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ABSTRACT

How do board composition and board ties influence the performance of startups? An immense body of literature on boards of directors with a predominant focus on large and mature firms remains largely inconclusive to the impact of boards on performance. In this paper, we argue that boards of directors provide means of startups to access expertise and gain legitimacy. We develop a set of hypotheses related to board size, turnover and interlock ties with similar and dissimilar organizations and test this with a comprehensive longitudinal dataset from Sweden. The results suggest that direct board ties to similar organizations have a positive effect whereas board ties to dissimilar organization have a negative effect on performance. Surprisingly, we find no consistent results of the effects of board structure. We discuss the implications for theory and practice.

Keywords:

Board of directors, interlock, network, performance, start-up, Sweden

INTRODUCTION

Today it is well recognized that many of a firm's potentially productive resources are located outside the firm and need to be accessed through different kinds of relationships. These relationships with external actors take many forms including short-term contracts, alliances, and joint ventures, and a wide range of literature describes how such relationships facilitate or impede various kinds of firm-level outcomes (Powell, Koput, & Smith-Doerr, 1996). Such formal relationships are many times as important for startups as for incumbent firms, however, startups typically find it difficult to establish such relations because of liability of newness and smallness (Stinchcombe, 1965). Instead startups often need to utilize other means to access external resources. One such mean is the social networks of the founders, which has received some attention in entrepreneurship literature (e.g. Starr & MacMillan, 1990). Another mechanism is to try appointing appropriate persons to the boards. Appropriateness of such board members could be seen in virtue of their own knowledge and experience, as well as their contacts with other organizations. As a consequence, board members can be valuable for attracting resources otherwise unavailable to the startup as well as for helping the startup to gain legitimacy in the marketplace. In this paper, we ask the question: How do board composition and board ties influence the performance of startups?

Much research on boards and external board ties posit that these reflect the needs of an organization and thereby should influence its behavior and performance (e.g. Pfeffer & Salancik, 1978). Empirical findings, however, show little consistency in results with regard to the influence on firm performance (Dalton, Daily, Ellstrand & Johnson, 1998; Westphal, 1999). There are at least three explanations proposed for these inconsistencies. Firstly, from a methodologically point of view it has been argued that the lack of longitudinal studies has undermined the possibilities of tracking the development of boards and how that shapes performance. Indeed, although the causality between firm performance and board

composition is difficult to resolve even in longitudinal studies, studies that do not incorporate such a perspective will find it even more difficult to resolve this issue (Mizruchi, 1996). Secondly, there are also concerns from sociocognitive perspectives that insufficient attention has been paid to the heterogeneity of board ties (Carpenter & Westphal, 2001). Thirdly, the majority of research focuses only on large and mature firms, typically Fortune 500 firms. The size, complexity, diversity, and number of forces operating on the performance of large firms may complicate boards abilities to control the outcomes in such firms (Daily & Dalton, 1993). That board composition in mature firms, and external board ties, tends to be more persistent than the changing needs of firms over time may further aggravate the situation (Lynall, Golden & Hillman, 2003; Forbes & Milliken, 1999). Thus, rather than controllers of certain outcomes, director in large firms may be influencers of events (Bourgeois, 1987). Since boards in smaller firms have been observed to be less constrained by organizational systems and structures, and as young age is commonly associated with less inertial forces, it could be argued that boards have potentially larger impacts in startups than large firms (Daily & Dalton, 1992; Eisenhardt & Schonhooven, 1990; Hoskisson, Johnson & Moesel. 1994; Forbes & Milliken, 1999; Daily, McDougall, Covin, & Dalton, 2002). That is, there may be a stronger link between the boards' service contribution and firm performance. Still there are few studies that address the impact of boards in small firms, and fewer still that do so in the context of startups.

To address these theoretical challenges in the literature, this paper investigates the effects of board composition and the structure of ties over time in independently founded startups. By so doing we contribute to prior research in at least two ways. First to the literature on the effects of boards and interlocking directories in firms by analyzing the generality of previous findings to startups. Second, we also contribute to entrepreneurship literature by testing on a large sample of startups for the effects of boards and board

interlocks as a means to acquire resources. We base our inference by developing novel dataset which targets startups in the Stockholm metropolitan region in Sweden and their board composition as well as board interlocks. Our unique dataset allows us to track all board ties over several years.

The rest of the paper is structured as follows. The next section reviews earlier work on boards and interlock board ties, and develops several hypotheses on the impact on performance. Section two discusses the methodology, while the third section presents the results of the study. The concluding sections discuss the results, and provide some inroads for further research.

THEORETICAL BACKGROUND

A firm's board of directors constitutes the supreme decision-making authority in a corporation and the body with ultimate responsibility for its strategy, and the coordination of tasks to achieve this strategy. While the specific roles of boards differ among firms, as do the opinions among different theoretical perspectives on the roles that boards of directors should have, most boards perform parts or all of the roles of control, service and strategy formulation (Zahra & Pearce II, 1989; Hillman & Dalziel, 2003). That is, boards have an important function in monitoring managerial and company performance, and representing shareholders' interests; boards provide services such as information, advice and counsel to top management; and boards help formulating and implementing strategy, as well as setting guidelines for effective control of the chosen strategy (Zahra & Pearce II, 1989; Pfeffer & Salancik, 1978).

Whether all or only some of the roles are present in any given startup, an effective execution of the boards' roles can be valuable to a startup. Carefully selected directors may, for example, provide the firm with valuable deep inside firm- or industry knowledge, act as boundary spanners to other organizations, and signal status and competence to outside

evaluators (Daily & Dalton, 1992; Selznick, 1957; Mizruchi, 1996). In startups, which are typically characterized by their infancy and weak resource-base, such and similar services can indeed be important, not least for crafting and implementing initial strategies. Appointing directors to the board of a startup thus provides an opportunity for new firms to benefit from directors' own experience and knowledge, as well as from their ties with other organizations. Similarly the extent of services that are present and translate into value in any given startup hence relates to the board itself, as well as to the connectedness of the directors.

Board composition

There is a large body of research that relates various aspects of boards of directors to different corporate outcomes. These aspects often relate to the different roles of control and service that boards perform. As the present study focus on the board of directors as a mean for the startup to acquire resources, i.e. the services provided by the board, the present study considers primarily two aspects argued to be important to that end; board size and changes in board composition.

Research on board size has primarily focused on directors' ability to provide access to resources and advice otherwise unavailable to the firm. Large boards have been argued to be beneficial for both reasons of external contingencies and internal dynamics. Consistent with the resource dependence perspective, some scholars argue that greater number of directors provide more opportunities to link the firm with the environment (e.g. Pfeffer & Salancik, 1978). Accordingly, large boards of directors should be more beneficial the greater the reliance of the firm on the external environment. Relating more to the internal dynamics of the boards, other scholars argue that provided the number of functions boards has to fulfil, larger boards are more likely to fill all these often separated roles (Dalton, Daily, Johnson & Ellstrand, 1999). Furthermore, referring more to the ability of the board to contribute to strategy and control, it

has also been suggested that large boards may not be as susceptible to managerial domination as smaller ones (Zahra & Pearce, 1989). Some support for each proposition has also been found in studies on large firms or in meta-analytic studies, indicating a systematic relationship between board size and financial performance (Pfeffer 1972; Daily & Dalton, 1993; Dalton et al., 1999). The literature is, however, not unequivocally in favor of large boards. Referring to the internal dynamics of the board it has, for example, been argued that larger boards may lead to increased problems of communication and coordination. Such problems may inhibit a board's ability to initiate strategic actions, or factions may even emerge which in turn can cause deeper conflicts (Eisenberg, Sundgren, & Wells, 1998; Goodstein, Gautam & Boeker, 1994). Other arguments in favor of smaller boards focus more on agency problems in relation to the ability of a large board to control management thereby leading to agency problems (Jensen, 1993; Yermack, 1996; Mintzberg, 1983). As for arguments in favor of larger boards, also these notions of the benefits of smaller boards have been empirically supported (Eisenberg et al., 1998; Yermack, 1996).

The inconsistencies in these results can partly be explained by that what constitutes a small or a large board differ among studies. Findings show board size to be correlated with firm size (Dalton et al., 1999) and studies that sample large firms accordingly tend to have large boards. For example, in Yermack's (1996) sample of large firms the boards consisted of 6 to 24 members, while Daily & Dalton (1993), focusing on smaller firms, had a median board size of 3 and 6 members. The studies' findings in favour of small and large boards respectively would thus appear consistent on a general level, and board size hence has to be related to the firms studied. In part, the inconsistencies may also be explained by differing external contingencies. Provided that firms differ in their reliance on critical external resources, the benefits of board sizes may differ accordingly. Results on samples in one industry may hence not be directly comparable with those on samples in another industry. Similarly, results on

large firms may not be transferable to small firms, let alone startups. Still, these factors may not explain all inconsistencies provided the number of studies that report no effects at all (Dalton et al., 1998).

The firms addressed in the present study are, however, in virtue of being startups likely to be greatly reliant on their environment for their growth and indeed survival. Many startups need, for example, to access resources such as finance, equipment, and information in order to establish themselves and entrepreneurs may also lack general management experience as well as industry-specific experience required to successfully establish the firm and grow (Eisenhardt & Schoonhoven, 1990; Shane, 2001). Rather than learning new skills, which take time and lead to economic inefficiencies, carefully chosen directors could replace much of trial and error associated with startup development. The board's knowledge and skills may therefore be a particularly critical ingredient for effectiveness in startups (Forbes & Milliken, 1999). Such knowledge may furthermore be even more important in high-tech industries where knowledge demands are higher (Kotz, 1998). As a larger board is likely to have a greater potential for interfaces with external resources, as well as is more likely to encompass more of the many potential roles and services a startup requires, we expect that large boards should be beneficial to new firms. Furthermore, as we expect that the average size of boards to be fairly small, considering that startups generally are small, we do not believe any problems to emerge with regard to the communication and coordination problems associated with large boards in other studies. Therefore:

Hypothesis 1: In startups, the number of board of directors positively influences performance.

Boards of directors need, however, not be stable over time. Changes occur as some directors leave and new ones are appointed. Such changes have been observed to occur when, for example, earlier returns on assets are poor so as to change direction (Eisenberg et al., 1998). Changes may also be necessitated to accommodate for new requirements. A central tenet in life-cycle theories is that firms' challenges and opportunities vary across different stages of the life cycle (Lynall et al., 2003). Such differences across life cycle stages may relate to, for example, changing resource needs, sophistication and complexity of systems and structures, and managerial capabilities required (Jawahar & McLaughlin, 2001). Also startups face a number of such challenges as they grow, including building an organization, finding the right customer segment, and initiating and scaling production (Dodge & Robbins, 1992). While some entrepreneurs are apt to lead the firm to growth through such varying challenges, many entrepreneurs are not. Rather, successful startups recruit managers and leaders better suited to the requirements facing the firm (Shane, 2001). Similarly, different competencies may be required in the board room of a startup during different stages of its life cycle. Based on these shifting requirements, Lynall et al. (2003) argue that boards formed in the life cycle stage the organization is currently in will outperform those formed in other stages. In effect, this should imply that new firms that make continuous changes to their boards over time should be more likely to outperform those that don't. Still, we believe that introducing too large changes in composition may run the risk of losing consistency and knowledge valuable to the firm. Therefore:

Hypothesis 2: In startups, change in board composition is curvilinear associated with firm performance, so that some change is beneficial and too much detrimental

Board connections

Early work on executives' ties argued that external such ties play an important role in absorbing uncertainty stemming from resource dependencies (Pfeffer, 1972; Pfeffer & Salancik, 1978). Thus viewed, external ties, and in particular interlocking directories, function as means to help manage a fit with the environment through resource cooptation and control (Lynall et al., 2003). Resource cooptation refers to the function of directors to absorb environmental uncertainty, while control refers to the use of directors to influence other firms respectively. Both concepts suggest that direct board ties are a means to create coordinated action among organizations and to reduce uncertainty by either improving access to critical resources, or by asserting control over other organizations operations. Startups, however, likely seek to find a fit rather than managing a fit with their environment. External ties in new firms then may not primarily be a means to assert control, and startups may furthermore not be in a position to co-opt the environment in the same sense as incumbents do. Rather, startups may be subject to such control from, for example, investors.

More in line with our focus on new firms' initial phases are other streams of literature that emphasize the role of executives' external ties to confer information rather than as a means for control. These lines of literature regard strategic choices as often surrounded by extreme information complexity stemming from factors such as information overload, environmental uncertainty and information ambiguity. Since decision makers have limited capacity to process and acquire information on their own, they tend to rely on heuristics and on established channels of information (March & Simon, 1958; Cyert & March, 1963). In both cases, the literature suggests the importance of external ties.

Literature has since long recognized the benefits of external ties as vital sources through which executives derive important insight into, for example, trends and the environment (e.g. Mintzberg, 1973). Personal contacts have been shown to be greatly preferred to these ends for reasons of being timely, firsthand, rich and circumventing intraorganizational biases (Daft & Lengel, 1984). Interlocks have further been argued to be particularly beneficial sources as such ties provide direct involvement in other firms' internal decision making (Haunschild, 1993; Useem, 1982). Apart from purely informational benefits, literature on executives' external ties has increasingly also come to focus on the informational and social influence conveyed in ties (Mizruchi, 1996). Findings point to that, firstly, external ties can impart a significant influence on how actors come to interpret reality. Provided that actors have only bounded rationality, they tend to rely on experiences and interpretations made in similar contexts by others in order to interpret their own context. Executives interacting with external actors may thus adopt these actors' representations to make sense of their own situation, something which may be especially salient under conditions of uncertainty (Geletkanycz & Hambrick, 1997; Cyert & March, 1963). Secondly, direct board ties also function as an important source of advice as experience from other strategically relevant boards can contribute to the strategic decision making process in the focal firm (Carpenter & Westphal, 2001). External referents can, for example, offer insights into a broader range of practices and strategic options than can executives on their own. Finally, by way of conveying information, advice and influence, external contacts also promote the diffusion of views and practices. Researchers have, for example, found evidence that executives will often adopt the same practices if linked via director networks (Davis, 1991). By extension, this has also been argued to be one explanation for the tendency for organizational conformity in industries (DiMaggio & Powell, 1993).

Together, these streams of research suggest that external ties provide important informational insights, help shape executives' frames of reference as well as influence their behaviors. Yet, while the relationship between executives' external ties and performance has been subject to many studies the findings are mixed (Mizruchi, 1996). This ambiguity has been argued to result partly from that interlock literature tend to treat all ties as equally positive, thereby ignoring the heterogeneity that may exist among interlocks (Gulati & Westphal, 1999).

Social network literature has observed that personal contacts may contribute different information and influence depending on their structure. Studies have, for example, demonstrated that ties to actors in similar contexts provide a redundancy of information, while ties with actors in dissimilar contexts provides for more disparate information (Granovetter; 1973; Burt, 1992). The benefits of executives' external ties may thus hinge upon their direction. Specifically, ties to firms in similar industries provide an abundance of information and knowledge of the industry of the focal firm. Executives' ties with such inside actors should thus increase their ability to grasp the subtleties of the industry's practices. Heterogeneous ties, or ties to actors outside the focal industry, instead impart more novel information and greater knowledge of a broader range of strategic alternatives. Executives' ties with such outside actors should thus increase their ability to formulate deviating strategies. As a result, ties with actors inside or outside the focal industry should have different effects. In fact, recalling the informational and social influence of ties, intraindustry ties would seem to promote conformity while extraindustry ties seem to promote opportunities for differentiation.

Turning to the organizational implications of either kind of ties, however, it is not clear cut what the effects are on performance. Differentiation is frequently argued as much important for competitive advantage (Porter, 1980), something a startup may require in order to make novel inroads to a market. Conformity, on the other hand, may promote efficiency and cost minimization as less experimentation and hence risk is associated with such an approach. Also,

while a startup may imitate readily apparent aspects of industry practice, it will likely need intraindustry ties to grasp the details of execution. Indeed, Shane (2001) found that the ability for a new firm to succeed was often crucially dependent on obtaining deep knowledge of the specific market and industry of interest, and the less evident aspects of strategic approaches. Conformity to industry wide tendencies can further enhance organizational legitimacy by signaling stability and viability to potential external stakeholders and reduce uncertainty surrounding critical dependencies (Geletkanycz & Hambrick, 1997). Such legitimacy can indeed be advantageous to startups which are often crucially dependent on their environment. Both intra- and extraindustry ties, and by extension differentiation and conformity, hence have their respective benefits and research suggests that the priority of the one over the other rather depends on the context (Geletkanycz & Hambrick, 1997).

One specific condition that has been found to influence the benefits of conformity is the level of environmental uncertainty. Geletkanycz & Hambrick (1997) argue that uncertainty increases the ambiguity around means-end linkages as well the difficulty for outsiders to assess the viability of the firm. In both cases, they argue, conformity to industry standards will make it easier for firms as adopting well-known practices confers less cost than experimentation and also increases legitimacy. However, Carpenter & Westphal (2001) argue to the contrary that during periods of turbulence, intraindustry ties may cause the firm to ignore vital environmental changes that threaten its long term stability. While both arguments find empirical support in the respective studies, we believe that in the context of startups intraindustry ties will confer greater benefits on average. The reasons are that startups are often inherently uncertain endeavors where perceived legitimacy by external stakeholders is crucial to attract investors, suppliers and customers. Moreover, while a deviant strategy may make for a novel inroad to a market such a strategy presumably needs to be set against a thorough

understanding of current practices and strategies in an industry in order to be successful, which again suggests the need for intraindustry ties. Therefore:

Hypothesis 3a: In startups, ties to similar organizations are positively associated with firm performance.

Hypothesis 3b: In startups, ties to dissimilar organizations are negatively associated with firm performance.

METHODS

Research setting

Whereas earlier studies on boards have primarily focused on large Fortune 500 firms, we theorized about the implications of board composition and direct board ties on startups. We argued that to have or to appoint appropriate directors to the board offer a way for new firms to access crucial resources such as information, commitments, expertise and legitimacy. As such effects may be difficult to observe in a snapshot, we chose a research design that allowed us to capture the development of new firms. We chose to analyze firms in the Stockholm region for several reasons. First, being the capital of Sweden, Stockholm is one of the most vibrant regions in terms of startups in the country. Second, by focusing on one region we were able to hold some macro-economic factors such as access to venture capital constant. Third, by analyzing Swedish firms we were able to get unique access to data on privately owned organizations.

Sample and data

All firms incorporated in Sweden are required by the Swedish law to register at the government agency Swedish Companies Registrations Office (SCRO). SCRO provides registered firms

with an organizational code and oblige firms to report, for example, financial data on a yearly basis, and changes to the board of directors and the CEO on a continuous basis. The data is kept in the agency's corporate directory and, except for detailed personal information, the data in the directory is publicly available and can be accessed either directly from SCRO or from firms and agencies that continuously draw from this directory to set up databases of their own. For the purpose of our study we chose to cooperate with one such firm. The reasons were twofold, firstly the firm updated all data on a continuous basis through a close collaboration with SCRO, and, secondly, because the firm's database exhibited some advantages as compared to that of SCRO when it came to the searchability of board ties.

The data were collected in several steps. In a first step we identified all companies to be included in our study. We applied four criteria to sample the firms. First, we limited the sample to companies registered between 1997 and 2003. The lower limit resulted from that data prior to 1997 were difficult to retrieve from the database, and the upper limit was due to that we did not expect any measurable effects of board ties in firms founded later than 2003. Since the date of registration does not always coincide with the upstart of the business we also had to clean the dataset from "resting" companies and revise the date of founding where a firm had started its business years after the date of registration. Second, to obtain a manageable dataset we confined the sample to a geographical area and to a specific industry. The choice fell on the greater Stockholm region as this is one of the most dynamic regions in Sweden. As for the industry, some scholars argue, as mentioned above, that boards and their knowledge may be of even more value in industries characterized by requirements of high degrees of specific knowledge, such as high-tech industries (Kotz, 1998). The ICT-industry, including manufacturing firms and firms providing services to manufacturing firms, fit such a criterion of a knowledge-intensive industry at the same time as it was large enough to provide a sample that allowed analyses. The ICT-industry was consequently chosen and relevant firms were

identified by using the associated SIC-code (72). To apply SIC-codes as a criterion for selection may cause a loss of firms that have not yet assigned or received a SIC-code. After controlling for the total population of firms (i.e all SIC-codes) we found that firms with no SIC-code amounted only to a few percent. Thirdly, we only included firms that had at some time during the period employed more than 5 employees. The reason is that we assumed these firms to have had ambitions to grow at some point, and therefore also were more likely to attend to their environments. The final criterion applied was that the firm should have started independently. The reason is that firms founded as, for example, joint ventures or subsidiaries are likely to from start enjoy advantages in the form of resources and perhaps even customers. While boards may play a significant role also in these firms, our interest was with startups, i.e. firms that start from 'scratch', where we assumed the knowledge and information of boards to play an even more important role. Information on the founding condition of the sample firms were obtained from Internet resources as well as corporate documentation. After singling out firms that were independently founded, the final sample amounted to 335 companies. For these firms we obtained financial data for each year they had been up and running, exits, as well as continuous data on the entry and exit of board members. We also retrieved the full financial records for the connected firms.

In the second step, we also cleaned the boards of directors of firms. In Sweden many founders rather than register a firm themselves, buy this service from law firms. Since every firm is required to have an accountable board member, the lawyers themselves often step in as board members before the firm is handed over to the entrepreneur. Such board members were removed from the sample. In addition, we assumed that board members with a short tenure than 1 month would have only a limited impact on the firms, and such directors were consequently also removed from the sample.

In the third step we obtained for each board member in every firm in our sample, all other boards in which they had positions simultaneously as in our focal firms. We labeled these firms associated firms and for each of these firms we obtained financial data as well as firm data. Again we applied the assumption that the director should have had a tenure of at least 1 month in the associated firm. The associated firm was also required to be active in order to be included.

Measures

Dependent variable. Following George (2005), we measured financial performance as gross profit calculated as cost of sold goods subtracted from revenues.

Independent variables. We measure *board size_{it}* as the number of board members for each firm *i* in year *t*. Two variables were developed to measure changes in board composition. We calculated the number of *new board members_{it}* and the number of *outgoing board members_{it}* in the board for firm *i* in year *t*.

Based on the board data over the years, we developed a two-mode network with individual board members affiliated to different organizations. We converted this data to one-mode as we argued that two firms are associated if they share at least one board member. That is, if a director has been on several boards prior to joining the board of the focal companies in our study, these ties are not counted. The reason is that data is more readily available for existing ties. Using this data, we were able to assess the effects of different types of board ties. Following Freeman (1979), we used degree centrality to obtain a measure of *ties to similar organizations_{it}*. We considered an organization to be similar if they corresponded on the same 2-digit SNI-code. Indeed, such organizations have similar competitive situation and competencies. Conversely, we counted the *ties to dissimilar organizations_{it}* by counting all unique ties to organizations not sharing the same 2-digit SNI-code.

Controls. Even though the organizations are within the ICT sector, there are some differences in the nature of their business. We therefore controlled for *industry* effects by using a dummy variable for each SNI-code in the sample. We also included *year* specific effects to control for the general economic trend.

Firm-specific effects that we control for include the age and size of the firm. Older firms may have had greater opportunities to build up routines and competencies to profit from, so we calculate the age_{it} for each firm i in year t . To assess whether larger firms are more profitable than smaller, we measured $size_{it}$ as the natural logarithm of the number of employees for firm i in year t .

Finally we also controlled for the effects of having ties to somewhat larger firms, that is, firms with more than 50 employees. To judge such effects we calculate the *share of ties to larger firms* $_{it}$ as the share of total ties for each firm i in year t that connects to firms with more than 50 employees. We run supplementary analyses using different definitions of large firms and found that the results were robust.

RESULTS

Table 1 illustrates the descriptive statistics for the sample. There are some high correlations between the variables and we therefore assessed the potential problem of multicollinearity by examining the Variance Inflation Factors (VIF). The VIF scores were below the generally accepted threshold level of 10.

Insert Table 1 about here

We chose to use a dynamic model with an autoregressive structure in the dependent variable to reflect the dynamic nature of a profit creation process. To do so, we used a Generalized Method-of-Moments (GMM) estimator for the parameters of this model (Arellano & Bond, 1991), which is suitable for an autoregressive model that includes a lagged dependent variable. The GMM has often been used in the models predicting corporate profits in the past (Geroski, Machin & Van Reenen, 1993). We also tested alternative specifications with cross-sectional time-series regression models where the disturbance term is first-order autoregressive and fixed firm effects. Our results are robust for this alternative estimation technique. Table 2 shows the results from the Arellano-Bond GMM regression with 1 lag. In model 1 we only include the control variables. In model 2 we add the independent variables.

 Insert Table 2 about here

Hypothesis 1 proposed a positive relationship between the board size and firm performance. Our results, however, found no such effect. *Hypothesis 2* suggested that turnover in the board composition is curvilinear associated to performance. Again, the hypothesis was rejected as we found no significant effect. *Hypothesis 3A* and *Hypothesis 3B* suggested a positive relationship of ties to similar organizations on performance, and a negative relationship of ties to dissimilar organizations on performance respectively. We find strong support for both these hypotheses.

DISCUSSION

Implications for theory

The results of this research are significant for several reasons. First, the findings contribute to literature on direct board ties by suggesting that such board involvements with other firms have a significant and lagged effect on the performance of new firms. Importantly, the findings also point to that it is not interlocks per se that are important, but that their effects are contingent upon the orientation of the firms connected to. While this is in line with our expectations, and those of some prior studies, prior studies are inconsistent as to what the effects are. Studying top executives' external ties in large publicly traded US firms, Geletkanycz and Hambrick (1997) found that intraindustry ties were associated with positive performance for firms operating in more uncertain environments, and vice versa that extraindustry ties were more conducive for firms in stable environments. They concluded that "a deviant, idiosyncratic strategy in a turbulent industry has a higher likelihood of being wrong and impairing performance" (1997: 676). However, studying large & medium sized firms, Carpenter & Westphal (2001) came to the opposite conclusion. The contributions of this article does not resolve the issue in the context of large, mature firms, but the findings does lend support to Geletkanycz & Hambrick's arguments in the context of startups. Our results suggest that in the inherently uncertain environment of startups, executives' intraindustry ties are much important to foster superior performance. This is also plausible in the light of that entrepreneurship scholars point to the vital importance of legitimacy and deep industry knowledge for startups to succeed (e.g. Shane, 2001). As argued by Geletkanycz and Hambrick, executives involvement with similar firms can likely contribute to such gathering of information, as well as to legitimacy, knowledge and expertise that may enhance a startup's ability to create a viable entry strategy. While diversity of ties may be important for inputs of a broader range of strategic alternatives, the results suggest that the price for obtaining such inputs could well be higher than the resulting benefits in the initial phases of startups. Rather, experimentation, especially with insufficient grounding in the current

practices of an industry could cause delays for new firms and as time often equals money performance could suffer. On the basis of these results then, we conclude that in startups initial phases it is much important to try form intraindustry ties in order to gain legitimacy and firsthand industry-specific information and knowledge. Still, further research is needed to asses these results.

The results on the positive effects of direct board ties to firms in similar industries also contribute to the entrepreneurship literature, by suggesting that having or appointing appropriate board members is an alternative, yet potentially important mechanism to acquire resources that can facilitate growth. Still, there is as little research on this mechanism in entrepreneurship literature as it is on the effects of direct board ties on startups in interlock literature (Daily et al., 2002).

Counter to expectations, however, the results did neither support our hypothesis on the effects of board size on firm performance nor hypothesis on the effects of changes in board composition on performance. As for board size, we find no robust results that can support neither findings on the benefits of larger boards in new firms, nor earlier findings on the benefits of smaller boards in small firms (Daily & Dalton, 1993; Eisenberg et al., 1998). If anything, the results rather confirm earlier null results (e.g. Finkle, 1998). This is, however, noteworthy by itself. Researchers often argue that the effects of larger boards should be more visible in small firms, and even more so in startups (e.g. Forbes & Milliken, 1999). Based on our null results for startups, however, we would rather conclude with Dalton et al. (1999) that it is not size per se that is the key factor influencing performance, but a sufficient size of the board so as to incorporate or access the necessary skills and information required. What constitutes a sufficiently large board to fill all the separate roles of a board, however, likely differ from firm to firm depending on the specific requirements in each case.

As for the effects of changes in board composition, literature associates prolonged tenure with negative performance for reasons of poor fit with managerial requirements, restricted information processing and reduced willingness to take risks (Lynall et al., 2003; Geletkanycz & Hambrick, 1997). Our results, however, are not significant although pointing in the direction of a positive and curvilinear association between changes in board composition and performance as expected. One possible explanation is that although our data stretches for a period of 9 years, the average age of startups in our sample is less and hence the need for, or effects of, changes in composition may not have emerged yet. Similarly as for board size, however, it may also be that changes in board composition have to be set against the specific requirements of each firm. Moderate changes in board composition may not be significant per se, but contingent on the particular circumstances of the firms.

We also offer a methodological contribution for analyzing boards in startups. Earlier studies on the influence of board composition and interlock board ties on firm performance have ignored the dynamic nature of the profit creation process. This creates a serious shortcoming as successful firms are likely to remain successful over time and vice versa (Geroski et al. 1993). To cope with this issue, we adopted an autoregressive model that lagged profitability, the dependent variable in our analyses. This enables a way of overcoming the problem of only analyzing board at one point in time as it is likely to alter the result in a significant way.

Implications for practice

For startups, one of the greatest challenges is to find a fit between the environment and their products, services and strategies. The startups board of directors has the ultimate responsibility for these decisions and as startups typically have fewer barriers between the daily operations and the directors one could argue that these directors have higher impact on

the destiny of the firm than directors of large incumbents. Accordingly effects of board size, changes in composition and director ties should also be more evident in startups.

While we find no evidence of board size and turnover in the board composition, our results suggest that interlock board ties is an important factor to consider. It appears that startups in their initial phases could benefit greatly by affiliating with directors on the boards of firms in similar industries, while they should refrain from affiliation with dissimilar firms. This suggests that, at least in the initial phases, learning the rules of the game in the focal industry should be prioritized over finding ways to go around them.

Limitations

This research has some potential limitations. The sample consisted only of startups and the results can therefore not be generalized to larger, more mature firms without further research. Also, we focused on one industry, the Swedish ICT-sector, in order to avoid influences of possible cross-sectional variations. Finally, it is also important to note that our analysis did not include measures of how changes in composition influenced the inside/outside ratio of directors. Although prior literature is inconclusive also with regard to the relative effects of inside and outside directors (Daily et al., 2002), the inclusion of such measures could possibly affect both the results on board size and changes in board composition. For the same reasons, measures of the age and experience of directors, previous affiliations of executives, external ties other than interlocks, and effects of eventual founder CEOs could further enlighten the effects of boards in the particular context that surrounds startups. Further research thus needs to investigate in more detail how boards and changes in the composition of boards may affect performance in independent entrepreneurial firms.

In conclusion, this research has potentially significant implications for research on interlocking directories and entrepreneurship research as well as on managerial practice. The

results suggest the importance of entrepreneurial firms to have or appoint members to the board that provide them with ties to other firms within the same industry. This research suggests a contingency fit between boards and the particular context of new firms and provides empirical support for and theoretical understanding of how boards and board connections influence the performance in startups. Our research calls for more research investigating the longitudinal development of boards and the implications on performance.

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LIST OF TABLES:**Table 1: Descriptive statistics**

Variable	Mean	S.D.	Min	Max	1.	2.	3.	4.	5.	6.	7.
1. Performance	-1790.24	7509.701	-85546	44155							
2. Size	1.935377	0.850264	0	5.371	-0.28						
3. Age	2.479479	1.98576	0	8	0.08	0.25					
4. Board composition	0.727434	0.386956	0	1	0.07	0.21	0.56				
5. Board size	3.655656	2.023533	0	11	-0.29	0.35	0.10	0.00			
6. Ties to similar organizations	3.067568	5.630497	0	55	-0.38	0.32	0.02	-0.08	0.52		
7. Ties to dissimilar organizations	0.627127	1.391945	0	14	-0.24	0.26	0.00	-0.08	0.42	0.74	
8. Share of ties to larger firms	0.122027	0.220599	0	1	-0.21	0.26	0.11	0.02	0.33	0.34	0.27

Table 2: GMM regressions predicting performance

Variable	Model 1	Model 2
Lagged performance	0.495 (0.043) ^{***}	0.476 (0.043) ^{***}
Size	-3189.837 (361.275) ^{**}	-3042.654 (368.947) ^{***}
Age	622.746 (179.934) ^{***}	613.429 (184.231) ^{***}
Share of ties to larger firms	-651.005 (1014.418)	-694.235 (1016.665)
Board composition		4220.153 (3961.403)
Board composition - squared		-3815.117 (3035.456)
Board size		13.028 (204.032)
Ties to dissimilar organizations		-222.849 (71.607) ^{***}
Ties to similar organizations		821.779 (260.282) ^{***}
Year dummies	Included	Included
Industry dummies	Included	Included
Number of firms	335	335
Number of firm years	1188	1188
Wald χ^2	315.30	331.73

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses.