}] (Humphery-Jenner, 2014) and return on investment [net income / icapt], which could potentially affect CEO compensation (Tosi, Werner, Katz, & Gomez-Mejia, 2000). These variables were also included in the analysis of organizational strategy variables of risk taking and diversification, given the association between performance and diversification (Hoskisson & Hitt, 1990). I control for firm leverage using the debt to equity ratio [dltt / {(at – ceq + (csho * prffc_f)} / at], as resource availability could be a potential driver of firm diversification, risk

taking, and CEO compensation. To capture a firm's efficiency in the use of its resources, I calculated the ratio of total sales to stockholder equity [sale/teq] and total sales to invested capital [sale/icapt] as measures of external and internal efficiency, respectively.[6]

I also control for a series of variables that have been proposed to influence total CEO compensation including CEO duality, board size, and degree of independence (see Essen, Otten, & Carberry, 2015: 175 for a detailed description of these measures). Given that the structural and compositional dimensions of boards can influence directors' enactment of not only monitoring, but also resource provision role (Hillman & Dalziel, 2003; Johnson et al., 1996), I included these measures as controls in the analysis of risk taking and diversification. I included average number of female directors on the board, average age of directors on the board, and the average number of overlap in directors' tenures on the board as proxies for board dynamics. Overall, by incorporating these measures in my model specification, I aimed to ensure that network-based constructs have predictive validity above and beyond variables that have been typically associated with organizational agency outcomes in prior governance research. In addition, I included CEO level variables such as age and gender to capture differences in CEO's strategic choices and compensation outcomes. Finally, to capture power dynamics within boards, I controlled for alternative operationalizations of network centralization, such as degree and betweenness centralization, to the extent that they are not highly intercorrelated with one another— a decision rule that I applied when including centrality measures of interlocking directorate networks. CEO pay was only included as a control variable in the analyses of diversification and risk taking. I ensured that none of the variables included in my model

[6] More detailed information on these ratios can be found in WRSD Industry Financial Ratio manual made available by WRDS Research Team (2016).

specification has a covariance of .70 or above. The variance inflation factor statistics are also presented in the results section.

When testing the antecedents of social cohesion and structural equivalence (i.e., Hypothesis 1 and 2), I used organizational performance, the number of observed relationships, board centralization, CEO duality and pay, and interlocks closeness in the prior year as control variables. The rationale for the inclusion of these control variables is that they could potentially influence tie formation and dissolution processes in the intraorganizational network of boards. High performing organizations may be subjected to inertial forces that may necessitate fewer changes in their intraboard networks than those of poor performing organizations (Greve, 1998). Given the influence of network density in the formation of subsequent network relationships (Kim, Howard, Pahnke, & Boeker, 2016), I include number of edges at time *t* as a predictor of network cohesion and structural equivalence at time *t+1*.

Degree and betweenness centralization were included in the model to capture the distribution of ties within boards of directors. In centralized boards, the distribution of ties may be more skewed, with centralized actors possessing a greater number of connections (Freeman, 1978). Independent of tie distribution, influential CEOs may exert influence on tie formation in boards of directors, so I capture CEO influence on the board using duality and pay as indicators. A measure of organizational interlock closeness centrality was included in the analysis to capture the potential influence of an organization's external social capital on its internal social capital. As discussed in Hypotheses 2, I expect these two forms of social capital to be related to one another. Interlock closeness denote to proximity of an organization to alters in the interlocking directorate network (Freeman, 1978). Since the information processing needs of close versus

distal organizations will differ, the internal social capital of boards may also show variance depending on the position of the organization in the interlocking directorate network.

Analysis

To analyze the data, I used a series of fixed-effects regression models with robust standard errors, controlling for year effects. Hausman model specification tests (Hausman, 1978) suggested that a fixed effects model is the appropriate approach for majority of the specified models. A few exceptions to this rule were the robustness analyses, where I used a random effects regression with robust standard errors, with year and 1-digit SIC industry controls, to explore the effect of board network characteristics on contingent pay, fixed pay, and unrelated diversification. It should be noted that the results were virtually unchanged with respect to the influence of network variables (i.e., cohesion, structural equivalence) on contingent pay, fixed pay, and unrelated diversification whether I ran a fixed or random effects model.

F. Results

I began the analysis by examining the correlation tables for evidence of potential multicollinearity. Correlations and descriptive statistics are reported in Table 2a and 2b. The output shows that multicollinearity was not an issue as all correlations were under |.70| and the highest correlation was observed between board size and structural equivalence (r = .66). In addition, the variance inflation factor (VIF) statistics observed for the regression models were below 2.4 on average and the highest observed value was 3.48 in the risk-taking model. One exception to this observation was found in the random effects model that included industry SIC codes at the 1-digit level wherein the dependent variable was unrelated diversification. The model generated VIF statistics that significantly above the conventional level of 10. Nevertheless, the significant effect observed in the analysis that I reported below remained

unchanged whether I ran a random effects model with industry controls or a fixed effects model after dropping industry controls. All VIF statistics that were associated with the variables used in the model was below 3.4.

Models 1 and 2 in Table 3 show the effects of environmental uncertainty on structural equivalence. Models 3 and 4 show the influence of firm centrality on social cohesion. In models 5 through 10 in Table 4, I explore the relationship of structural equivalence and social cohesion with organizational agency outcomes. Specifically, Models 5 and 6 show the influence of structural equivalence and social cohesion on CEO compensation. Models 7 and 8 show the effects of structural equivalence and social cohesion on organizational diversification. Finally, the effects of equivalence and cohesion on risk taking are reported in Models 9 and 10. In each model set [1–2, 3–4, 5–6, 7–8, 9–10], I regress the control variables in the first and the explanatory variables in the second step of the regression analysis. The results are interpreted in the following section.

Models 1 and 2 show the results of the test of Hypothesis 1. I did not find evidence of a statistically significant effect of environmental uncertainty on structural equivalence on the board. Furthermore, I did not observe a statistically significant effect on equivalence when dynamism, complexity, and hostility were regressed as a composite index. Interestingly, however, I found that firm centrality influences structural equivalence on the board. Both forms of centrality (i.e., firm size and centrality in the interlock network) have a consistent negative effect on structural equivalence on the board. Overall, the results suggest that while environmental uncertainty does not influence board network heterogeneity from a functional perspective—indicating lack of support for Hypothesis 1—organizations with greater centrality appear to have more homogeneous networks in terms of structural equivalence.

Models 3 and 4 show the effect of firm centrality on cohesion in the intraorganizational network of boards of directors. In line with the intraclass perspective of interlocks, I argued that central firms will have more cohesive intraorganizational board networks. I found that both firm size and centrality in the interlocking directorate network influence social cohesion in boards. As expected, centrally positioned firms in the interlocking directorate have more cohesive boards of directors. This provides statistical support for Hypothesis 2. However, contrary to my expectations, larger firms have less cohesive boards. A potential explanation for this finding is that due to their enhanced visibility in and greater access to the directors' labor market, larger firms appoint diverse members (e.g., minority status directors, novice directors, etc.) to their board, the cumulative effect of which is the emergence of less cohesive board networks. Overall, the results of the analysis lend mixed support for Hypothesis 2.

The competing sets of hypotheses 3–3_{alt} and 4–4_{alt} were tested in Models 5 through 10. As reported in Models 5 and 6, I found no statistically significant relationship between CEO compensation and equivalence or cohesion. In this respect, when total CEO compensation is taken into consideration as an agency problem, no support is found for Hypotheses 3-3_{alt} and 4-4_{alt}. To further diagnose the issue, I regressed these variables on non-contingent CEO pay. I calculated non-contingent pay as the ratio of log-transformed salary and bonus to log-transformed total CEO compensation minus other compensation. I did not find a statistically significant relationship between network measures and the ratio of fixed (non-contingent) CEO compensation either. As a robustness check, I also ran a panel tobit regression with random effects controlling for industry and year effects, given that fixed pay is calculated as a limited dependent variable (i.e., percentage). Again, I did not find a significant effect. Overall, I found no support for Hypotheses 3-3_{alt} or 4-4_{alt} in the domain of CEO compensation.

Models 7–8 show the influence of equivalence and cohesion on diversification. The results show a significant and negative effect of equivalence on total diversification. The effect of cohesion on diversification was not significant. To further examine the relationship, in a subsequent analysis I used a random effects regression and controlled for industry and year effects. I found a significant negative effect of equivalence on unrelated diversification (*p*-value < .05). Interestingly, equivalence and cohesion did not have a significant effect on related diversification. Overall, the results reported in Model 8 provide support for Hypothesis 3 in the domain of total diversification. In addition, the purported benefits of social cohesion or network heterogeneity (i.e., low levels of structural equivalence) were not observed in the domain of related diversification.

Finally, the effects of equivalence and cohesion on firm strategic risk taking are reported in Models 9–10. I observed a non-significant effect of structural equivalence on risk taking. This result fails to provide support for Hypotheses 3 and 3_{alt} in the domain of risk taking. Importantly, there is a significant negative effect of cohesion on risk taking. The results provide support for Hypothesis 4, which suggested that agency problems surface when boards of directors have cohesive intraorganizational networks. In additional analyses not reported here, I used average tie strength and density as alternative measures of board cohesion and found significant negative impact of both measures on risk taking.

G. Discussion

The purpose of this study was two-fold: a) develop a more comprehensive understanding of internal social capital of boards of directors, and b) construct a measure of directors' dyadic tie strength and explore the antecedents and consequences of intraboard network characteristics. I addressed the former issue in the first part of the paper by building on social network dynamics

research (Liben-Nowell & Kleinberg, 2007; McPherson et al., 2001; Monge & Contractor, 2001, Rivera et al., 2010), a behavioral theory of corporate governance (Westphal & Zajac, 2013), and recent theoretical work in corporate governance research (Shropshire, 2010). In the second half of the paper, I developed a measure of tie strength using objective indicators of social mechanisms that create strong ties among directors and tested the antecedents and consequences of network constructs that have been frequently examined in social contagion research: structural equivalence and cohesion (Burt, 1987).

The results of the test of Hypotheses 1 and 2 lend greater credibility to the intraclass perspective on boards of directors (Ornstein, 1984; Palmer, 1983). Both structural equivalence and social cohesion within boards of directors are predicted by organizational centrality rather than the dynamics of the organizational task environment. This calls into question the extent to which boards of directors promote organizational adaptation (Pfeffer & Salancik, 1978), wherein organizations align the composition and structure of their boards with their environment. Nevertheless, more conclusive evidence on this issue will require future research to test tie formation within boards of directors. One of the limitations of this methodology of tie strength inference is that the use of stable dyadic characteristics in the measurement of social similarity (e.g., age) makes it problematic to test tie formation and dissolution over time, because the degree of similarity does not change in these types of dimensions. It would be interesting for future research to separately examine the effects of dynamic-only dimensions underlying tie strength. In this way, social exchange and status categories are more conducive to constructing dynamic network relationships over time.

The results of the tests of Hypotheses 3 and 3_{alt} and 4 and 4_{alt} showed that CEO compensation has no relationship with cohesion or equivalence on the board, even when

alternative measures of cohesion and forms of compensation are used. Cohesion and structural equivalence, as network measures, were most influential in the analyses of agency costs in the context of diversification and risk taking. Specifically, I found that organizations with more structurally equivalent boards engage in lower levels of diversification, while organizations with cohesive boards—whether cohesion is operationalized as vertex connectivity, density, or average tie strength—engage in lower levels of risk taking. An argument can be made from an agency theory perspective to explain these results. First, the results provide some support for the argument that high levels of structural equivalence on the board help directors enact their monitoring responsibilities more effectively by distributing power embedded in social relationships more equally. Second, agency theory suggests that cohesive relationships within boards of directors may engender agency problems by undermining the board's ability to monitor management. The results obtained in the analysis sharply contrast with Westphal's (1999) finding that friendship ties do not compromise boards' monitoring responsibilities. An intriguing question that arises from these cumulative findings is under what circumstances cohesion could be beneficial or detrimental. It would be fruitful for future research to explore the contingencies that influence the relationship between board cohesion and organizational agency outcomes.

H. Conclusion

The results of the study demonstrate that inferring tie strength from archival data has promise to extend current understanding of organizational agency problems. The findings suggest that both structural equivalence and social cohesion on boards of directors are important predictors of organizational agency problems. Furthermore, the study offers an important step toward better understanding the antecedents of board network design from both functional and

sociological perspectives in corporate governance. For theoretical parsimony, in this paper I only examined a small portion of potentially interesting constructs from a network theory perspective, leaving room for future research in this area to build on the findings reported herein. I hope that the work presented here will set a precedent for future research using network analytic approach in the context of boards of directors.

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J. Figures and Tables

Figure 1: A Model of the Antecedents and Consequences of Characteristics of Intraorganizational Networks of Boards of Directors

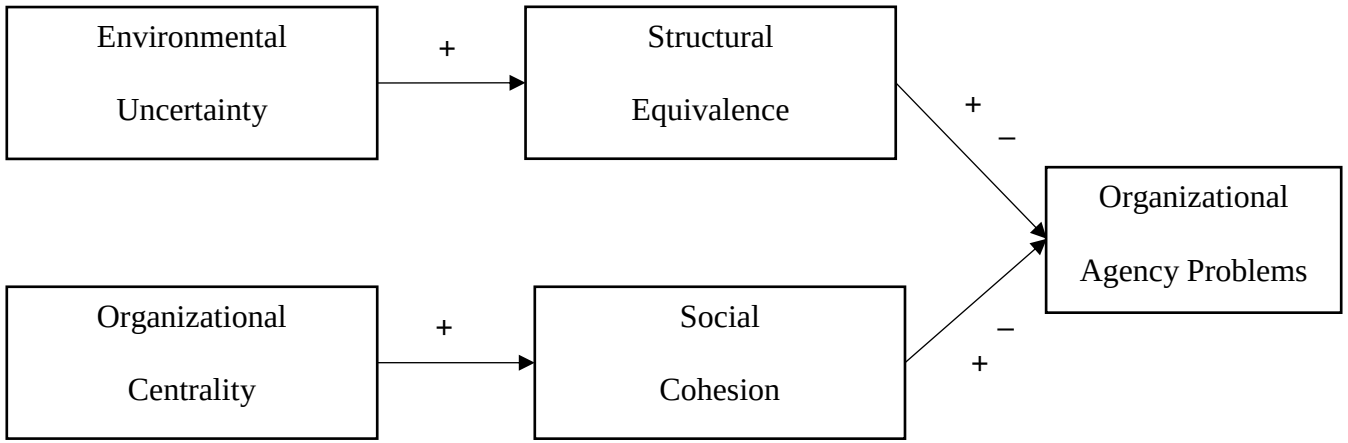

Table 1a: Constructing Intraorganizational Ties of Boards of Directors and Inferring Tie Strength from Objective Indicators

Indicator Variable	Social Similarity	Social Influence	Social Exchange	Social History
Co-Dependent	1			
Co-Independent	1			
Co-Gender	1			
Co-Oldsters	1			
Co-Youngsters	1			
Age Similarity	1			
Honorific Title	1			
Military Title	1			
Administrative Title	1			
Public Service Title	1			
Pro Directors	1			
Novice Directors	1			
Current Board Seats		1		
Firm Committee Seats		1		
Firm Committee Chairs		1		
Committee Chairs Local		1		
Committee Financial Expert Global		1		
Prestige		1		
Co-Financial Expert			1	
Co-Hierarchical Standing			1	
Related Interlocking Directorate			1	
Vertical Interlocking Directorate			1	
Overlap in Board Tenure				1
Co-Committee Membership				1

Table 1b: Descriptions of Dyadic Variables used in the Construction of Tie Strength

Indicator Variable	Description
Co-Dependent	Both directors are non-independent directors
Co-Independent	Both directors are independent directors
Co-Gender	Both directors are female
Co-Oldsters	Both directors are within the 75th quartile of the sample in age
Co-Youngsters	Both directors are within the 25th quartile of the sample in age
Age Similarity	Absolute difference in directors age (reverse coded)
Honorific Title	Both directors hold honorific titles (e.g., Lord, Duke, Lady, etc.)
Military Title	Both directors hold military titles (e.g., Admiral, General, etc.)
Administrative Title	Both directors hold administrative titles (e.g., Senator, Governor, etc.)
Public Service Title	Both directors hold public servant titles (e.g., Doctor, Professor, Dean, etc.)
Pro Directors	Both directors are within the 75th quartile of the sample in tenure
Novice Directors	Both directors are within the 25th quartile of the sample in tenure
Current Board Seats	Absolute difference in the number of current boards seats held
Firm Committee Seats	Absolute difference in the number of committee seats held on the board
Firm Committee Chairs	Absolute difference in the number of committee chairmanships held on the board
Committee Chairs Local	Absolute difference in the number committee chairmanships held in S&P 500 firms
Committee Financial Expert Global	Absolute difference in the number financial expert position held all BoardEx firms
Prestige	Absolute difference in the maximum asset size of S&P 500 firms on which the directors serve
Co-Financial Expert	Both directors are financial experts on the board (assumed communication link)
Co-Hierarchical Standing	Both directors hold hierarchical title on the board (i.e., CEO, Chairman, Lead Independent Director, Committee Chair) (assumed communication link)
Related Interlocking Directorate	Other firms on which directors serve are matched at the 1-digit SIC level
Vertical Interlocking Directorate	Other firms on which directors serve are vertically related, that is their representative industries (based on 2-digit NAICS code) have a non-zero input-output. Bureau of Labor Statics' interindustry sales table was used in the construction of this table.
Overlap in Board Tenure	Overlap in tenure of directors [1 – abs(tenure_dir_a – tenure_dir_b)/(tenure_dir_a + tenure_dir_b)]: missing values due to calculation error were replaced with 0.
Co-Committee Membership	Directors serve on the same committee on the focal firm's board.

Table 2a: Descriptive Statistics and Correlations – Antecedents Model

#	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7
1	Equivalence	2.63	0.51	1.00						
2	Cohesion	2.20	1.59	0.19	1.00					
3	Tobin's Q $_{log}$	0.59	0.48	0.17	-0.11	1.00				
4	ROI	0.11	0.16	0.03	0.02	0.33	1.00			
5	Board Edges	56.58	37.59	-0.28	0.57	-0.21	0.00	1.00		
6	Degree Centralization	0.39	0.15	-0.27	-0.22	0.02	0.01	-0.09	1.00	
7	Betw. Centralization	0.24	0.17	-0.04	-0.47	0.12	0.00	-0.44	0.60	1.00
8	CEO Total Pay $_{log}$	8.86	1.29	-0.09	0.13	-0.08	0.03	0.17	0.00	-0.10
9	CEO Duality	0.59	0.49	-0.02	0.13	-0.06	0.02	0.07	0.01	-0.06
10	Dynamism	0.05	0.05	-0.07	0.08	-0.19	-0.04	0.13	0.01	-0.05
11	Complexity	0.81	0.21	0.15	-0.04	0.15	0.01	-0.19	0.00	0.06
12	Hostility	-3.11	0.15	-0.07	-0.03	-0.12	-0.07	0.01	0.02	0.02
13	Org. Int. Close Cent	-0.10	0.91	-0.18	0.18	-0.03	0.04	0.21	0.04	-0.14
14	Org. Int. Degree Cent	3.96	3.37	-0.23	0.41	-0.08	0.07	0.50	0.02	-0.34
15	Org. Size $_{log}$	9.52	1.44	-0.31	0.29	-0.53	-0.08	0.47	-0.01	-0.24

Note: Correlations and descriptive statistics Equivalence (first column) were calculated based on 4657 firm-year observations All other statistics were calculated based on 4658 firm-year observations.

Table 2a (Cont.)

#	Variable	8	9	10	11	12	13	14	15
8	CEO Total Pay log	1.00							
9	CEO Duality	0.10	1.00						
10	Dynamism	0.03	0.02	1.00					
11	Complexity	0.00	-0.03	-0.47	1.00				
12	Hostility	-0.01	0.05	0.47	-0.29	1.00			
13	Org. Int. Close Cent	0.16	0.04	0.01	-0.02	0.00	1.00		
14	Org. Int. Degree Cent	0.23	0.15	0.08	-0.05	0.02	0.48	1.00	
15	Org. Size log	0.23	0.11	0.25	-0.17	0.15	0.27	0.51	1.00

Note: Correlations and descriptive statistics Equivalence (first column) were calculated based on 4657 firm-year observations All other statistics were calculated based on 4658 firm-year observations.

Table 2b: Correlations and Descriptive Statistics – Consequences Model

#	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12
1	CEO Pay	8.94	1.23	1.00											
2	Diversification	0.80	0.68	0.09	1.00										
3	Risk Taking	0.05	2.01	0.10	0.11	1.00									
4	Dynamism	0.05	0.05	0.03	0.01	0.06	1.00								
5	Complexity	0.81	0.21	0.01	-0.03	0.06	-0.43	1.00							
6	Hostility	-3.11	0.15	0.00	0.00	0.02	0.38	-0.27	1.00						
7	Org. Int. Degree Cent	3.99	3.36	0.23	0.20	0.44	0.08	-0.04	0.02	1.00					
8	Org. Int. Close Cent	0.01	0.99	0.17	0.05	0.17	0.00	-0.02	0.01	0.46	1.00				
9	Org. Size	9.55	1.43	0.22	0.24	0.58	0.21	-0.17	0.14	0.51	0.28	1.00			
10	Tobin's Q	0.59	0.48	-0.08	-0.24	-0.09	-0.17	0.14	-0.11	-0.09	-0.03	-0.53	1.00		
11	ROI	0.11	0.17	0.01	-0.01	0.00	-0.03	0.00	-0.07	0.07	0.03	-0.08	0.31	1.00	
12	Debt-Equity Ratio	6129.85	21460.38	0.08	0.10	0.52	0.21	-0.20	0.15	0.27	0.09	0.52	-0.24	-0.09	1.00
13	Efficiency_e	2.60	25.47	0.01	0.03	-0.02	0.03	-0.04	0.02	0.02	0.01	0.01	0.01	0.03	-0.01
14	Efficiency_i	1.47	1.98	0.03	-0.05	-0.06	0.00	-0.10	-0.04	0.09	0.06	-0.11	0.16	0.40	-0.10
15	Board Size	10.70	2.46	0.17	0.11	0.24	0.16	-0.22	0.08	0.43	0.24	0.51	-0.27	-0.01	0.23
16	Avg. # Independents	0.86	0.07	0.16	0.09	0.11	0.08	-0.09	0.03	0.26	0.21	0.26	-0.15	-0.02	0.08
17	Avg. # Females	0.16	0.09	0.11	0.11	0.14	0.03	-0.11	0.06	0.29	0.28	0.26	-0.05	0.05	0.09
18	Avg. Age of Directors	61.61	3.31	0.16	-0.01	0.06	0.00	-0.04	0.04	0.04	0.08	0.20	-0.14	-0.01	0.06
19	Dir. Tenure Overlap	0.59	0.13	-0.04	-0.09	-0.04	0.00	0.00	-0.05	-0.05	-0.07	-0.03	0.03	0.01	0.00
20	CEO Total Pay	8.89	1.23	0.80	0.09	0.08	0.03	0.00	0.00	0.25	0.18	0.24	-0.08	0.02	0.08
21	CEO Duality	0.59	0.49	0.09	0.04	0.06	0.02	-0.04	0.05	0.15	0.02	0.11	-0.06	0.02	0.04
22	CEO Age	56.32	6.12	0.07	0.03	0.03	0.02	-0.07	0.07	0.02	0.01	0.12	-0.10	-0.01	0.03
23	CEO Gender	0.03	0.17	0.05	0.07	0.03	0.01	-0.06	-0.01	0.07	0.08	0.07	-0.01	0.02	0.00
24	Degree Centralization	0.39	0.15	0.02	0.01	-0.01	0.01	-0.01	0.02	0.03	0.06	-0.01	0.02	0.02	0.01
25	Betw. Centralization	0.24	0.17	-0.09	-0.08	-0.17	-0.05	0.05	0.02	-0.33	-0.10	-0.23	0.12	0.00	-0.10
26	Equivalence	2.65	0.54	-0.10	-0.07	-0.13	-0.06	0.13	-0.07	-0.24	-0.18	-0.30	0.18	0.02	-0.15
27	Cohesion	2.27	1.72	0.11	0.09	0.20	0.08	-0.05	-0.03	0.40	0.15	0.28	-0.11	0.02	0.12

Note: Correlations and descriptive statistics CEO pay and diversification were calculated based on 4990 firm-year observations for CEO pay (first column) and 3896 observations for diversification (second column). All other statistics were calculated based on 5022 firm-year observations.

Table 2b (Cont.)

#	Variable	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
13	Efficiency_e	1.00														
14	Efficiency_i	0.14	1.00													
15	Board Size	0.02	-0.02	1.00												
16	Avg. # Independents	0.00	-0.01	0.24	1.00											
17	Avg. # Females	0.03	0.11	0.16	0.18	1.00										
18	Avg. Age of Directors	0.01	-0.02	0.11	0.09	-0.04	1.00									
19	Dir. Tenure Overlap	-0.04	-0.03	-0.12	-0.01	-0.06	0.04	1.00								
20	CEO Total Pay	0.02	0.03	0.18	0.16	0.12	0.15	-0.03	1.00							
21	CEO Duality	0.01	-0.01	0.04	0.11	0.07	0.05	0.03	0.10	1.00						
22	CEO Age	0.01	0.00	0.11	0.00	0.01	0.36	0.01	0.08	0.23	1.00					
23	CEO Gender	-0.03	0.02	0.04	0.07	0.24	-0.03	0.00	0.05	0.00	-0.04	1.00				
24	Degree Centralization	0.02	0.02	0.07	0.04	0.04	-0.01	-0.27	0.01	0.01	-0.03	0.02	1.00			
25	Betw. Centralization	0.01	0.03	-0.18	-0.11	-0.01	-0.06	-0.28	-0.10	-0.06	-0.08	-0.02	0.60	1.00		
26	Equivalence	-0.05	-0.02	-0.65	-0.14	-0.14	-0.11	0.42	-0.10	-0.01	-0.07	-0.02	-0.33	-0.07	1.00	
27	Cohesion	-0.02	-0.04	0.28	0.14	0.02	0.02	0.40	0.12	0.11	0.08	0.02	-0.30	-0.57	0.27	1.00

Note: Correlations and descriptive statistics CEO pay and diversification were calculated based on 4990 firm-year observations for CEO pay (first column) and 3896 observations for diversification (second column). All other statistics were calculated based on 5022 firm-year observations.

Table 3: Antecedents of Board Structural Equivalence and Cohesion

	Structural Equivalence				Cohesion			
	Model 1		Model 2		Model 3		Model 4	
	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig
Constant	3.89	**	3.85	**	0.31		1.56	†
	0.23		0.28		0.58		0.80	
Tobin's Q $_{log}$	-0.05		-0.06	†	0.09		0.02	
	0.03		0.04		0.11		0.10	
ROI	0.03		0.03		0.12		0.12	
	0.03		0.03		0.09		0.09	
Board edges	0.00		0.00		0.02	**	0.01	**
	0.00		0.00		0.00		0.00	
Degree Centralization	-0.48	**	-0.47	**	-0.45	*	-0.53	*
	0.08		0.08		0.21		0.20	
Betw. Centralization	0.18	**	0.18	**	-0.47	*	-0.37	*
	0.06		0.07		0.19		0.18	
CEO Duality	0.04	*	0.03	†	0.13	*	0.13	*
	0.02		0.02		0.06		0.06	
CEO Total Pay $_{log}$	0.01		0.01		0.04		0.05	
	0.01		0.01		0.04		0.04	
Org. Int. Close Cent	0.01		0.01		0.03		-0.01	
	0.01		0.01		0.03		0.03	
Org. Int. Degree Cent	-0.01	*	-0.01	†			0.06	**
	0.01		0.01				0.02	
Org. Size $_{log}$	-0.12	**	-0.13	**			-0.17	*
	0.03		0.03				0.08	
Dynamism			0.32		1.69	**	1.71	**
			0.20		0.53		0.52	
Complexity			0.01		-0.04		-0.06	
			0.08		0.25		0.25	
Hostility			-0.04		-0.32	*	-0.34	*
			0.04		0.14		0.14	
Year fixed effects		Yes				Yes		
R-squared within	0.07		0.07		0.14		0.15	
F Statistic	6.66		5.88		12.36		12.92	
N of firm-year observations	4860		4657		4658		4658	
N of firms	482		471		471		471	

† p < .10; * p < .05; ** p < 0.01

$_{log}$ = log transformed

Table 4: Consequences of Board Structural Equivalence and Cohesion

	CEO Total Pay $_{log}$				Total Diversification				Risk Taking			
	Model 5		Model 6		Model 7		Model 8		Model 9		Model 10	
Variable	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**
Constant	3.80	*	3.37	†	0.18		0.43		-6.13	**	-6.05	**
	1.72		1.83		0.53		0.54		1.72		1.78	
Dynamism	-0.14		-0.17		-0.19		-0.19		0.08		0.11	
	0.24		0.25		0.24		0.24		0.33		0.33	
Complexity	0.01		0.01		-0.15		-0.16		0.23		0.24	
	0.17		0.17		0.11		0.11		0.23		0.23	
Hostility	0.00		0.01		-0.13		-0.13		0.06		0.05	
	0.13		0.13		0.09		0.09		0.10		0.10	
Org. Int. Degree Cent	0.00		0.00		0.01		0.01		-0.02		-0.01	
	0.01		0.01		0.01		0.01		0.02		0.02	
Org. Int. Close Cent	0.01		0.01		-0.01		-0.01		-0.03		-0.03	
	0.02		0.02		0.01		0.01		0.02		0.02	
Org. Size $_{log}$	0.44	*	0.44	*	0.11	**	0.11	**	0.61	**	0.61	**
	0.20		0.20		0.03		0.03		0.15		0.15	
Tobin's Q $_{log}$	0.47	**	0.47	**	0.00		0.00		0.03		0.03	
	0.13		0.13		0.04		0.04		0.10		0.10	
ROI	0.01		0.01		0.00		0.00		0.10		0.10	
	0.09		0.09		0.04		0.04		0.09		0.09	
Debt-Equity Ratio	0.00	**	0.00	**	0.00		0.00		0.00	**	0.00	**
	0.00		0.00		0.00		0.00		0.00		0.00	
Efficiency_e	0.00		0.00		0.00		0.00		0.00		0.00	
	0.00		0.00		0.00		0.00		0.00		0.00	
Efficiency_i	0.01		0.01		0.00		0.00		0.00		0.00	
	0.01		0.01		0.01		0.01		0.01		0.01	
Board Size	0.00		0.01		0.00		-0.01		0.00		0.00	
	0.01		0.02		0.01		0.01		0.02		0.02	
Avg. # Independents	0.58		0.55		0.11		0.13		-0.19		-0.19	
	0.42		0.41		0.21		0.21		0.36		0.36	

† $p < .10$; * $p < .05$; ** $p < 0.01$

Table 4 (Cont.)

	CEO Total Pay $_{log}$				Total Diversification				Risk Taking			
	Model 5		Model 6		Model 7		Model 8		Model 9		Model 10	
Variable	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**	**Coef**	**Sig**
Avg. # Females	-0.13		-0.07		0.13		0.13		-0.03		-0.09	
	0.38		0.38		0.16		0.16		0.41		0.41	
Avg. Age of Directors	0.01		0.01		-0.01	†	-0.01	†	0.01		0.01	
	0.02		0.02		0.01		0.01		0.02		0.02	
Dir. Tenure Overlap	-0.20		-0.36		0.02		0.04		-0.05		0.10	
	0.22		0.25		0.08		0.09		0.16		0.14	
CEO Total Pay $_{log}$					-0.02	*	-0.02	*	0.01		0.01	
					0.01		0.01		0.17		0.17	
CEO Duality	0.10	**	0.10	**	-0.01		-0.01		0.08	*	0.08	*
	0.03		0.03		0.02		0.02		0.04		0.04	
CEO Age	0.00		0.00		0.00		0.00		-0.01		-0.01	
	0.01		0.01		0.00		0.00		0.01		0.01	
CEO Gender	0.26		0.25		-0.02		-0.01		0.13		0.13	
	0.19		0.19		0.06		0.06		0.17		0.17	
Degree Centralization	0.01		0.08		0.02		-0.02		0.15		0.13	
	0.20		0.22		0.07		0.07		0.15		0.13	
Betw. Centralization	-0.09		-0.08		-0.02		0.02		-0.02		-0.10	
	0.09		0.10		0.06		0.06		0.18		0.18	
Equivalence			0.11				-0.06	*			-0.02	
			0.08				0.03				0.08	
Cohesion			0.02				0.01				-0.04	*
			0.01				0.01				0.02	
Year fixed effects		Yes				Yes				Yes		
R-squared within	0.09		0.09		0.09		0.09		0.26		0.26	
F Statistic	15.26		14.36		9.91	**	9.43	**	13.76		13	
N of firm-year observations	4991		4990		3896		3896		5023		5022	
N of firms	473		473		404		404		473		473	

† p < .10; * p < .05; ** p < 0.01

$_{log}$ = log transformed

IV. Chapter III: Networks within Networks: Interorganizational Imitation of Corporate Strategic Activity via Directors' Intra- and Interorganizational Network Ties

A. Abstract

Do interlocked organizations converge on similar strategies as ideas diffuse in organizational environments? Research on interorganizational networks has provided important evidence that to cope with competitive uncertainty, interlocked organizations imitate one another's strategic choices. Building on this notion, this paper examines imitation of corporate strategic decisions among interlocked organizations, while accounting for the influence of interlocking directors' embeddedness in intraorganizational board networks and the characteristics of these networks. By exploring imitation through a focus on the intersection of intra- and interorganizational networks of directors, I provide an empirical test of the notion that interlocking directorates may transfer corporate-level information more effectively depending on the characteristics of intraorganizational board networks, contributing to our understanding of the conditions that make interlocking directorates matter. Results show that prior acquisition activity of an organization's alters in the interlocking directorate network has a stronger influence on the focal organization's subsequent acquisition activity when interlocking directors occupy central positions in the intraboard networks of interlocked organizations.

B. Introduction

Interlocking directorates are one of the more comprehensively studied networks in the strategic management literature. An interlocking directorate, or more commonly board interlock, is an interorganizational network relationship formed when a director becomes affiliated with two or more boards of directors (Mizruchi, 1996; Scott, 1991; 1997). The analysis of these affiliation networks has a long history, dating back to the early 20th century (Scott, 1997).[7] Much of the initial interest in interlocking directorates is attributable to their legal and socio-political implications. Interlocking directorates can be consequential to interorganizational competition, for instance, when organizations representing intraindustry interlocks engage in collusion (Bazerman & Schoorman, 1983; Buch-Hansen, 2014). Interlocks were also regarded as central to our understanding of the social structure of power and control, and the allocation of resources embedded within interorganizational linkages (Domhoff, 1967; Useem, 1979).

In the latter half of the last century, management theorists have considered interlocking directorates as instruments of cooptation and coordination (Allen, 1974; Aldrich, 1979; Burt, Christmen, & Kilburn, 1980; Pfeffer & Salancik, 1978), highlighting their key role in organizations' enactment of their environments. Director interlocks are mechanisms that facilitate the management of environmental uncertainties (Pfeffer & Salancik, 1978). But they also serve an alternative purpose: they are conduits for the transfer of knowledge-based resources (Mariolis & Jones, 1982), a byproduct of which is deliberate or inadvertent diffusion of strategic decisions among organizations (Shropshire, 2010). As the early research on organizational contagion and diffusion has demonstrated (Davis, 1991; Haunschild, 1993; Haunschild &

[7] In their analysis of corporate elite networks, Chu and Davis (2016) suggest that Brandeis's (1914) work marks the beginning of the rise in scholarly work on interlocking directorates.

Beckman, 1998; Palmer, Jennings, & Zhou, 1993; Westphal, Seidel, & Stewart, 2001), interlocking directorates can influence organizational decisions in areas of corporate, competitive, and cooperative strategy as well as organizational structure. As more recent studies show (Connelly, Johnson, Tihanyi, & Ellstrand, 2011; Tuschke, Sanders, Hernandez, 2014; Zhu, 2013), corporate expansion decisions (e.g., mergers and acquisitions, foreign market entry, etc.) are still of major interest to research on interlocking directorates and organizational imitation.

A critical assumption of the literature on interorganizational imitation and diffusion of corporate strategic activity is that members of the board fulfilling the interlocking directorship role are well-positioned to extract knowledge from one organization and disseminate it to another (Palmer & Barber, 2001). The argument that resonates within much of the interlock literature is that the likelihood of knowledge transfers between a focal organization (ego) and its ties (alters) increases significantly when the focal organization and its alters are interlocked. Institutional theory's contention that when faced with uncertainty organizations undertake isomorphic change by adopting design elements and features of other organizations in their environment (DiMaggio & Powell, 1983) underlies this argument. Resource dependence literature extends this argument by exploring the direction of isomorphic change—the question of who imitates whom— incorporating the concepts of power, dependency, and control (see Hillman, Withers, Collins, [2009]; Casciaro & Piskorski, [2005], Pfeffer & Salancik, [1978], and Zona, Gomez-Mejia, & Withers, [2015] for a discussion of these concepts) in the imitation literature. While board memberships are the underlying pipelines through which knowledge flows from one organization to another, the literature suggests that prevalent practices emanate from central, powerful, prestigious, and successful organizations to alters that lack these characteristics (Connelly et al., 2011). In practice, the process of knowledge transfer may break

down independent of the characteristics of organizations if the interlocking director does not have the means to extract or acquire knowledge (learn) from alters, or fails to put the acquired knowledge to use (implement) in the focal organization, a point that was also echoed in recent theoretical research on board interlocks (Shropshire, 2010).

The objective of this paper is to empirically test these ideas by focusing on interorganizational imitation of acquisition decisions in the context of interlocking directorate networks.[8] Recent research on interorganizational imitation and interlocks has begun to explore the conditions under which practice adoption by interlinked organizations is more likely to occur (e.g., Connelly et al., 2011; Sanders & Tuschke, 2007; Shipilov, Greve, Rowley, 2010; Shropshire, 2010; Tuschke et al., 2014). I contribute to this line of research by empirically testing whether internal board network characteristics interact with alters' corporate expansion decisions (i.e., acquisitions) to predict a focal organization's expansion decisions (i.e., acquisitions). Specifically, I focus on two network characteristics that can facilitate (or constrain) knowledge acquisition and implementation on boards of directors: a) interlocking directors' centrality in intraorganizational board networks, and b) average tie strength of the intraorganizational board networks. In so doing, I use network methodology to estimate the magnitude of the effect of structural and relational characteristics of *intra*organizational board networks on *inter*organizational imitation. The analytical technique that I use has been used in prior research on board interlocks, and can be described as the "systematic network analysis mapping the social organization of business power" (Carroll & Sapinski, 2011: 180); yet, I apply this technique to not only between-organization but also within-organization networks.

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[8] For the purpose of this paper, I define organizational imitation as the process wherein a focal organization's agents (i.e. directors) become acquainted with, adopt, and implement strategic decisions that resemble those of the organization's alters.

I begin with a brief review of the organizational imitation literature in the context of board interlocks. In this section, I also present a summary of the research that focuses on the relationship between interlocking directorates and acquisitions. I then introduce my hypotheses concerning the relationship between network characteristics and interorganizational imitation in the form of corporate acquisition activity. I conclude with a discussion of the major implications of the study's findings for extant theory and research.

C. Interorganizational Diffusion of Corporate Strategic Activity via Board Interlocks

Interlocking directorates are dyadic interorganizational ties (Fennema & Schijf, 1978) that are formed when a director is affiliated with two or more organizations (Mizruchi, 1996). From a functional perspective, interlocking directorates are relational mechanisms that facilitate organizations' cooptation of their environments and reduce environmental uncertainty (Pfeffer & Salancik, 1978). Cooptation, as defined by Selznick, is "the process of absorbing new elements into the leadership or policy-determining structure of an organization as a means of averting threats to its stability or existence" (1948: 34; 1949: 13). Uncertainty occurs when organizations cannot make accurate predictions about their environment due to inconsistent information or lack of sufficient information (Milliken, 1987), resulting in a major threat to an organization's stability or existence. Dependence on other organizations for the provision of resources is an impediment to organizations' ability to make accurate predictions into the future, and thus constitutes a major source of variation and instability (Pfeffer & Salancik, 1978).

Theory suggests that interlocking directorates reduce uncertainty to the extent that they can serve as sustained channels of resource exchanges among organizations. Coopted directors are believed to become sympathetic of a focal organizations' needs and priorities over time, becoming motivated to provide (or facilitate the provision of) resources that are critical to the

effective functioning of the focal organization, thus reducing uncertainty (Pfeffer & Salancik, 1978). Haunschild and Beckman (1998) suggest that board interlocks are omnipresent because they possess information-based advantages. The authors ask:

> "[W]hy is the information conveyed through interlocks so influential? Likely reasons are that interlocks can be inexpensive, trustworthy, credible information sources. Interlocks are low-cost sources in that directors are required for all public firms, and the information that comes from a director is thus an inexpensive by-product of such mandated relationships" (1998: 817).

A series of studies since 1990s have investigated whether information indeed diffuses between organizations, and whether this diffusion manifests itself as interorganizational imitation in areas of organizational practices and routines, strategy, and structure. Research to date has examined the effects of interlocking directorates on corporate contributions to charitable organizations (Galaskiewicz, 1997; Galaskiewicz & Wasserman, 1989), contributions to political candidates (Mizruchi, 1992), corporate acquisition activity (Haunschild, 1993; Palmer & Barber, 2001; Westphal et al., 2001), acquisition premiums paid (Haunschild, 1994), acquisition relatedness (Westphal et al., 2001), international market entry (Connelly et al., 2011; Tuschke et al., 2014), alliance formation (Gulati & Westphal, 1999), adoption of the position pill (Davis, 1991), stock options (Sanders & Tuschke, 2007), option backdating (Bizjak, Lemmon, & Whitby, 2009), adoption of reformist board practices (Shipilov, Greve, & Rowley, 2010), adoption of the multidivisional organizational form (Palmer, Jennings, & Zhou, 1993), and executive and director appointments (Carpenter & Westphal, 2001; Williamson & Cable, 2003). Research in this tradition has recurrently corroborated the idea that interlocking directorates are a source of external social capital for organizations that engender informational benefits.

Recent research on board interlocks and interorganizational imitation has begun to recognize that the likelihood that an organization will take advantage of informational benefits

from their social context is contingent on the characteristics of interlocking directorates. For instance, studying the multi-wave diffusion of board practices in Canada, Shipilov and colleagues (2010) found that the effect of interlocks on mimetic adoption (in the second wave) diminishes for organizations that have already adopted some of these reformist practices (in the first wave). Connelly and colleagues (2011) found that the likelihood of mimicry among interlocked organizations in terms of international market entry is higher when prior adopters have been successful with the use of the strategy. Tuschke and colleagues (2014) investigated whether the characteristics of interlocking directorates and those of interlocked directors explain the differential rate at which boards mimic other organizations' market entry choices. The authors distinguished between three types of interlocks: incoming, ongoing, and indirect, and examined their interaction with a) type of learning experience, b) type of director forming the interlock, and c) focal firm's prior experience with the target market. Recently, Shropshire argued that interorganizational diffusion, that is transfer of knowledge among organizations, is more likely "[…] when interlocking directors are more likely to have and contribute their experience in the boardroom […], and […] when that outside knowledge is more likely to influence board decision making […]" (2010: 249). The abovementioned empirical studies provide important evidence for these contentions.

In this study, I focus on interorganizational imitation of corporate strategic activity, particularly acquisition activity. Acquisitions are long-term strategic decisions that involve the use of significant organizational resources in the purchase of a controlling stake at target organizations. They are ubiquitous, albeit difficult to implement, corporate strategic actions that organizations undertake to expand inorganically and to acquire new resources (Hitt & Ireland, 1985). Acquisitions may help not only reduce organizations' dependence in their resource

environments (Pfeffer, 1972; Pfeffer & Salancik, 1978), but also create "market imperfections" (Wernerfelt, 1984: 175) and develop synergies [with target organizations] (Barney, 1988) as a basis of competitive advantage in the post-acquisition period.

Given their long-term consequences on an organization's strategic orientation, the decision to acquire another organization confronts leaders with uncertainty. Searching and selecting the right acquisition target, assessing the target's resources in terms of their quality as well as relatedness to and compatibility with those of the focal organization may all represent major sources of uncertainty for strategic leaders. One efficient way for organizations to deal with uncertainty underlying acquisitions is to adopt decision outcomes of other organizations as part of a vicarious learning process (Tuschke et al., 2014). Prior research using relational perspectives (e.g., organizational learning, network theory, institutional theory) on acquisitions has shown that a focal organization's acquisition decisions are indeed not isolated from those of other organizations in their environment. As mentioned above, organizations that are connected via interlocking directorates have been shown to imitate one another's acquisition strategies with respect to total number of acquisitions (Haunschild, 1993; Westphal et al., 2001), acquisition premiums (Haunschild, 1994), and type of acquisitions (i.e., related/unrelated acquisitions, see Westphal et al., [2001] for a description). Furthermore, as Palmer and Barber (2001) have shown directors' network embeddedness (e.g., social club memberships, outgoing ties to interlocked alters) is a predictor of corporate acquisition activity, especially during waves of elevated acquisition activity among industry organizations.

Following this line of research, in this study, I focus on organizations' decisions to engage in acquisitions, that is, corporate acquisition activity. For this study, I define corporate acquisition activity as the cumulative set of expansion decisions that a focal organization

commits to in a (given) period and that it completes over time by purchasing a controlling stake of another organization. Boards of directors are believed to be maximally involved in the strategic decision-making process in the case of acquisitions (Westphal et al., 2001), considering the fact that these decisions are highly scrutinized by investors, shareholders, media, and other important stakeholder groups. In the context of acquisition decisions, the forces underlying mimetic isomorphic change in the form of adoption of other connected organizations' decision outcomes is likely to be strong in magnitude, facilitating interorganizational imitation— a contention that has been corroborated in prior research (Haunschild, 1993; Westphal et al. 2001). Below, I discuss how a consideration of the characteristics of intraorganizational board networks adds to our understanding of the extent to which interlocked organizations imitate one another's decision to engage in acquisitions.

D. Intraorganizational Board Networks and Interorganizational Imitation

Beyond protecting the collective rights of stakeholders by mitigating the risk of opportunistic executive behaviors, directors are responsible for the provision of resources to executives, typically in the form of strategic advice and counsel (Hillman & Dalziel, 2003; Hillman, Cannella, & Paetzold, 2000; Johnson, Daily, & Ellstrand, 1996). The extent to which board members can effectively perform their duties is said to be a function of their expertise, among other factors (Hambrick, Misangyi, & Park, 2015). Directors rich in human and social capital are believed to be better positioned to provide management with information that is directly relevant to the organization's strategic direction. To this end, Haynes and Hillman (2010) have demonstrated that board capital (i.e., human capital, social capital) affects strategic change in organizations, an effect that is also contingent on the CEO's power. Moreover, the effects of human and social capital could be additive or multiplicative in some circumstances.

For instance, Kor and Sundaramurthy (2008) showed that board capital is an important predictor of organizational expansion strategies. More importantly, the authors found that the effect of directors' industry-specific human capital on organizational growth is contingent on their levels of both external social capital (measured as the number of outside directorships) and internal social capital (measured as tenure on the board). The latter point is important in that Kor and Sundaramurthy's (2008) study is one of the few studies that have examined the interaction effects of internal and external social capital of the board.

In a conceptual paper, Shropshire (2010) outlined several intraorganizational factors that facilitate the transfer of knowledge from a focal organization to a tied-to organization in an interlocking directorate. The author suggests that a director's ability to partake in the process of diffusion is contingent on the interlocking director's: a) access to the CEO, b) experience with minority directors, c) committee membership, d) depth and/or breadth of experience, and e) status. Several of these categories are relational in nature, necessitating the examination of boards of directors' intraorganizational networks. For instance, prior experience with minority directors implies social similarity and potential interpersonal attraction, which are important to knowledge transfers (Darr & Kurtzberg, 2000; Levin & Cross, 2002). Similarly, committee memberships constitute the basis of task-based proximity networks in which directors interact with one another when enacting their responsibilities (Bilimoria & Piderit, 1994).

Following this line of thought, an interlocking director's superior access to knowledge in the intraorganizational network in which he/she is embedded should affect the extent to which the director understands organizational strategies being implemented, and transfers and utilizes that knowledge on the focal organizations' boards. In network theory terminology, superior or preferential access to knowledge is a function of a director's position within their networks,

namely their network centrality. Network centrality can be broadly conceptualized as the extent to which an actor is better connected than other actors in his/her network (Freeman, 1978). Individuals who are central in their networks can enjoy social capital benefits in various different forms, including a) access to a greater number of alters with knowledge, b) autonomous access to alters with knowledge, and c) control of other network actors' access to alters with knowledge (Brass, 1984; Burt, 1992; Freeman, 1978). In this study, I focus on betweenness centrality, which is the extent to which individuals are connected in ways that allow them to control flows in knowledge networks in ways that reduce their dependence on others, while increasing the dependence of other actors on them (Brass, 1984).

In line with network theory, I contend that betweenness centrality of interlocking directors on their focal organization's board and those of its alters will influence their ability to acquire from and disseminate knowledge to others in their network. In small group contexts, such as boards of directors, wherein power possession and allocation is of crucial importance to decision-making, knowledge embedded in relationships constitutes a critical source of director social capital. The ability to tap into knowledge embedded in relationships and to control flows of knowledge within the context of board networks should affect the extent to which directors can influence strategic decision-making processes. Accordingly, knowledge transfers between organizations and subsequent interorganizational mimicry of organizational strategies should be a function of: a) a director's control of knowledge flow channels on the focal organization's boards of directors, b) a director's control of knowledge flow channels on alters' boards of directors, and c) the interaction of former with the latter. Formally stated:

Hypothesis 1: *Interlocking directors' betweenness centrality in the focal organization's intraboard network positively moderates the extent to which alters' prior acquisition experience will influence the focal organization's subsequent acquisition strategy.*

Hypothesis 2: *Interlocking directors' betweenness centrality in the alters' intraboard network positively moderates the extent to which alters' prior acquisition experience will influence the focal organization's subsequent acquisition strategy.*

Hypothesis 3: *The positive moderating effect of interlocking directors' betwenness centrality in the focal organization's intraboard network on the relationship between alters' prior acquisition experience and the focal organization's subsequent acquisition strategy will be stronger the higher the interlocking directors' betwenness centrality in the alters' intraboard network.*

Another key assumption in organizational research is that top executives and board members of organizations are collectives that have team-like properties, such that every actor is connected to every other actor within these groups. Research has challenged this assumption by suggesting that decision-making units involving the upper echelon of the organization may be characterized by fluid participation (Arendt, Priem, & Ndofor, 2005). This suggests that there might be a discrepancy between what directors *may* do and what they *can* do in terms of acquiring or providing boards of directors with knowledge of alters' practices. This discrepancy has generally been unaccounted for in research on interorganizational imitation. As prior research has highlighted, social capital has a key role in the creation of new knowledge (Nahapiet & Ghoshal, 1998). Therefore, the relational properties of network ties within an organizational knowledge processing unit, such as a board of directors, will have an important

influence on the extent to which knowledge that pertains to organizational strategy can be transferred between pairs of organizations.

Intangible resources such as tacit knowledge are more easily understood by and transferred among network participants when the network is cohesive (Hansen, 1999; Reagans & McEvily, 2003). Strength of relationships constitutes one way of conceptualizing cohesiveness in networks. Ceteris paribus, individuals who spend more time together, who like and trust each other, and who share common history are more strongly connected to one another (Granovetter, 1973; Krackhardt, 1992). Westphal's (1999) research has provided important evidence that knowledge transfers in the form of solicitation and acquisition of advice between CEOs and directors are more likely to occur when friendship ties exist between these actors, and friendship implies a strong tie in the context of boards of directors. Strong ties provide actors with affective motivations (e.g., trust, reciprocity, etc.) to undertake the processes of soliciting and sharing knowledge with others. Accordingly, a network that is characterized by weak ties may reduce the likelihood that directors will be able to engage in knowledge acquisition in their role as members of the boards of directors of the focal organization's alters. Similarly, these directors may be unable to effectively transfer knowledge obtained from the alters to the focal organization, if the focal organization's network is characterized by a cluster of weak ties. Formally stated, I expect that:

> **Hypothesis 4:** *The average degree of tie strength within a focal organization's intraboard network positively moderates the extent to which alters' prior acquisition experience will influence the focal organization's subsequent acquisition strategy.*

Hypothesis 5: *The average degree of tie strength within alters' intraboard networks positively moderates the extent to which alters' prior acquisition experience will influence the focal organization's subsequent acquisition strategy.*

Hypothesis 6: *The positive moderating effect of the average degree of tie strength within a focal organization's intraboard network on the relationship between alters' prior acquisition experience and the focal organization's subsequent acquisition strategy will be stronger the higher the average degree of tie strength within alters' intraboard networks.*

E. Method

Data and Sample

The population of interest for this study is publicly traded organizations listed in the United States stock exchanges. Publicly traded organizations are of interest as boards of directors are of particular significance under conditions of separation of ownership and control (Berle & Means, 1932). The sampling frame for the study includes S&P 500 index organizations for the twelve-year period between 2004 and 2015. Organizational and industry-level data were retrieved from COMPUSTAT and CRSP databases. I used secondary (archival) data obtained from BoardEx and Execucomp as the primary sources of corporate governance-related data (e.g., boards of directors, CEOs, etc.). Data on acquisition activity were retrieved from the SDC Platinum – Thompson Reuters database.

In constructing the final sample, I constrained my analysis to organizations that were identified as members of the S&P 500 index in the BoardEx dataset. This yielded a total of 486 firms. Next, I limited my analysis to those organizations that could be matched with a CUSIP identification number in the SDC Platinum dataset. The final sample used in the analysis stage

(testing Hypotheses 1 through 6) consisted of 367 S&P 500 organizations and 3,372 firm-year observations.

Measurement

Dependent variable. The dependent variable in this study is the *total number of acquisitions announced* by the focal firm in a given year. An organization is considered to have announced an acquisition when the CUSIP number of the acquirer reported in the transaction data from SDC Platinum matches that of the focal organization in the governance dataset. I constrained the analysis to transactions involving the purchase of at least 10% shares in the target firm to avoid including potential portfolio investments.[9] I also excluded self- or defensive-tenders, stock repurchases, and spin-offs. Finally, I focused on only completed acquisitions.

For any given year, if an organization was not associated with an announced acquisition listed in the SDC Platinum dataset, it received a score of 0 on total acquisitions during that year, suggesting that it did not engage in acquisitions in the particular year. As suggested before, acquisitions have been commonly used by researchers in the context of imitation and diffusion, as they are considered organizational strategic decisions that are susceptible to strong mimetic isomorphic forces because they entail high levels of risk and uncertainty (e.g., Haunschild, 1993; Westphal et al. 2001). Similar to prior research in this area (e.g., Haunschild, 1993; Westphal et al. 2001, I consider a significant effect of prior total acquisitions by alters on subsequent total acquisitions of the focal organization as evidence of interorganizational imitation. Accordingly, the dependent variable was measured as a lead variable at time *t+1*, while all other independent and control variables were measured at time *t*. It should be noted that prior researchers have used

[9] 10% of equity ownership is generally required for an investor to have sufficient voting power and be able to exert control over the target firm (OECD, 2008).

a two-year (Westphal et al., 2001) and a four-year window (Haunschild, 1993) in operationalizing this variable. I chose to use a one-year window to avoid the potential influence of any organizational event or change that may transpire in the period leading up to the announcement of acquisition decisions and that may have a major influence on the organization's decision to engage in acquisitions independent of its alters' acquisition activity.

Independent (moderator) variables. The independent variables include *alters' prior acquisition experience, betweenness centrality score of interlocking directors on the focal organization's board, betweenness centrality score of interlocking directors on alters' boards*, *average tie strength on the focal organization's board*, and *average tie strength on alters' board*s. Alters' acquisition experience is the total number of acquisitions announced by interlocked partners at time *t*. For firms that have more than one interlocking directorate tie, I used the average number of all acquisitions that were announced by the alters at time *t*.

I computed the intraboard network measures in two steps. First, I infer the strength of intraorganizational network ties of boards of directors for each organization and each director dyad in each year by constructing a composite variable, which involves summing the standardized scores (Bellieveau, O'Reilly, & Wade, 1996) of a set of formative indicators of the second-order constructs of social influence, similarity, exchange, and history — network formation processes that I have identified based on prior research on social networks (Liben-Nowell & Kleinberg, 2007; McPherson et al., 2001; Monge & Contractor, 2001, Rivera et al., 2010), a behavioral theory of corporate governance (Westphal & Zajac, 2013), and recent theoretical work in corporate governance research (Shropshire, 2010). A detailed outline of this measurement model, which was originally developed for a different study, can be found in Appendices A and B. Second, I compute *average tie strength* by taking the mean of all dyadic

ties in a given board at a given time period. In the case when an organization is tied to more than one alter organization in a given year, I take the mean tie-strength score of alters' boards. I compute other network-based measures, including *directors' betweenness centrality* and the network-based control variables using igraph (Csardi & Nepusz, 2006) and SNA (Butts, 2007a; 2007b) packages in R, using a dichotomized (based on mean tie strength of the sample) director-to-director edge list. Centrality scores were calculated based on Freeman's (1978) formulations. Betweenness centrality is measured as the number of times a given node (director) falls on the shortest path between other actors in the network. Interaction terms were created by mean centering the criterion variables and then multiplying them. Plots of the interaction effects reported in Figure 2 and 3 were generated by using the standardized scores for all control and independent variables (Dawson, 2014).

Control variables. In the analysis, I controlled for three major dimensions of environmental uncertainty: dynamism, complexity, and hostility (or absence of munificence) (Dess & Beard, 1984; Keats & Hitt, 1988; Miller & Friesen, 1983). Environmental dynamism and hostility were operationalized using a regression technique wherein 5-year log-transformed total industry sales [ln(sales + 1)] for a given 3-digit SIC industry category were regressed on time. The inverse of the regression coefficient is the degree of environmental hostility in the subsequent year, whereas the standard error of the regression is the degree of environmental dynamism in the subsequent year. Complexity was measured using the Herfindahl index, which is the sum of squared market shares of industry firms (Boyd, 1990; 1995), using non-transformed segment sales classified at the 3-digit SIC level. Industries that are more concentrated (few firms holding a large share of the market) are regarded as less complex. This variable is inversely coded, so that higher values denote increased levels of complexity. All segment related

information used in the construction of these variables was retrieved from CRSP Historical Segments database. Non-business segments were excluded from the computation. Organizational mimicry may be a result of strong coercive and/or normative pressures (DiMaggio & Powell, 1983). The mimetic processes may work at differential rates for different organizations based on the environmental dynamics that strategic leaders face and/or managerial discretion that they possess. Controlling for dimensions of environmental uncertainty helps tease out these effects to some extent.

In addition, I control for *firm size* by including the natural logarithm of an organization's total assets, and *prior performance*, computed as log-transformed Tobin's Q and return on investment (ROI). Both large organizations and high-performing organizations are more likely to possess slack resources than their smaller, poor-performing counterparts, and to engage in acquisitions. In this regard, I also control for *debt-to-equity ratio* (c.f., Haunschild, 1993) and *organizational efficiency*, using the ratio of total sales to stockholder equity as well as the ratio of total sales to invested capital, to capture the financial ability of organizations to engage in acquisitions.[10] Organizational efficiency measures were included in the analysis as poor efficiency indicators may prompt executives to avoid engagement in acquisitions to implement operational- and strategic-level changes that would help 're-orient' the organization (Barker & Duhaime, 1997).

To account for informational advantages that may lead to acquisition activity through interlocking directorates (Haunschild, 1993; Shropshire, 2010), I controlled for *betweenness centrality of the organization in the interlocking directorate*. This measure was calculated based

[10] For more information on these ratios, see WRSD Industry Financial Ratio manual developed by WRDS Research Team (2016).

on a one-mode organization-to-organization projection of the two-mode organization-to-director network, using Freeman's (1978) betweenness centrality measure. An organization-to-organization adjacency matrix shows relationships between interlocked organizations with 0 denoting no interlocking relationship. This adjacency matrix was created by multiplying the two-mode organization-to-director matrix with its transpose. Using the igraph package on R (Csardi & Nepusz, 2006), I calculated betweenness centrality as the number of times a given organization appears on the shortest path between interlocked organizations (Freeman, 1978).

To capture the effect of prior experience in organizational boundary expansion on subsequent acquisition activity, following Haunschild (1993) I measured a focal organization's average number of acquisitions in the last three years. The decision to control for the past three-year acquisition activity follows from the repetitive momentum hypothesis, which suggests that an organization's prior strategic choices can strongly influence subsequent strategic choices as decision rules are developed into "routines and competencies" (Amburgey & Miner, 1992: 336), a point that was similarly raised by Haunschild (1993). However, I should note that the results of the hypotheses tests reported in the following section remained unchanged when I used prior acquisition experience calculated using acquisition activity in the previous five years.

Boards' involvement in strategy and capacity to engage in monitoring and resource provision activities (Hillman & Dalziel, 2003; Johnson et al., 1996) are controlled for by including a number of indicator variables. Prior research has provided evidence of a relationship of board size and diversity with strategic change (Goodstein, Gautam, & Boeker, 1994), therefore I controlled for *board size* and *percentage of female directors on the board* in the analysis of acquisition decisions. Boards with longer *average overlap in directors' tenures* may be associated with enhanced corporate strategic activity, as directors with overlapping tenures

may be able to more speedily reach strategic consensus based on tried-and-true intraboard routines that they have developed over time (Tuggle, Schnatterly, & Johnson, 2010). Research shows evidence for an effect of executives age on acquisition decisions (Yim, 2013). Accordingly, I controlled for *average age of directors* on the board. Finally, at the board level, to capture the potential influence of director independence on acquisition decisions, I included *percentage of non-executive directors on the board* in the analysis as a proxy for board control. In addition, I compute structural equivalence and centralization on boards of directors using igraph (Csardi & Nepusz, 2006) and SNA (Butts, 2007a; 2007b) packages on R. *Structural equivalence* on the board denotes network homogeneity in terms of the distribution of ties within boards of directors. High levels of structural equivalence suggest that ties are relatively homogenously distributed among actors. It was calculated based on the Euclidean distance between dyads of directors' ties to alters (Burt, 1976). Similarly, *centralization* (i.e., degree and betweenness centralization) measures the extent to which some directors on the board are more connected than others (Freeman, 1978). Both measures help capture potential consolidation of power and control within boards of directors, which could be consequential for acquisition decisions. To mirror these potential network effects in the context of alters' boards, I incorporated average structural equivalence and centralization scores of alters' in the analysis.

Joseph, Ocasio, and McDonnell (2014) have shown that CEO power is an important determinant of a firm's adoption of CEO-only governance structure. In line with this, I controlled for CEO power in the statistical model by adding *CEO duality* (i.e., CEO also serving as chairman of the organization). I captured the influence of CEOs' characteristics and motivation to engage in acquisition strategies by incorporating *CEO age, gender, and pay* (log-transformed tdc1) as control variables. Prior research suggests that there is a relationship between CEO age

and risk taking, with older executives taking less risk than their younger counterparts (Serfling, 2014). In addition, the literature shows evidence of an effect of CEO gender on acquisition decisions, with male executives being associated with more acquisition activity than their female counterparts (Huang & Kisgen, 2013). Finally, CEO pay has long been associated with risk-taking preferences and behaviors of CEOs in corporate governance research (Coles, Daniel, & Naveen, 2006), therefore, it was included in the analysis of acquisition activity.

To capture the potential influence of alters' characteristics on the mimetic processes, I controlled for *organizational size of alters* by averaging log-transformed total assets of alters. Finally, I controlled for the average degree centrality (i.e., number of interlocking directorates) of alters' to account for potential informational benefits that may accrue to a focal organization that is tied to heavily connected alters' in the interlocking directorate network (Freeman, 1978).

Analysis

Given the nature of the dependent variable—a count variable—I used a panel conditional fixed effects negative binomial regression with year effects to test my hypotheses. A Hausman model specification test (Hausman, 1978) suggested that a fixed effects model was appropriate for the data. The results of the regression analysis are reported in Models 1 through 9 in Table 2, and the summary statistics for the regression analyses (e.g., log-likelihood ratios) are reported in Table 3.

In Model 1, I regress control variables on total acquisition activity. In Model 2, I regress alters' prior acquisition activity on the dependent variable. While I did not formally hypothesize a relationship, I expect alters' prior acquisition activity to be positively related to organizations' subsequent acquisition activity, consistent with prior research (Haunschild, 1993; Westphal et al., 2001). In Model 3, I regress all four criterion variables—betweenness centrality score of

interlocking directors on the focal organization's board (sender's betweenness from here on), betweenness centrality score of interlocking directors on alters' boards (receiver's betweenness from here on), average tie strength on the focal organization's board (sender's tie strength from here on), and average tie strength on alters' boards (receiver's tie strength from here on) —on total acquisition activity.

Model 4 reports the interaction effects of sender's betweenness centrality and alters' prior acquisition experience, while Model 5 reports the interaction effect of receiver's betweenness centrality and alters' prior acquisition experience on total acquisition activity. Models 6 and 7 report the interaction effects of alters' prior acquisition experience with sender's tie strength and receiver's tie strength, respectively on total acquisition activity. In Model 8, I report the three-way interaction effect of sender's betweenness centrality, receiver's betweenness centrality, and alters' prior acquisition experience on total acquisition activity. Finally, the effect of the three-way interaction among sender's tie strength, receiver's tie strength, and alters' prior acquisition experience on total acquisition activity is reported in Model 9.

F. Results

Correlations and descriptive statistics are reported in Table 1. As the results show, none of the correlations is above |.70|. In addition, the highest VIF statistic for any given variable in any model and the highest average VIF statistic for any given model shown in Table 2 was 1.97 and 4.25, respectively, which are significantly below the commonly accepted level of 10. Overall there is sufficient evidence to suggest that multicollinearity is not an issue.

In Model 1, of the control variables, organizational size, Tobin's q, debt-to-equity ratio, betweenness centrality, and CEO total pay are positively related to focal organization's total number of acquisition at time *t+1*. Overall, the results show that central, large, high-debt

(relative to equity), or high performing organizations' CEOs and CEOs who are paid relatively high engage in a greater number of acquisitions.

In Model 2, I test the interorganizational imitation hypothesis that alters' prior acquisition experience influences focal organizations' subsequent acquisitions (Haunschild, 1993; Westphal et al., 2001). The average number of acquisitions announced by alters' does not have a significant effect on focal organizations' acquisition activity. This finding is not surprising given that not all interlocking directorates are uniformly formed to carry out economic objectives of organizations or to enact organizational environments (Mizruchi, 1996). It also gives credibility to the idea that some interlocks may transfer knowledge more successfully than others (Shropshire, 2010), an idea that I explore in Models 3 through 9.

In Model 3, the results show that receiver's betweenness centrality has a positive impact on the total number of acquisitions, while strength of ties in the focal organization's board has a negative impact on acquisition activity. Whereas the former result is expected, the latter is somewhat surprising. A potential explanation is that decision making may be slowed down in boards of directors that are characterized by strong interpersonal linkages among their members. Consensus seeking among strongly connected alters may slow down pre-acquisition decision making processes (e.g., search, due diligence, etc.); as such, relational embeddedness within boards of directors may reduce overall acquisition activity. Nevertheless, this remains a plausible, but speculative, interpretation of the results, requiring further examination in future research.

Hypothesis 1 was supported, as shown in Table 2, Model 4. The coefficient on the interaction term of alters' prior acquisition experience and senders' betweenness centrality is positive and significant ($p < .05$). As Figure 2 shows, consistent with Hypothesis 1, the influence

of alters' prior acquisition on focal organizations' acquisition activity becomes stronger at higher levels of sender's betweenness centrality. This suggests that access to and control over board processes at the focal organization's board is an important determinant of interlocking directors' capacity to transfer knowledge among tied organizations and implement it on the focal board.

Hypothesis 2 suggested that centrality of directors in alters' board positively moderates the effect of alters' prior experience on focal organization's acquisition activity. The results reported in Model 5 provide support for this hypothesis: the interaction term is positive and significant ($p < .05$). In Figure 3, the interaction plot shows that the influence of alters' prior acquisitions on focal organization's acquisition activity is enhanced when interlocked directors' betweenness centrality is high. Put differently, the results corroborate the idea that access and control benefits that centrally connected directors enjoy on alters' boards of directors enable them to acquire knowledge on alters' acquisition strategies and use that information more influentially on the focal organization's board.

As Models 5 through 9 show, I did not find support for hypotheses 3, 4, 5, or 6. The results indicate that the position of interlocked directors in the social structure of boards of both the focal organization and its alters is a more important determinant of the extent to which interorganizational imitation occurs as compared to the relational characteristics of boards of directors (i.e., strength of ties). While tie strength has a direct negative effect on acquisition activity it does not interact with prior acquisition experience of alters.

G. Discussion

Interorganizational contagion and diffusion literatures have provided important evidence that interlocking directorates are networks that provide social capital benefits to organizations. One of the key social capital benefits that accrue to organizations that are embedded in these

networks is the facilitation of vicarious organizational learning and transfers of organizational knowledge (Tuschke et al., 2014). Organizational leaders become exposed to strategic decision-making processes of other organizations in their networks when they forge interlocking directorate ties. Recent research on interlocks argues that not all interlocking directorates are conducive to organizational contagion and diffusion (e.g., Connelly et al., 2011; Sanders & Tuschke, 2007; Shipilov, Greve, Rowley, 2010; Shropshire, 2010; Tuschke et al., 2014).

In the present study, I explored this idea further by examining the circumstances under which knowledge obtained via interlocks matter. I constructed a comprehensive sample, comprising 3,372 organization-year observations concerning acquisition activities of S&P 500 organizations in the period between 2004 and 2015. The results provided strong support for Hypotheses 1 and 2—that central directors' experiences matter. I did not find evidence to support Hypothesis 3 through 6. The results of the study suggest that interlocking directors' access to and control over flow of knowledge-based resources on the focal and alter organizations' boards of directors have a significant influence on the extent to which organizational imitation occurs. As hypothesized, I found that interlocks transfer knowledge more successfully to the extent that directors are positioned to have access to and control over key board processes. These findings contribute to research on corporate elite networks by simultaneously exploring the influence of external and internal networks of corporate elite members on organizational outcomes, providing credence to past theoretical research that has conceptualized directors' access to board processes as a determinant of interorganizational diffusion in the context of interlocking directorates (e.g., Shropshire, 2010).

The lack of significant findings for Hypothesis 4, 5, and 6 suggest that tie strength is not an important determinant of interorganizational imitation. Nevertheless, as Model 1 has shown,

tie strength within a focal organization's board has a significant negative effect on total acquisition activity. This result, when combined with the findings pertaining to Hypotheses 1 and 2, is certainly promising for future research efforts that may be directed towards better understanding how relational and structural embeddedness in boards of directors influence organizational strategy and policy decisions. In analyses that have been reported elsewhere, I found significant negative effect of cohesion among directors of a focal organization on organizational risk taking. The results suggested that cohesive board networks may engender potential agency costs. Future empirical research may separately investigate whether tie strength (including other operationalizations of relational and structural embeddedness) interact with prior acquisition experience of alters' to predict level of activity for acquisitions that enhance organizational competitive advantage or that destroy stakeholder value.

Another potential future direction involves distinguishing between formal task networks of boards of directors and informal social networks of directors within boards. While the former is cognitive in nature, the latter is affect-infused (see Fombrun, 1982; Ibarra, 1993; Umphress, Labianca, Brass, Kass, & Scholten, 2003 for discussions of instrumental and expressive ties), and therefore may have potentially different effects on acquisition activity. It would be interesting for future research to test the independent and interactive effects of interlocking directors' prominence in task-based and affect-based social networks of boards of directors. For instance, a director who is central in the formal task network may be well-positioned to extract knowledge from alters, yet the capacity of the director to influence board processes (e.g., strategic decision-making and policy-making) may be weakened to the extent that the director is at the periphery of the informal (e.g., friendship) network of boards of directors.

H. Conclusion

In the present study, I found positive interaction effects of director centrality within boards of directors and alters' prior acquisition experience on firm acquisition activity in the context of board interlocks. The study represents an important step towards better understanding how networks (ties *within* boards of directors) layered within other networks (ties *between* boards of directors) simultaneously influence interorganizational imitation of strategic decisions. The antecedents and consequences of directors' embeddedness within the confines of corporate elite circles remains a relevant and important area of inquiry with underexplored territory, wherein novel research questions can be asked and examined. It is my hope that this study advances that effort.

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J. Tables and Figures

Table 1: Descriptive Statistics and Correlations

#	Variables	Mean	St. Dev.	1	2	3	4	5	6	7	8	9
1	Total Acquisitions	1.26	2.17	-								
2	Dynamism	0.05	0.06	-0.05	-							
3	Complexity	0.82	0.21	0.03	-0.50	-						
4	Hostility	-3.11	0.16	-0.06	0.50	-0.35	-					
5	Organizational Size $_{log}$	9.73	1.45	0.05	0.26	-0.22	0.18	-				
6	Tobin's Q $_{log}$	0.57	0.45	0.15	-0.23	0.21	-0.15	-0.51	-			
7	ROI	0.11	0.16	0.08	-0.06	0.05	-0.08	-0.09	0.33	-		
8	Debt to Equity Ratio	7250.06	25236.47	0.04	0.26	-0.24	0.19	0.54	-0.26	-0.11	-	
9	Efficiency_e	2.53	26.90	-0.02	0.04	-0.05	0.03	0.02	-0.01	0.03	-0.01	-
10	Efficiency_i	1.54	1.84	0.01	-0.04	-0.08	-0.06	-0.12	0.13	0.31	-0.12	0.14
11	Org. Int. Betw Cent	700.41	806.00	0.10	0.04	-0.05	0.02	0.39	-0.09	0.04	0.21	0.01
12	Org. Acquisition Experience	1.22	1.76	0.59	-0.02	0.03	-0.05	0.13	0.08	0.04	0.13	0.00
13	Board Size	10.99	2.32	0.00	0.17	-0.22	0.13	0.50	-0.27	-0.02	0.24	0.03
14	Degree Centralization	0.39	0.15	-0.01	0.02	-0.02	0.02	-0.03	0.04	0.02	0.01	0.02
15	Betweenness Centralization	0.23	0.16	-0.03	-0.05	0.05	0.01	-0.26	0.14	0.01	-0.10	0.01
16	Equivalence	1.66	0.54	0.00	-0.06	0.12	-0.10	-0.25	0.16	0.03	-0.16	-0.06
17	Avg. # Independents	0.87	0.06	-0.04	0.10	-0.14	0.06	0.24	-0.12	0.01	0.07	0.01
18	Avg. # Females	0.17	0.09	0.01	0.03	-0.11	0.08	0.21	-0.03	0.05	0.07	0.03
19	Avg. Age of Directors	61.50	3.07	-0.05	0.00	-0.03	-0.01	0.19	-0.17	-0.02	0.07	0.01
20	Dir. Tenure Overlap	0.59	0.12	-0.02	0.02	0.00	-0.04	0.02	-0.02	0.00	0.01	-0.05
21	CEO Total Pay $_{log}$	8.98	1.14	0.05	0.03	-0.01	-0.03	0.28	-0.10	0.00	0.08	0.03
22	CEO Duality	0.61	0.49	0.01	0.04	-0.07	0.07	0.14	-0.04	0.01	0.03	0.03
23	CEO Age	55.89	5.83	0.00	0.02	-0.04	0.04	0.16	-0.13	-0.01	0.04	0.00
24	CEO Gender	0.03	0.17	0.03	0.01	-0.07	-0.02	0.05	0.00	0.04	-0.01	-0.03
25	Alters' Avg. Size $_{log}$	9.92	1.00	0.05	0.00	0.00	0.00	0.32	-0.07	0.04	0.15	0.01
26	Alters' Avg. Degree Centralization	0.39	0.09	0.01	0.04	-0.02	0.01	0.01	0.01	-0.02	0.05	0.00
27	Alters' Avg. Equivalence	1.61	0.32	-0.01	-0.03	0.03	0.02	-0.09	0.00	-0.01	-0.02	-0.01
28	Alters' Avg. Acquisition Experience	6.72	8.07	0.12	0.04	-0.01	0.00	0.35	0.01	0.07	0.17	0.02
29	Sender Betweenness	10.15	9.67	-0.04	0.02	-0.05	0.06	0.02	-0.01	0.01	0.00	0.02
30	Receiver Betweenness	9.19	7.81	0.00	0.07	-0.05	0.03	0.11	-0.07	-0.02	0.18	0.01
31	Organization's Strength of Ties	0.24	2.23	0.03	0.04	0.00	-0.05	0.24	-0.07	0.03	0.07	-0.02
32	Alters' Avg. Strength of Ties	0.63	1.43	0.09	0.02	-0.03	0.03	0.23	-0.06	0.02	0.17	0.01

Note: Correlations and descriptive statistics were calculated based on 3372 firm-year observations. Log = log-transformed

Table 1 (Cont.)

#	Variables	10	11	12	13	14	15	16	17	18	19	20
11	Org. Int. Betw Cent	0.05	-									
12	Org. Acquisition Experience	-0.01	0.11	-								
13	Board Size	-0.04	0.37	0.01	-							
14	Degree Centralization	0.02	-0.04	0.02	0.06	-						
15	Betweenness Centralization	0.04	-0.31	-0.02	-0.21	0.61	-					
16	Equivalence	-0.02	-0.18	-0.03	-0.61	-0.36	-0.09	-				
17	Avg. # Independents	0.02	0.19	-0.02	0.17	0.01	-0.11	-0.07	-			
18	Avg. # Females	0.11	0.18	0.01	0.14	0.04	0.00	-0.12	0.13	-		
19	Avg. Age of Directors	-0.03	0.05	-0.03	0.14	-0.04	-0.09	-0.10	0.11	-0.05	-	
20	Dir. Tenure Overlap	-0.02	-0.01	-0.06	-0.09	-0.28	-0.29	0.42	0.06	-0.01	0.06	-
21	CEO Total Pay $_{log}$	0.02	0.21	0.04	0.25	-0.02	-0.14	-0.11	0.11	0.13	0.11	0.03
22	CEO Duality	0.02	0.13	0.01	0.07	-0.01	-0.10	-0.01	0.14	0.09	0.07	0.06
23	CEO Age	0.00	0.06	0.00	0.17	-0.06	-0.14	-0.09	0.05	0.02	0.35	0.03
24	CEO Gender	0.02	0.03	0.02	0.02	0.01	-0.03	0.00	0.07	0.24	-0.05	0.02
25	Alters' Avg. Size $_{log}$	0.03	0.20	0.06	0.20	0.10	-0.11	-0.12	0.13	0.16	0.20	-0.03
26	Alters' Avg. Degree Centralization	-0.03	-0.06	0.04	0.00	0.08	0.06	0.00	-0.06	0.01	0.02	0.00
27	Alters' Avg. Equivalence	-0.02	-0.03	-0.02	-0.11	-0.07	0.00	0.06	-0.04	-0.05	-0.06	0.02
28	Alters' Avg. Acquisition Experience	0.03	0.55	0.14	0.28	0.00	-0.25	-0.12	0.10	0.16	-0.02	-0.05
29	Sender Betweenness	0.02	-0.11	-0.03	0.29	0.36	0.48	-0.34	-0.01	0.08	0.03	-0.21
30	Receiver Betweenness	-0.04	0.05	0.00	0.03	0.14	0.04	-0.02	0.00	0.00	0.04	-0.03
31	Organization's Strength of Ties	-0.03	0.35	0.01	0.07	-0.28	-0.60	0.43	0.15	-0.01	0.09	0.45
32	Alters' Avg. Strength of Ties	0.02	0.20	0.10	0.16	-0.01	-0.16	-0.06	0.09	0.07	0.05	0.01

Note: Correlations and descriptive statistics were calculated based on 3372 firm-year observations.
Log = log-transformed

Table 1 (Cont.)

#	Variables	21	22	23	24	25	26	27	28	29	30	31
21	CEO Total Pay	-										
22	CEO Duality	0.13	-									
23	CEO Age	0.09	0.20	-								
24	CEO Gender	0.05	0.01	-0.05	-							
25	Alters' Avg. Size $_{log}$	0.14	0.11	0.12	0.06	-						
26	Alters' Avg. Degree Centralization	0.00	-0.07	0.02	0.00	-0.07	-					
27	Alters' Avg. Equivalence	-0.05	-0.02	0.00	-0.04	-0.29	-0.34	-				
28	Alters' Avg. Acquisition Experience	0.17	0.12	0.06	0.01	0.28	-0.05	-0.06	-			
29	Sender Betweenness	0.00	-0.05	-0.02	-0.01	0.08	0.08	-0.05	-0.08	-		
30	Receiver Betweenness	0.02	-0.04	-0.03	0.02	0.10	0.17	-0.26	0.02	0.17	-	
31	Organization's Strength of Ties	0.14	0.15	0.13	0.05	0.23	-0.03	-0.03	0.35	-0.38	0.04	-
32	Alters' Avg. Strength of Ties	0.06	0.10	0.05	-0.01	0.31	-0.31	0.42	0.27	0.00	-0.24	0.25

Note: Correlations and descriptive statistics were calculated based on 3372 firm-year observations.
Log = log-transformed

Table 2: Conditional Fixed Effects Negative Binomial Regression

DV: Total Acquisitions	Model 1			Model 2			Model 3		
Variable	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**
Constant	-2.99	1.30	*	-2.98	1.31	*	-3.73	1.36	**
Dynamism	-0.17	0.58		-0.17	0.58		-0.25	0.59	
Complexity	0.33	0.27		0.33	0.27		0.34	0.27	
Hostility	-0.29	0.19		-0.29	0.19		-0.29	0.19	
Org. Size $_{log}$	0.14	0.06	*	0.14	0.06	*	0.15	0.06	*
Tobin's Q $_{log}$	0.37	0.11	**	0.37	0.11	**	0.39	0.11	**
ROI	0.12	0.16		0.12	0.16		0.13	0.16	
Debt to Equity Ratio	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Efficiency_e	0.00	0.00		0.00	0.00		0.00	0.00	
Efficiency_i	-0.01	0.03		-0.01	0.03		0.00	0.03	
Org. Int. Betw. Cent	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Org. Acq. Experience	-0.02	0.02		-0.02	0.02		-0.02	0.02	
Board Size	0.01	0.02		0.01	0.02		0.03	0.02	
Degree Centralization	-0.08	0.23		-0.08	0.23		0.01	0.24	
Betweenness Centralization	0.08	0.22		0.08	0.22		-0.11	0.27	
Equivalence	-0.04	0.09		-0.04	0.09		0.10	0.11	
Avg. # Independents	-0.15	0.53		-0.15	0.53		-0.05	0.53	
Avg. # Females	-0.22	0.44		-0.22	0.44		-0.25	0.44	
Avg. Age of Directors	0.02	0.01		0.02	0.01		0.02	0.01	
Dir. Tenure Overlap	0.35	0.25		0.35	0.25		0.54	0.26	*
CEO Total Pay $_{log}$	0.09	0.02	**	0.09	0.02	**	0.09	0.02	**
CEO Duality	0.03	0.07		0.03	0.07		0.03	0.07	
CEO Age	0.00	0.01		0.00	0.01		0.00	0.01	
CEO Gender	0.11	0.16		0.12	0.16		0.12	0.16	
Alters' Avg. Size $_{log}$	-0.03	0.04		-0.03	0.04		-0.04	0.05	
Alters' Avg. Degree Cent.	-0.02	0.30		-0.02	0.30		0.08	0.30	
Alters' Avg. Equivalence	-0.07	0.09		-0.07	0.09		-0.13	0.11	
Alters' Avg. Acquisition Exp.				0.00	0.00		0.00	0.00	
Sender Betweenness							0.00	0.00	
Receiver Betweenness							0.01	0.00	*
Org.'s Strength of Ties							-0.07	0.03	**
Alters' Avg. Strength of Ties							0.04	0.03	
Int. Term 1: Exp * Send. Cent.									
Int. Term 2: Exp * Rec. Cent.									
Int. Term 3: Exp * Send. Tie St.									
Int. Term 4: Exp * Rec. Tie St.									
Int. Term 5: Betweenness									
Int. Term 6: Tie Strength									
Int. Term 7: Three-way Betw.									
Int. Term 8: Three-way Tie St.									

† $p < .10$; * $p < .05$; $p < 0.01$

$_{log}$ = log-transformed

Table 2 (Cont.)

DV: Total Acquisitions	Model 4			Model 5			Model 6		
Variable	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**
Constant	-3.69	1.36	**	-3.92	1.36	**	-3.73	1.36	**
Dynamism	-0.30	0.59		-0.23	0.59		-0.24	0.59	
Complexity	0.37	0.27		0.38	0.27		0.33	0.27	
Hostility	-0.29	0.19		-0.29	0.19		-0.29	0.19	
Org. Size $_{log}$	0.15	0.07	*	0.16	0.07	*	0.15	0.06	*
Tobin's Q $_{log}$	0.39	0.11	**	0.40	0.11	**	0.39	0.11	**
ROI	0.13	0.16		0.12	0.16		0.13	0.16	
Debt to Equity Ratio	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Efficiency_e	0.00	0.00		0.00	0.00		0.00	0.00	
Efficiency_i	0.00	0.03		0.00	0.03		0.00	0.03	
Org. Int. Betw. Cent	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Org. Acq. Experience	-0.02	0.02		-0.02	0.02		-0.02	0.02	
Board Size	0.02	0.02		0.03	0.02		0.03	0.02	
Degree Centralization	-0.04	0.24		0.01	0.24		0.02	0.24	
Betweenness Centralization	-0.09	0.27		-0.10	0.27		-0.13	0.27	
Equivalence	0.09	0.11		0.10	0.11		0.10	0.11	
Avg. # Independents	-0.04	0.53		-0.07	0.53		-0.05	0.53	
Avg. # Females	-0.26	0.44		-0.29	0.44		-0.27	0.44	
Avg. Age of Directors	0.02	0.01		0.02	0.01		0.02	0.01	
Dir. Tenure Overlap	0.55	0.26	*	0.53	0.26	*	0.55	0.26	*
CEO Total Pay $_{log}$	0.09	0.02	**	0.09	0.02	**	0.09	0.02	**
CEO Duality	0.03	0.07		0.03	0.07		0.03	0.07	
CEO Age	0.00	0.01		0.00	0.01		0.00	0.01	
CEO Gender	0.13	0.16		0.11	0.16		0.12	0.16	
Alters' Avg. Size $_{log}$	-0.04	0.05		-0.04	0.05		-0.04	0.05	
Alters' Avg. Degree Cent.	0.06	0.30		0.06	0.30		0.08	0.30	
Alters' Avg. Equivalence	-0.12	0.11		-0.12	0.11		-0.13	0.11	
Alters' Avg. Acquisition Exp.	0.00	0.00		0.00	0.00		0.00	0.00	
Sender Betweenness	0.00	0.00		0.00	0.00		0.00	0.00	
Receiver Betweenness	0.01	0.00	*	0.01	0.00	**	0.01	0.00	*
Org.'s Strength of Ties	-0.07	0.03	**	-0.08	0.03	**	-0.07	0.03	**
Alters' Avg. Strength of Ties	0.04	0.03		0.04	0.03		0.04	0.03	
Int. Term 1: Exp * Send. Cent.	0.00	0.00	*						
Int. Term 2: Exp * Rec. Cent.				0.00	0.00	*			
Int. Term 3: Exp * Send. Tie St.							0.00	0.00	
Int. Term 4: Exp * Rec. Tie St.									
Int. Term 5: Betweenness									
Int. Term 6: Tie Strength									
Int. Term 7: Three-way Betw.									
Int. Term 8: Three-way Tie St.									

† p < .10; * p < .05; p < 0.01

$_{log}$ = log-transformed

Table 2 (Cont.)

DV: Total Acquisitions	Model 7			Model 8			Model 9		
Variable	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**	**Coef**	**Std Er**	**Sig**
Constant	-3.77	1.36	**	-3.79	1.36	**	-3.72	1.36	**
Dynamism	-0.28	0.60		-0.31	0.59		-0.24	0.59	
Complexity	0.35	0.27		0.37	0.27		0.30	0.27	
Hostility	-0.29	0.19		-0.29	0.19		-0.29	0.19	
Org. Size $_{log}$	0.16	0.07	*	0.16	0.07	*	0.15	0.07	*
Tobin's Q $_{log}$	0.39	0.11	**	0.39	0.11	**	0.39	0.11	**
ROI	0.12	0.16		0.12	0.16		0.12	0.16	
Debt to Equity Ratio	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Efficiency_e	0.00	0.00		0.00	0.00		0.00	0.00	
Efficiency_i	0.00	0.03		0.00	0.03		0.00	0.03	
Org. Int. Betw Cent	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Org. Acquisition Experience	-0.02	0.02		-0.02	0.02		-0.02	0.02	
Board Size	0.03	0.02		0.02	0.02		0.03	0.02	
Degree Centralization	-0.01	0.24		-0.07	0.24		0.07	0.24	
Betweenness Centralization	-0.09	0.27		-0.07	0.27		-0.12	0.27	
Equivalence	0.10	0.11		0.08	0.11		0.09	0.11	
Avg. # Independents	-0.08	0.53		-0.05	0.53		-0.05	0.53	
Avg. # Females	-0.21	0.44		-0.29	0.44		-0.30	0.44	
Avg. Age of Directors	0.02	0.01		0.02	0.01		0.02	0.01	
Dir. Tenure Overlap	0.52	0.26	*	0.51	0.26	†	0.60	0.26	*
CEO Total Pay $_{log}$	0.09	0.02	**	0.10	0.02	**	0.09	0.02	**
CEO Duality	0.02	0.07		0.03	0.07		0.02	0.07	
CEO Age	0.00	0.01		0.00	0.01		0.00	0.01	
CEO Gender	0.12	0.16		0.12	0.16		0.10	0.16	
Alters' Avg. Size $_{log}$	-0.04	0.05		-0.04	0.05		-0.05	0.05	
Alters' Avg. Degree Cent.	0.06	0.30		0.02	0.30		0.11	0.30	
Alters' Avg. Equivalence	-0.13	0.11		-0.11	0.11		-0.15	0.11	
Alters' Avg. Acquisition Exp.	0.00	0.00		0.00	0.00		0.00	0.00	
Sender Betweenness	0.00	0.00		0.00	0.00		0.00	0.00	
Receiver Betweenness	0.01	0.00	*	0.01	0.00	*	0.01	0.00	*
Org. Strength of Ties	-0.07	0.03	**	-0.07	0.03	**	-0.08	0.03	**
Alters' Avg. Strength of Ties	0.03	0.03		0.04	0.03		0.05	0.03	†
Int. Term 1: Exp * Send. Cent.				0.00	0.00	†			
Int. Term 2: Exp * Rec. Cent.				0.00	0.00	*			
Int. Term 3: Exp * Send. Tie St.							0.00	0.00	
Int. Term 4: Exp * Rec. Tie St.	0.00	0.00					-0.01	0.00	*
Int. Term 5: Betweenness				0.00	0.00	†			
Int. Term 6: Tie Strength							0.03	0.01	**
Int. Term 7: Three-way Betw.				0.00	0.00				
Int. Term 8: Three-way Tie St.							0.00	0.00	

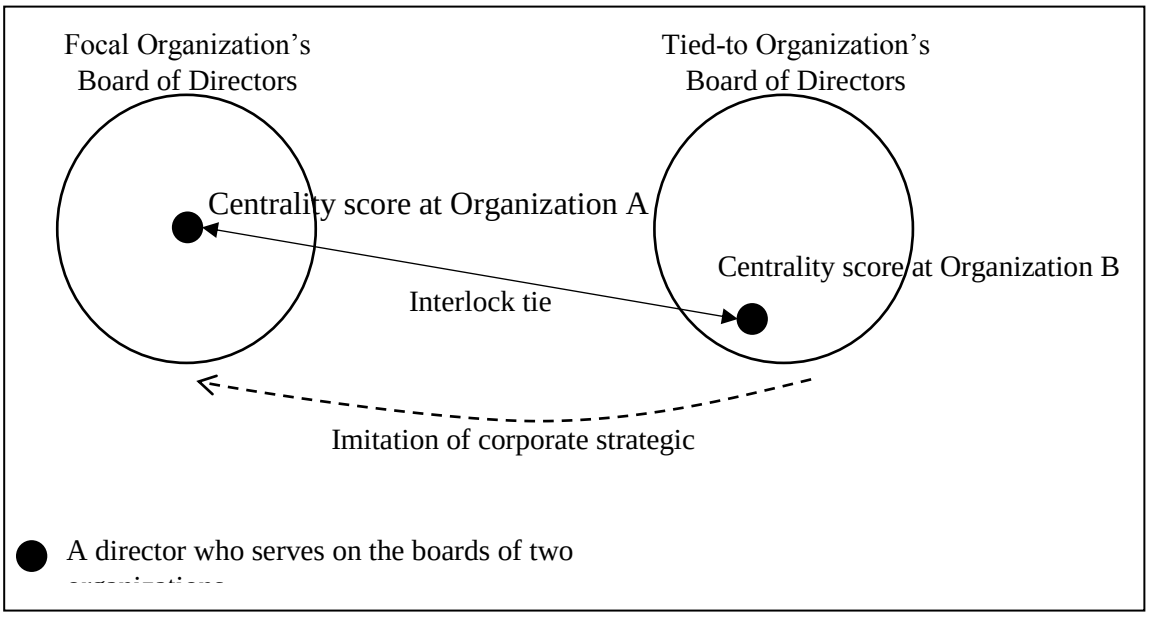
† $p < .10$; * $p < .05$; $p < 0.01$

$_{log}$ = log-transformed

Table 3: Model Summaries

Model	# of Observations	# of Firms	Log Likelihood	Wald χ 2	AIC	BIC	Hypothesis Tested	Supported
Model 1	3375	367	-3454.83	129.43**	6983.65	7210.25	Control	
Model 2	3375	367	-3454.83	129.43**	6985.65	7218.37	Experience	
Model 3	3372	367	-3444.34	143.49**	6972.67	7229.85	Criterion Variables	
Model 4	3372	367	-3441.85	148.95**	6969.70	7233.00	H1	Yes
Model 5	3372	367	-3441.44	149.84**	6968.87	7232.17	H2	Yes
Model 6	3372	367	-3444.20	143.63**	6974.40	7237.70	H4	No
Model 7	3372	367	-3443.37	145.79**	6972.74	7236.04	H5	No
Model 8	3372	367	-3437.72	157.87**	6967.45	7249.12	H3	No
Model 9	3372	367	-3437.20	159.30**	6966.41	7248.08	H6	No

Figure 1: An illustration of director centrality and tie strength in boards of directors



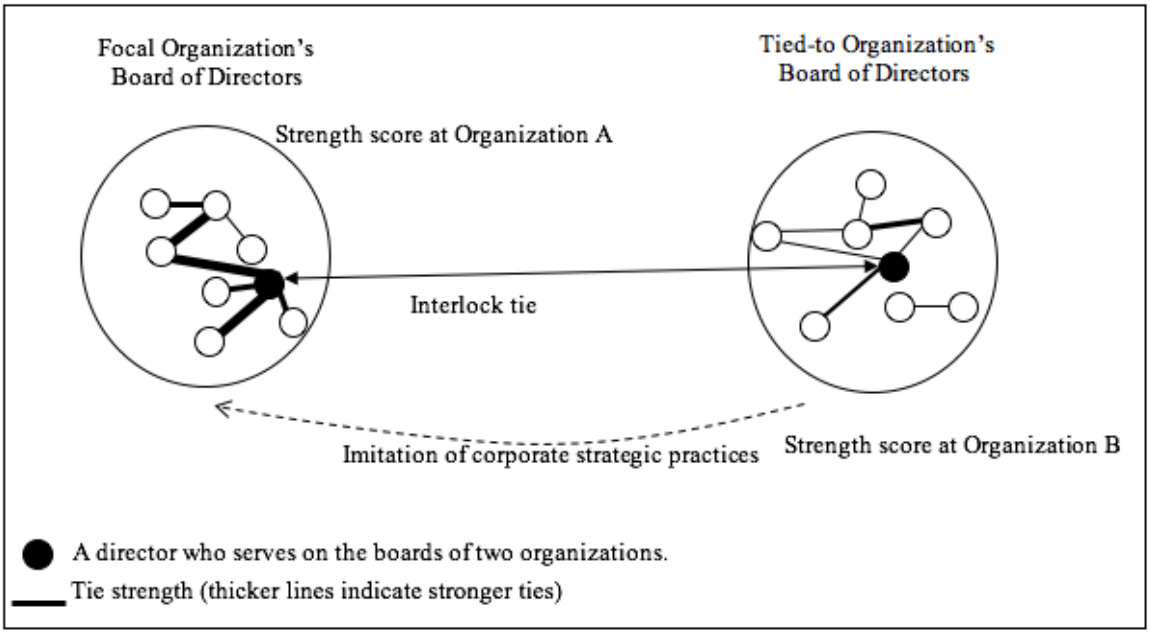


Figure 2: The Interaction Effect of Partner's Prior Acquisition Experience and Interlocking Directors' Average Betweenness Centrality on Focal Firm's Board

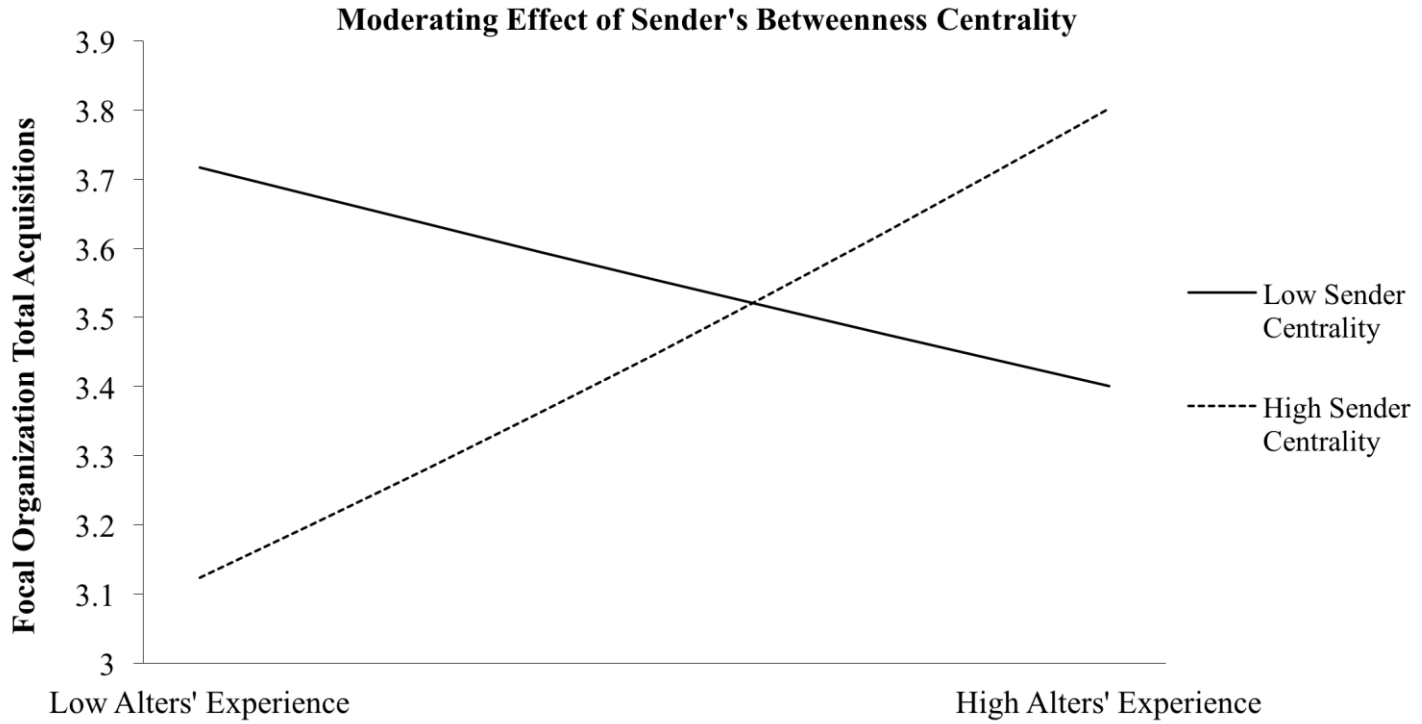
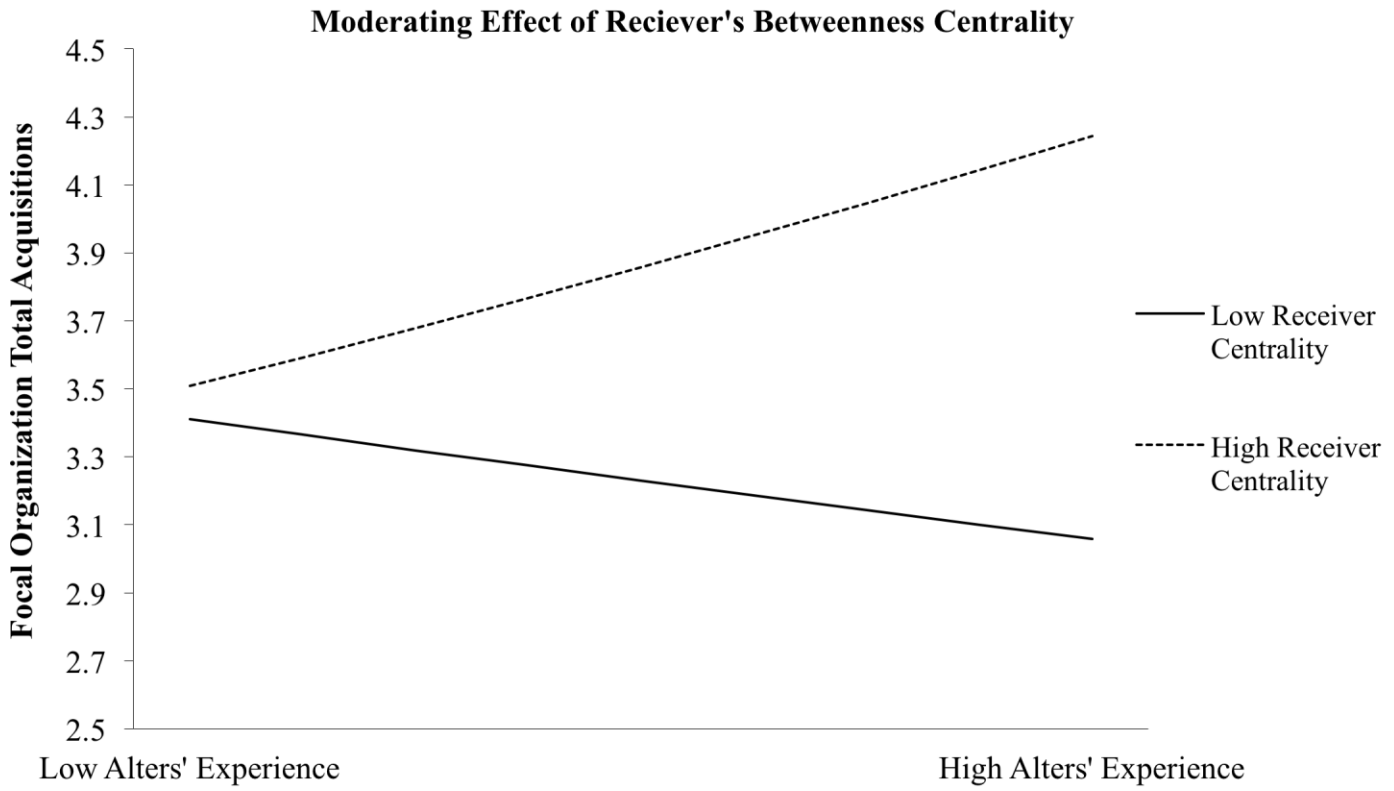


Figure 3: The Interaction Effect of Partner's Prior Acquisition Experience and Interlocking Directors' Average Betweenness Centrality on Tied-to Firms' Boards



Appendix A: Constructing Intraorganizational Ties of Boards of Directors and Inferring Tie Strength from Objective Indicators

Indicator Variable	Social Similarity	Social Influence	Social Exchange	Social History
Co-Dependent	1			
Co-Independent	1			
Co-Gender	1			
Co-Oldsters	1			
Co-Youngsters	1			
Age Similarity	1			
Honorific Title	1			
Military Title	1			
Administrative Title	1			
Public Service Title	1			
Pro Directors	1			
Novice Directors	1			
Current Board Seats		1		
Firm Committee Seats		1		
Firm Committee Chairs		1		
Committee Chairs Local		1		
Committee Financial Expert Global		1		
Prestige		1		
Co-Financial Expert			1	
Co-Hierarchical Standing			1	
Related Interlocking Directorate			1	
Vertical Interlocking Directorate			1	
Overlap in Board Tenure				1
Co-Committee Membership				1

Appendix B: Descriptions of Dyadic Variables used in the Construction of Tie Strength

Indicator Variable	Description
Co-Dependent	Both directors are non-independent directors
Co-Independent	Both directors are independent directors
Co-Gender	Both directors are female
Co-Oldsters	Both directors are within the 75th quartile of the sample in age
Co-Youngsters	Both directors are within the 25th quartile of the sample in age
Age Similarity	Absolute difference in directors age (reverse coded)
Honorific Title	Both directors hold honorific titles (e.g., Lord, Duke, Lady, etc.)
Military Title	Both directors hold military titles (e.g., Admiral, General, etc.)
Administrative Title	Both directors hold administrative titles (e.g., Senator, Governor, etc.)
Public Service Title	Both directors hold public servant titles (e.g., Doctor, Professor, Dean, etc.)
Pro Directors	Both directors are within the 75th quartile of the sample in tenure
Novice Directors	Both directors are within the 25th quartile of the sample in tenure
Current Board Seats	Absolute difference in the number of current boards seats held
Firm Committee Seats	Absolute difference in the number of committee seats held on the board
Firm Committee Chairs	Absolute difference in the number of committee chairmanships held on the board
Committee Chairs Local	Absolute difference in the number committee chairmanships held in S&P 500 firms
Committee Financial Expert Global	Absolute difference in the number financial expert position held all BoardEx firms
Prestige	Absolute difference in the maximum asset size of S&P 500 firms on which the directors serve
Co-Financial Expert	Both directors are financial experts on the board (assumed communication link)
Co-Hierarchical Standing	Both directors hold hierarchical title on the board (i.e., CEO, Chairman, Lead Independent Director, Committee Chair) (assumed communication link)
Related Interlocking Directorate	Other firms on which directors serve are matched at the 1-digit SIC level
Vertical Interlocking Directorate	Other firms on which directors serve are vertically related, that is their representative industries (based on 2-digit NAICS code) have a non-zero input-output. Bureau of Labor Statics' interindustry sales table was used in the construction of this table.
Overlap in Board Tenure	Overlap in tenure of directors [1 – abs(tenure_dir_a – tenure_dir_b)/(tenure_dir_a + tenure_dir_b)]: missing values due to calculation error were replaced with 0.
Co-Committee Membership	Directors serve on the same committee on the focal firm's board.

V. Conclusion

I began this dissertation with the motivation of helping the management field develop a more advanced understanding of how the social context within which directors are embedded influences organizational strategy decisions. I conducted a traditional narrative and a systematic main path analytic review of the literature, developing a new framework for organizing extant research on managerial networks and outlining key research themes. I found evidence that cohesive boards of directors may suffer from agency problems, whereas boards with structurally equivalent positions may be less susceptible to these problems. These findings suggest that whether directors' embeddedness in intraorganizational board networks is beneficial or detrimental requires further research attention. I also found evidence that interorganizational imitation of corporate strategic activity is more likely to occur when interlocking directors are central actors in the intraboard networks of connected organizations. Taken together, the findings presented in this dissertation provide important evidence that directors' social networks are consequential for organizational strategy and governance structures. Nevertheless, the notion that organizational economic conduct is embedded in and shaped by social relationships (Granovetter, 1985) should be further corroborated by future research. It is my hope that this dissertation advances that effort in the context of corporate board networks.