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CAN BOARD LEADERSHIP CONTRIBUTE TO BOARD DYNAMIC MANAGERIAL CAPABILITIES? AN EMPIRICAL EXPLORATION AMONG NORWEGIAN FIRMS

1. Introduction

The person with the greatest ability to influence board leadership is the chairperson of the board (Machold, Huse, Minichilli, & Nordqvist, 2011; Roberts, McNulty, & Stiles, 2005). In particular, the board chair holds a position through which the engagement and effectiveness of the other board members can be influenced (Knockaert, Bjørnåli, & Erikson, 2015; Krause, Semadeni, & Withers, 2016). However, we are only in the beginning phases of determining relationships that elaborate on the leadership impact of board chairs (Machold et al., 2011; Withers & Fitza, 2016). As such, research in strategic management on board chairs has primarily attended to its effect on strategic change (Quigley & Hambrick, 2012) and firm performance (Withers & Fitza, 2016). We therefore know little about how board chairs directly contribute to the dynamics inside the board (Krause et al., 2016; Withers & Fitza, 2016). In our study we extend this research by drawing on the dynamic capabilities perspective to explore how the unique leadership position of board chairs may impact board dynamic managerial capabilities under different levels of environmental dynamism (Helfat & Martin, 2014; Sirmon & Hitt, 2009) using a sample of Norwegian firms, where boards have been found to be actively involved in strategic decision making (Minichilli, Zattoni, Nielsen, & Huse, 2012).

The initial research on dynamic capabilities focuses on the dynamic capabilities of the firm, where Teece, Pisano, & Shuen (1997) defines them as the firm's ability to build competencies to address rapidly changing environments. Later on, the dynamic capabilities perspective is extended in its focus to also elaborate on the dynamic capabilities of managers (Adner & Helfat, 2003). This line of research highlights that dynamic managerial capabilities - the dynamic capabilities of managers in sensing and seizing opportunities as well as reconfiguring assets - are central capabilities through which managers build, integrate and reconfigure organizational resources and competencies to adapt to changing environmental conditions (Adner & Helfat, 2003). Because the board of directors not only oversee management decisions but also are increasingly involved in strategic decision making (Finkelstein, Hambrick, & Cannella, 2009; Pugliese et al., 2009; Zahra & Pearce, 1990), the dynamic managerial capabilities of the board can be important drivers that revitalize the dynamic capabilities of the firm (Helfat & Martin, 2014; Kor & Mesko, 2013). For instance, boards can revitalize the dynamic capabilities of the firm through their active involvement in strategic decision making where they outline relevant strategic actions and resource priorities that contribute to strategic change (Finkelstein & Mooney, 2003). From this perspective, we bring attention to the impact of board chairs and argue that

it is important to examine the unique leadership position of board chairs in influencing the boards' dynamic managerial capabilities. This argument builds on the observations that board chairs orchestrate board dynamics through their active involvement in setting board agendas and chairing board meetings as well as through the influence they have on other board members (Machold et al., 2011; Roberts et al., 2005).

To better understand these dynamics, we focus on one specific board chair attribute – their human capital. Given that human capital is the stock of knowledge and experience that contribute to the development of dynamic managerial capabilities (Adner & Helfat, 2003), we propose that board chairs with greater human capital have a greater leadership impact and thus are in a better position to influence the sensing, seizing, and reconfiguring capabilities of their boards. Consistent with the dynamic managerial capabilities perspective (Teece, 2007), this study takes into consideration the contexts of environmental dynamism and examines how it may moderate the impact of board chair human capital. Research on managerial discretion suggests that both environmental and individual factors influence strategic leaders' impact on their organizations (Finkelstein & Hambrick, 1990; Hambrick & Finkelstein, 1987). Consistent with this research, there is evidence showing that firms experiencing a high level of environmental dynamism are more likely to benefit from the resources contributed by their board chairs (Withers & Fitza, 2016). We thus predict that the positive relationships between board chair human capital and board dynamic managerial capabilities (i.e., sensing, seizing, and reconfiguring capabilities) are stronger in firms operating in a more dynamic environment.

This paper thus addresses the following two questions: Does the chair's human capital contribute to the development of dynamic managerial capabilities (i.e. sensing, seizing, and reconfiguring) at the board level? How does environmental dynamism influence the relationship between board chair human capital and board dynamic managerial capabilities? We test our hypotheses using survey data from a sample of 410 Norwegian firms. The Norwegian setting fits our purpose well because Norwegian boards have been described as very active boards (Minichilli et al., 2012). As such, their active involvement in decision making and entrepreneurial activity makes their dynamic managerial capabilities especially relevant. The results of the study are largely consistent with our predictions, showing that board chair human capital is positively associated with the board's sensing, seizing, and reconfiguring capabilities, and the associations are stronger in a more dynamic environment. The only exception is for the moderating effect of environmental dynamism on the relationship with board reconfiguring capability. Overall, these results suggest that

board chairs with greater human capital can play a bigger leadership role in the development of board dynamic managerial capabilities, especially in more dynamic environments.

Our theory and supportive findings make several important contributions to the strategic management and corporate governance literature (Finkelstein et al., 2009). First, this study contributes to the dynamic managerial capabilities literature (Adner & Helfat, 2003) by drawing attention to the dynamic managerial capabilities of the board of directors and introducing the board chair's human capital as a driver. In particular, our work offers empirical support to the notion that board chairs can have a direct impact on board dynamic managerial capabilities. Consequently, our study complements prior research on board chairs dominated by agency theory in the corporate governance literature (Krause et al., 2016). We show that the dynamic capabilities perspective is an important perspective to consider when studying board chair effects. Secondly, we contribute to research on board chairs by moving beyond a static view of them as merely providers of resources. Our findings suggest that they can contribute to the firm's dynamic managerial capabilities at the board level, to an extent that depends on the environmental conditions the firm faces. In particular, we suggest that board chairs with greater human capital play a bigger leadership role in more dynamic and uncertain environments. Thirdly, it provides new insights concerning the growing literature on board value creation (Huse, 2007). By examining board sensing, seizing and reconfiguring capabilities, our study directs attention to the strategic leadership role of board chairs through which they can enhance board value creation. Consequently, our research sheds new light on the value creating role of board chairs.

The rest of this article is structured as follows. We start with a literature review and the development of our hypotheses, followed by a description of the methods for conducting the research including sample, data and the variables. We then present our analysis and results of the six multivariate regression models. Finally, we discuss the findings and contributions before concluding with the implications for future research.

2. Literature review and hypotheses

2.1. Board chair leadership

The person with the greatest influence on a board is the board chairperson (Machold et al., 2011; Withers & Fitza, 2016). In particular, the leadership of the board chair is about setting board meeting agendas and engaging board

members to ensure positive firm outcomes when the board performs the agency and resource provision functions (Forbes & Milliken, 1999). The literature suggests that boards perform two primary functions. Agency theory suggests that boards contribute to firm performance by monitoring and controlling managerial decisions (Adams, Hermalin, & Weisbach, 2010; Fama & Jensen, 1983), while resource dependence theory suggests that boards can provide valuable resources, including advice and counsel to management, that are important to their firms' survival and competitive advantage (Hillman & Dalziel, 2003; Salancik & Pfeffer, 1978; Withers, Hillman, & Cannella, 2012). Board chairs can contribute to both the agency and resource provision functions by shaping board norms through their leadership to create a climate where all board members are encouraged to contribute with their knowledge and skills (Knockaert et al., 2015). Although scholars have argued that the knowledge and experience of board chairs contribute to positive leadership behavior (Krause et al., 2016), research on the impact of board chair leadership is rather scarce (Machold et al., 2011). As such researchers are only in the beginning phase of developing a perspective that elaborates on the leadership impact of board chairs (Withers & Fitza, 2016). In this context, we investigate the impact of board chair leadership by focusing on their human capital from a resource-based view (RBV) perspective (Barney, 1991; Wernerfelt, 1984).

2.2. The human capital of board chairs

The pioneering work on the RBV by Wernerfelt (1984) and Barney (1991) has guided many researchers to explore what resources and capabilities enable firms to obtain sustainable competitive advantage. According to this research, human capital is one type of resource that is critical to the development of value creating strategies (Mahoney & Kor, 2015; Mahoney & Pandian, 1992). Meanwhile, research on boards of directors has shown that the board chair is in a vital position to influence board functions and firm competitiveness (Gabrielsson, Huse, & Minichilli, 2007; Knockaert et al., 2015; Machold et al., 2011). Some scholars thus have recently begun to examine the attributes that make board chairs valuable resources to their firms (Krause et al., 2016; Withers & Fitza, 2016). We build on this RBV perspective and especially its extension, the dynamic capabilities perspective (Helfat & Peteraf, 2003, 2015), to examine the extent to which board chair human capital influences the dynamic managerial capabilities of the board.

As the leader of the board, the board chair can have a significant impact on the effectiveness that other board members perform their agency and resource provision duties (Roberts et al., 2005). Machold et al. (2011: p. 378) argue that the board chair "is the most critical person in the boardroom who integrates knowledge and develops initiatives to

engage board members in team dynamics”. In this position, the human capital of the board chair plays a critical role in bringing out the value creating potential of the board (Gabrielsson et al., 2007). Human capital refers to an individual’s skills and knowledge, which are typically developed through education, training, and experience (Becker, 1962). For board chairs, their human capital is “the innate and learned abilities, expertise, and knowledge” possessed by them (Castanias & Helfat, 2001: p. 662), which can be conceptualized to include both firm specific and industry specific human capital. Firm specific human capital refers to knowledge about the firm’s critical technologies, products and processes (Krause et al., 2016). On the other hand, industry specific human capital refers to the knowledge specific to an industry, gained through the experiences of working in that industry. For example, it could be the managerial knowledge of competition, regulation, technology and supply chains specific to an industry (Kor & Misangyi, 2008).

There is a general consensus that board members with high levels of human capital are more likely to provide high-quality services (Kor & Sundaramurthy, 2008). Furthermore, it has been recognized that the human capital of individual board members influences their effectiveness in agency and resource provision duties (Hillman & Dalziel, 2003). Consequently, possessing adequate human capital in the form of firm specific and industry specific knowledge is seen as a prerequisite for maintaining reasonable performance as a board chairperson (Knockaert et al., 2015; Krause et al., 2016). Given that board chairs play a leadership role in board decisions, the human capital a board chair brings to the boardroom can have a significant impact on the board’s collective actions, entrepreneurial activities, and strategic choices (Kor & Misangyi, 2008; Kor & Sundaramurthy, 2008). From this standpoint, the board chair holds a critical position that directly influences the functioning of the board (Krause et al., 2016; Withers & Fitza, 2016). In our empirical setting of Norway, because firms tend to be relative small (Huse, 1990), industry and firm specific knowledge provided by board chairs can be especially important given that these firms are often less resourceful and face a higher risk due to the liability of smallness (Zhang, Baden-Fuller, & Pool, 2011). To gain industry and firm specific knowledge, board chairs need to have extensive experiences within their firms and industries as this knowledge is often accumulated over time (Castanias & Helfat, 2001). When board chairs possess industry and firm specific knowledge that is valuable, rare, inimitable, and non-substitutable, they can become an important source of their firms’ competitive advantage (Barney, 1991).

2.3. Board dynamic managerial capabilities

A significant portion of previous research on boards has applied the RBV perspective (Gulati & Westphal, 1999; Huse, 2007; Kor & Misangyi, 2008; Kor & Sundaramurthy, 2008; Krause et al., 2016; Machold & Farquhar, 2013). Extending the RBV perspective to dynamic markets leads us to the dynamic capabilities perspective (Teece et al., 1997), which draws attention to the enhancement of existing resource configurations under changing environmental conditions (Eisenhardt & Martin, 2000). Defined as “the firm’s ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al., 1997: p. 516), its main assumption embraces that firms need dynamic capabilities to modify their short-term strategic position in order to build long-term advantages (Teece, 2007). As such, the dynamic capabilities perspective is especially promising to help understand the foundation of long-term enterprise success in increasingly challenging environments facing global competition and fast-paced technology advancements (Augier & Teece, 2008; Kor & Mesko, 2013). By highlighting the importance of strategy, leadership, and management, it can help decision makers - including boards - to prioritize and outline relevant strategic actions they must adopt to achieve change and enhance firm performance (Adner & Helfat, 2003; Teece, 2007). In line with these theoretical arguments, Adner & Helfat (2003) introduced the concept of dynamic managerial capabilities as the microfoundations of firms’ dynamic capabilities, which denotes attention to managers’ capabilities in sensing and seizing opportunities and reconfiguring assets to adapt to changing environmental conditions (Helfat & Peteraf, 2015). These capabilities influence the quality of strategic decisions and allow firms to stay agile (Helfat & Martin, 2014).

Given this recent development, we argue that it is important to study dynamic managerial capabilities of boards of directors as well. Boards are increasingly involved in strategic decision making where they as a team share information, knowledge, and experiences (Finkelstein et al., 2009; Zahra & Pearce, 1990). Thus, it makes sense to study the dynamic managerial capabilities of boards as the dynamic capabilities perspective can help boards outline strategic actions and priorities in complex and changing environments (Beck & Wiersema, 2013; Teece, 2007). Furthermore, boards are expected to be increasingly entrepreneurial to foster product, market, and strategy innovations by means of supporting and regulating levels of innovation and entrepreneurial activity because business environments are changing faster and becoming more dynamic (Withers & Fitza, 2016; Åberg, Kazemargi, & Bankewitz, 2017). As such, board dynamic managerial capabilities should be studied because there is an entrepreneurial management function embedded in the dynamic capabilities perspective that can be applied to different strategic levels of

organizations (Teece, 2007: p. 1346). Consequently, we believe that it is important to understand factors that contribute to the dynamic managerial capabilities of boards of directors. The reason is that such capabilities can lead to organizational and strategic renewal, which is essential for the long-term survival of firms, especially when external environments are changing rapidly (Kor & Mesko, 2013; Sirmon & Hitt, 2009; Zahra, Sapienza, & Davidsson, 2006).

Researchers have argued that human capital is the stock of knowledge and experience that play a key role in shaping dynamic managerial capabilities (Adner & Helfat, 2003; Helfat & Martin, 2014). As such, human capital consists of knowledge and experience of prior firm and industry conditions. Knowledge of prior conditions can help decision makers understand current industry and firm dynamics. Furthermore, it helps them in detecting emerging opportunities and allows them to evaluate alternative paths of growth and change (Kor & Misangyi, 2008). Consequently, the human capital accumulated from prior experiences contributes to dynamic managerial capabilities. Given that the board chair plays an important role in managing board meetings, setting board agendas, giving business advice, and influencing board dynamics (Krause et al., 2016; Machold et al., 2011; Withers & Fitza, 2016), his/her human capital may have a significant impact on the board's dynamic managerial capabilities. By using prior experience and knowledge in the process of orchestrating team dynamics, the board chair can influence the dynamic managerial capabilities of the board. These arguments are in line with Kor & Mesko (2013) who argue that CEO's orchestrate team dynamics to influence the dynamic managerial capabilities of their teams. However, empirical examination of these arguments is scarce as most research on dynamic managerial capabilities has focused on organizational factors that enable firms to change and develop these capabilities (Adner & Helfat, 2003). From this perspective, it makes sense to give attention to the board chair, as the strategic leadership of an individual can be a central element in developing team dynamic managerial capabilities and sustaining organizational change (Kor & Mesko, 2013; Rosenbloom, 2000). Given these arguments, we develop hypotheses about the relationships between board chair human capital and the board's sensing, seizing, and reconfiguring capabilities, which are summarized in Figure 1.

INSERT FIGURE 1 ABOUT HERE

Board sensing capability. Sensing capability refers to the alertness and discovery process leading to the identification of opportunities and threats (Teece, 2007). In most organizations the identification of opportunities and

threats are part of strategic processes that take place on a management level. In these processes boards contribute with quality judgments and new perspectives when opportunities and threats are presented to them by the management (Huse, 2007). It is an activity that necessitates the board to scan, search and interpret information that could potentially affect the firm's ability to create value (Sirmon, Hitt, & Ireland, 2007). Such sensing capability can be grounded in the board's collective processes and may depend on individual capabilities and personal knowledge and experience (Helfat & Peteraf, 2015; Teece, 2007). Specifically, it may depend on the human capital of the board chair. A board chair with high levels of human capital possess more relevant information and knowledge of prior conditions in the focal industry and can therefore better shape an understanding of current dynamics and recognize new developments and trends in the industry. On the other hand, a board chair with a shortage of human capital is more likely to misinterpret situations and fail to identify trends and developments in the industry in a timely fashion (Kor & Misangyi, 2008). Understanding such trends and developments could be an important capability that positively influences the collective board process of sensing. Furthermore, a board chair with extensive knowledge and experience of both firm specific and industry specific developments has superior familiarity and understanding of possible threats and opportunities (Knockaert et al., 2015; Krause et al., 2016). Consequently, the board chair uses this familiarity and understanding to positively influence and facilitate the activities through which board members explore and sense opportunities and threats.

A board chair with more industry and firm experience will be regarded as having more status. Therefore, he/she will act with more confidence when providing and offering external information that can lead to opportunities being sensed (Knockaert et al., 2015). Furthermore, it has been suggested that experienced executives with significant status are better able to transfer knowledge and ideas (Shropshire, 2010). Finally, you could argue that board chairs with more firm and industry experience may act as social persuaders that are more confident about their own contributions and facilitate the transfer of knowledge more openly (Shropshire, 2010) which would positively impact the sensing of opportunities. With these arguments, we expect board chair human capital to positively impact the sensing capability of the board.

Hypothesis 1: There is a positive relationship between board chair human capital and board sensing capability.

Board seizing capability. Seizing is the ability to respond to opportunities and threats that have been sensed (Helfat & Peteraf, 2015; Teece, 2007). It requires the boards to make decisions. Most typically boards make decisions

to either accept or reject proposals brought forward by management. Additionally, they provide advice and counsel to the CEO and other TMT members, who use them as means to test ideas, craft strategies, solve problems, and shape decisions (McNulty & Pettigrew, 1999). These activities necessitate a number of leadership roles of the board chair, including that of a moderator, figurehead, listener, supporter, strategist, as well as a bridge in the board's relationship with management (Gabrielsson et al., 2007; Kanadli, Torchia, & Gabaldon, 2017). In these leadership roles the board chair makes judgment and gives advice that can influence the seizing capability of the board. The quality of the board chair's judgment and advice is likely to be positively related to both firm-specific experience and industry experience of the board chair (Krause et al., 2016). Specifically, it has been argued that chairs with industry experience can form better judgments and decisions concerning major investments and competitive positioning by providing valuable advice and contesting suggestions in the board seizing process (Knockaert et al., 2015; Kor & Misangyi, 2008). Additionally, chairs with firm-specific knowledge are better aware of internal firm strengths and weaknesses (Kor & Mahoney, 2005). Consequently, they are in a position to form and make judgments and decisions that are more informed and unique to the firm, thus contributing positively to the board seizing capability. To the extent that board chair human capital is made up of valuable industry and firm-specific knowledge, we argue that it has a positive impact on the board's seizing capability.

Hypothesis 2: There is a positive relationship between board chair human capital and board seizing capability.

Board reconfiguring capability. Reconfiguring capability refers to the ability to enhance, combine, align and modify the firm's resources and capabilities, thus sustaining growth and profitability (Helfat & Peteraf, 2015; Teece, 2007). Boards with high reconfiguring capability enable their firms to pursue innovation and strategic renewal that can help reduce the adverse effects of increased competition and environmental changes (Agarwal & Helfat, 2009). The board chair can influence reconfiguring activities through participation in board meetings as well as through interaction with the CEO in-between board meetings. As such, the board chair is not only directly involved in the firm operations through board meetings. Some argue that board chairs have great impact on CEOs and other members of the executive management through dialogues of counseling and advise. Some researchers have noticed that these take place on a frequent basis even weekly or biweekly (Huse, 2009: p. 290).

The knowledge to reconfigure resides in organizational members who have an ability to recombine and mobilize resources and technologies as markets change, and thus sustain growth and profitability (Sirmon et al., 2007). As such, it has been suggested that board chairs who possess superior experience and knowledge are more familiar with the range of options to sustain growth and profitability, and will therefore act with more confidence as markets change (Knockaert et al., 2015). As a result, they are better equipped to lead a board, and convince and motivate people to change in order to facilitate strategic renewal and innovation (Helfat & Peteraf, 2015; Teece, 2007). By facilitating these processes, board chairs are in a position to influence the atmosphere and environment that help build and nurture the boards reconfiguring capability. Furthermore, empirical research shows that the human capital of the chair may have a positive impact on specific reconfiguring activities of the board. For example, an experienced and knowledgeable chair may positively facilitate the process of appointing a new CEO (Tian, Haleblian, & Rajagopalan, 2011) or the acquisition of another firm (Peng & Fang, 2010). With these arguments, we expect board chair human capital to have a positive impact on board reconfiguring capability.

Hypothesis 3: There is a positive relationship between board chair human capital and board reconfiguring capability.

2.4. Moderating effect of environmental dynamism

Environmental dynamism reflects the degree of change and the corresponding instability and uncertainty caused by the external environment (Eisenhardt & Martin, 2000; Sirmon et al., 2007). There is general consensus that environmental dynamism is a factor impacting the development of dynamic capabilities (Eisenhardt & Martin, 2000; Wang & Ahmed, 2007). As such, it has been argued that firms develop dynamic managerial capabilities more persistently when external environments are dynamic (Drnevich & Kriauciunas, 2011; Zahra et al., 2006). Moreover, upper echelons theory and research on managerial discretion suggests that strategic leaders tend to have a strong impact on their organizations when they have greater discretion, which can be influenced by both environmental dynamism and the leader's personal characteristics such as their human capital accumulated over time through experiences (Finkelstein et al., 2009; Hambrick & Finkelstein, 1987). Thus, to study the impact of environmental dynamism on the relationship between board chair human capital and the dynamic managerial capabilities of the board is in line with recent research contending that more focus should be put on uncovering the contexts where boards and board chairs make a difference (Boivie, K. Bednar, Aguilera, & Andrus, 2016; Withers & Fitza, 2016).

Upper echelons theory and research suggests that leaders who possess extensive knowledge and expertise are better positioned to deal with environmental changes and adapt their firms to critical contingencies (Finkelstein et al., 2009). We argue that board chairs with greater human capital and extensive knowledge and experience have greater alertness and discovery processes leading to opportunities and threats being identified. They are also in a better position to make decisions and solve problems. Finally, they are also more capable of mobilizing resources. With these capabilities they detect environmental dynamism and positively influence their board's ability to use their dynamic managerial capabilities to rapidly respond to changing environments. Empirical research supports these arguments as it has been found the leaders of the upper echelon who perceive high levels of environmental dynamism promote and develop dynamic managerial capabilities more successfully (Barrales-Molina, Bustinza, & Gutiérrez-Gutiérrez, 2013). As such, one could expect that the board chair would promote and develop board sensing, seizing and reconfiguring capabilities to a higher extent in dynamic environments as such capabilities are needed to manage strategic change (Helfat & Peteraf, 2015). Previous research strengthen such arguments as evidence suggest that firms experiencing high environmental dynamism are more likely to benefit from the resources provided by the board chair (Withers & Fitza, 2016). In contrast, when the firm's environment is less dynamic or more stable, the human capital possessed by the board chair tends to have a less significant effect board dynamic managerial capabilities because it is less important for the firm to development dynamic capabilities in such an environment (Helfat & Peteraf, 2015). Moving from this reasoning on the impact of environmental dynamism, we expect board chair human capital to have a stronger positive impact on board dynamic managerial capabilities (sensing, seizing and reconfiguring) in more dynamic environments than in less dynamic environments.

Hypothesis 4: The positive relationship between board chair human capital and board sensing capability is stronger in more dynamic environments.

Hypothesis 5: The positive relationship between board chair human capital and board seizing capability is stronger in more dynamic environments.

Hypothesis 6: The positive relationship between board chair human capital and board reconfiguring capability is stronger in more dynamic environments.

3. Method

3.1. Sample and data

We test our hypotheses by taking advantage of the unique survey data from the Value Creating Board program, which was conducted among Norwegian firms from the end of 2005 to the first half of 2006 (Sellevoll, Huse, & Hansen, 2007). We acquired the data from the Value Creating Board program and worked closely with the people that created and administered the surveys. The survey was part of a long standing research program with the purpose of understanding how boards of directors behave and work, consistent with the call for corporate governance researchers to capture the actual behavior of boards through surveys (Hambrick, Werder, & Zajac, 2008). Before the survey was sent out, a great deal of effort was spent on developing the research instrument to enhance the construct validity of the measures. Furthermore, in line with the recommendations of (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), a number of procedural techniques were followed to reduce the risk of common method bias ((Minichilli, Zattoni, & Zona, 2009). They included, (a) a cover letter that guaranteed the anonymity and confidentiality to moderate the respondents likelihood of making socially desirable responses, (b) dependent and independent variables that were placed apart from each other in the questionnaire, (c) a lot of attention to the wording of questions was given and inputs from pilot interviews were used in order to avoid vague concepts, reduce item ambiguity and minimize social desirability bias (d) clear information explaining that there were no right or wrong answers and that each question should be answered as honestly as possible (Minichilli et al., 2009).

The dataset generated by the research instrument contains a large number of validated scales (Machold et al., 2011; Minichilli & Hansen, 2007; Zattoni, Gnan, & Huse, 2015; Zhang, 2010). In particular, it contains valuable information that can be used to study boards from a dynamic capabilities perspective and to test our hypotheses about how the chairperson influences the dynamic managerial capabilities of the board. The questionnaires were sent out to CEOs, board chairs, and directors of 2,954 companies, and most questions were answered on a seven-point Likert scale. The response rate was 33% at the individual level; after excluding firms with incomplete responses that contain missing answers to some of the questions asked, the final sample consists of 410 firms with complete responses. The boards we studied belonged to different types of Norwegian companies including: firms at the Oslo Stock Exchange, other public tradable firms, and private joint stock companies of different sizes. We excluded small enterprises with less than 30 employees in order to have companies with formal governance arrangements in our sample. The companies

operated in the following industries; finance and real estate, service, manufacturing and production, and other industries. For the purpose of this study, we used information collected from CEOs to evaluate and measure the human capital of the board chair and the dynamic managerial capabilities of the board. CEOs have been considered as good informants of board processes in the firms that they work and are in a better position than other board members to evaluate important processes inside the board (Zattoni et al., 2015). Furthermore, they are good informants as they are receivers of advice and counsel from the board members in their companies. Consequently, board researchers have frequently used primary survey data based on responses from CEOs (Minichilli & Hansen, 2007; Zahra, Neubaum, & Huse, 2000; Zattoni et al., 2015). Furthermore, CEOs frequently interact with board chairs (Huse, 2009) and are therefore in a good position to evaluate their true firm and industry knowledge and experience which is of relevance in this study.

Norwegian boards share many similarities with boards in other European countries, meaning our findings have important implications for other European contexts (Machold et al., 2011). Norway has also been regarded as a strong force in Europe regarding the code of practice for corporate governance and the professionalization of boards, which makes it a good setting for our study (Seierstad & Opsahl, 2011; Singh & Vinnicombe, 2003). Moreover, for the purpose of our study, this setting is particularly to our advantage as boards in Norway are responsible for the management of the company and have the greatest decision making authority. As such, Norwegian boards have been described as very active boards (Minichilli et al., 2012), which makes a good case for observing their dynamic managerial capabilities. Furthermore, the setting is to our advantage as separation of the CEO and board chair positions is a common practice in Norway, where CEO duality is only allowed in small companies. This arrangement allows us to better understand the influence the chair has on the board (Krause et al., 2016). CEOs can be board members, but executives other than the CEO are not formally board members with voting rights (Rasmussen & Huse, 2011). Data from the Value Creating Board survey show some distinct characteristics of the Norwegian setting with regards to board chairs. Specifically, these board chairs on average had been in their current position for about 6 years, 19% of them had previously been CEOs, and 15% of them worked full time in their position as board chairs (Sellevoll et al., 2007).

3.2. Independent variable

Board chair human capital is our independent variable. Board chair human capital is the skills and experience that the chairperson brings to the board room in order to fulfill their governing function and offer advice to the management team (Johnson, Schnatterly, & Hill, 2013; Kor & Sundaramurthy, 2008). The items for chair human capital were selected in line with the conceptualization of Castanias & Helfat (1991). They characterized managers of the upper echelon as firm resources that possess different qualities and quantities of generic, industry-specific and firm-specific skills. Our two items used to measure chair human capital capture industry experience and firm specific knowledge, which have been used to measure CEO human capital in previous research (Buchholtz, Ribbens, & Houle, 2003). The Cronbach α statistic is at an acceptable level of 0.77 (Gliem & Gliem, 2003).

3.3. Dependent variables

Our dependent variables are the three specific measures of board dynamic managerial capabilities; sensing, seizing, and reconfiguring. Following the work of Helfat & Peteraf (2015) on dynamic managerial capabilities, we measured the managerial cognitive capabilities that underpin these dynamic managerial capabilities as proxies for our dependent variables. This conceptualization builds on the understanding that dynamic managerial capabilities can be disaggregated for analytical purposes into sensing, seizing and reconfiguring components that depend on managerial cognitive constructs that can be measured at the board level. All three constructs had an acceptable level of Cronbach α statistic above 0.75. Factor analysis also showed a high level of consistency among the items as indicated in Table 1.

INSERT TABLE 1 ABOUT HERE

Sensing. Sensing represents the board's ability to identify opportunities and threats through scanning, anticipating and interpretative activity. The items of sensing were selected in line with the conceptual work of Helfat & Peteraf (2015) who argued that sensing can be conceptualized by capturing perception and attention skills. We consequently used three items that capture perception and attention skills possessed by the board as a team to develop a construct that reflects the sensing capabilities of the board. Perception is about the creation of useful and meaningful

information leading to different interpretations and recognition of patterns, which improve sensing capability (Helfat & Peteraf, 2015). To capture perception, we asked questions concerning the extent to which board members ask critical questions regarding material they have received from the management. Attention, on the other hand, is about detecting signals and maintaining a vigilant or alert mind that lead to opportunities and threats being detected (Posner & Petersen, 1990). We thus asked questions that were designed to capture the extent to which the board is active in seeking additional information to reports from management.

Seizing. Seizing is about making decisions and executing them (Teece, 2007). Boards seize opportunities as they adopt new business model designs or make strategic investments. In line with the conceptualization of Helfat & Peteraf (2015), seizing requires the cognitive capabilities of problem-solving and reasoning. This makes sense as making decisions and executing them is made easier if the board possesses problem-solving and reasoning skills. When measured, these two cognitive capabilities (problem-solving and reasoning skills) will therefore be appropriate proxies that capture the board's seizing capability. Problem-solving is about finding solutions to problems in order to reach a goal and seize an opportunity (Helfat & Peteraf, 2015). We therefore use measures that capture the board's ability to present and find creative and innovative solutions to capture problem-solving. Reasoning and problem-solving are closely related but they can be distinguished as reasoning is more related to evaluating information and arguments to determine if a decision is reasonable (Helfat & Peteraf, 2015). We believe that board discussions are associated with reasoning as discussions consist of evaluations of information and arguments. Therefore, we asked a question that captures the level of board discussions to measure reasoning.

Reconfiguring. Reconfiguring is about enhancing and altering organizational assets and structures. For reconfiguring activities to proceed, it is important to create motivation to change, and overcome resistance to change (Teece, 2007). This requires two main sources of cognitive capabilities, namely, communication and social cognition (Helfat & Peteraf, 2015). In particular, this follows the argumentation that the board's ability to enhance and alter organizational assets and structures is made easier when they possess communication skills and social cognition. When measured, these two aspects will therefore be used as proxies that reflect the board's ability to reconfigure. Communication is about representing and communicating ideas, which are important capabilities that are critical to attain understanding and support in reconfiguring activities. We capture communication by measuring the level of open discussions between board members. Social cognition refers to mental activities associated with perceiving, remembering, building confidence, and understanding people (Helfat & Peteraf, 2015). These are important cognitive

capabilities essential to motivate change and thus reconfigure businesses. Ability to create trust and foster values and attitudes are important aspects of social cognitive capabilities that enhance reconfiguring capabilities (Gulati, 1995; Helfat & Peteraf, 2015). Consequently, we asked questions about trust between board members as well as their values and attitudes.

3.4. Moderating variable

Environmental dynamism is referred to as the uncertainty stemming from the external environment (Sirmon et al., 2007). We used responses from the survey to measure environmental dynamism as done in previous research (Drnevich & Kriauciunas, 2011). The variable was developed by asking respondents to evaluate past industry growth, opportunities of technology innovation and opportunities of product innovation experienced by the firm in the past two years (Wang & Ahmed, 2007). For board processes, the benefits of using the CEO as the single respondent has been proclaimed (Zattoni et al., 2015). However, because environmental dynamism is a contextual variable, we decide to use both CEOs and board chairs as respondents, to improve the reliability of the measure. The reason for this is that a contextual variable is less prone to social biases that create divergence across the respondents. As such, it is more likely that answers from the multiple respondents concerning their view on environmental dynamism are converging and thus representing the construct being investigated and not averaged measures that reflect divergence across the respondents (van Ees, van der Laan, & Postma, 2008).

3.5. Control variables

We include a number of control variables in our model in order to rule out alternative explanations of our findings. Consistent with prior research, we apply control measures at both organizational and board levels (Krause et al., 2016; Minichilli et al., 2009). At the organizational level, we control for firm size, firm age, industry, and technology intensity. Chair human capital may be a function of organizational characteristics such as firm size and firm age (Krause et al., 2016; Machold et al., 2011). Accordingly, we control for *firm size* by measuring the logged number of employees (Machold et al., 2011) and *firm age* by measuring the logged number of years the firm had been incorporated (Huse, 2009). Furthermore, we control for the firm's *industry sector* with dummies for service, manufacturing and production, and other industry sectors, respectively (Torchia, Calabrò, & Morner, 2015), and a dummy for whether the firm is considered a *high tech* company or not (Machold et al., 2011). These variables were chosen because they are

likely to be related to dynamic capabilities and environmental dynamism (Barrales-Molina et al., 2013; Drnevich & Kriauciunas, 2011; Zahra et al., 2006) and have commonly been used in board research (Haynes & Hillman, 2010). At a board level we control for board size, board experience and meeting time. *Board size* (the number of board members with full voting rights) is one of the well-studied usual suspects that has been frequently controlled for in previous studies (Zattoni et al., 2015). We control for it as it could impact board dynamics and the power the chairperson possesses over its board. We control for *board human capital* to assure that effects that we attribute to the board chair's human capital cannot be attributed to the board's human capital (Krause et al., 2016). For board human capital, we use a single item measure (extensive knowledge of board activity possessed by board members) that has been commonly used in prior studies (Kor & Misangyi, 2008; Sundaramurthy, Pukthuanthong, & Kor, 2014). We deem it important to control for board *meeting time* (average length of board meetings in hours) as it has been found to have a positive impact on board outcomes (Gabrielsson et al., 2007). Items related to the CEO that we control for include CEO duality and CEO tenure. We control for *CEO duality* (the CEO is also the board chairperson) and *CEO tenure* (years that the present CEO has been in this position) as they may impact the processes within the board and the power of the board chair (Krause, 2016; Krause et al., 2016; Quigley & Hambrick, 2012). Finally, we control for two items related to the board chair. Whether the *chair has been CEO* (the board chairperson has previously been CEO of the firm) is one of our control variables as this phenomenon (often referred to as “shadow emperors”) may impact the extent to which the board engages in change and thus the use of its dynamic capabilities (Quigley & Hambrick, 2012). *Chair tenure* (years that the present board chairperson has been in this position) is also a control variable as the length of service can be a source of power which the chair may use to influence other board members (Shropshire, 2010).

4. Analysis and results

Table 2 presents the descriptive and correlation statistics of the sample, and Table 3 presents results from the multivariate regression analysis that was used to test our hypotheses. The statistical analysis of the six multivariate regression models was performed using SPSS 23. Model 1-3 test the relationship between chair human capital and the three dynamic managerial capabilities (sensing, seizing and reconfiguring) of the board. In Model 4-6 environmental dynamism is added as the moderator in the relationship between chair human capital and the three board dynamic managerial capabilities. We conducted the analyses using the SPSS process macro (Hayes, 2013). The independent

variable and the moderator were mean-centered to minimize issues related to multicollinearity and standard errors inflation (Hayes, 2013). We analyzed the variance inflation factors (VIF) to assess our sample for multicollinearity. Our VIF values ranged from 1.47 to 2.76 which is well below the commonly accepted level of 10 (Hair, Anderson, Tatham, & Black, 2006). Consequently, we do not expect multicollinearity problems to bias our observations. In addition to the measures described in section 3.1, Harman's one factor test was performed to test for common method bias. It evaluates the amount of biases inherited in the variance proposition distribution of items. Unrotated 1st factor should be less than 50%, we are on an acceptable level of 28,4% (Podsakoff & Organ, 1986). Furthermore, *F*-statistics show that all models are significant at $p < .01$.

INSERT TABLE 2 AND TABLE 3 ABOUT HERE

Model 1 tests the positive relationship between chair human capital and board sensing capability proposed in Hypothesis 1. The results show that the coefficient of chair human capital is positive and statistically significant at $p = 0.08$ ($b = 0.09$, $s.e. = 0.05$), providing support, though relatively weak, for Hypothesis 1. Model 2 test the positive relationship between chair human capital and board seizing capability proposed in Hypothesis 2. Results show that the coefficient of chair human capital is positive and significant at $p < 0.01$ ($b = 0.15$, $s.e. = 0.05$), providing strong support for Hypothesis 2. Model 3 test the positive relationship between chair human capital and board reconfiguring capability proposed in Hypothesis 3. Results show that the coefficient of chair human capital is positive and significant at $p < 0.01$ ($b = 0.21$, $s.e. = 0.04$), providing strong support for Hypothesis 3.

Hypothesis 4 proposes that the positive relationship between chair human capital and board sensing capability is stronger in more dynamic environments. Results in Model 4 show that the coefficient for the interaction of chair human capital and environmental dynamism is positive and statistically significant at $p = 0.04$ ($b = 0.09$, $s.e. = 0.04$), providing support for Hypothesis 4. Our further analysis shows that board chair human capital has a positive relationship with board sensing capability under high environmental dynamism ($b = 0.192$, $s.e. = 0.068$, $p = 0.005$, where dynamism is one standard deviation above sample mean) and moderate environmental dynamism ($b = 0.083$, $s.e. = 0.050$, $p = 0.098$, where dynamism is at the sample mean), but no relationship under low environmental dynamism ($b = -0.026$, $s.e. = 0.078$, $p = 0.738$, where dynamism is one standard deviation below sample mean). To aid the

interpretation of the moderating effect of environmental dynamism, we present visually in Figure 2a the relationship between chair human capital and board sensing capability under high, medium (moderate), and low environmental dynamism.

INSERT FIGURE 2a ABOUT HERE

Hypothesis 5 proposes that the positive relationship between chair human capital and board seizing capability is stronger in more dynamic environments. Results in Model 5 show that the coefficient for the interaction of chair human capital and environmental dynamism is positive and statistically significant at $p=0.02$ ($b=0.11$, $s.e.=0.04$), providing support for Hypothesis 5. Our further analysis shows that board chair human capital has a positive relationship with board seizing capability under high environmental dynamism ($b=0.274$, $s.e.=0.080$, $p=0.001$, where dynamism is one standard deviation above sample mean) and moderate environmental dynamism ($b=0.142$, $s.e.=0.054$, $p=0.009$, where dynamism is at the sample mean), but no relationship under low environmental dynamism ($b=0.010$, $s.e.=0.074$, $p=0.896$, where dynamism is one standard deviation below sample mean). To aid the interpretation of the moderating effect of environmental dynamism, we present visually in Figure 2b the relationship between chair human capital and board seizing capability under high, medium (moderate), and low environmental dynamism.

INSERT FIGURE 2b ABOUT HERE

Hypothesis 6 proposes that the positive relationship between chair human capital and board reconfiguring capability is stronger in more dynamic environments. Results in Model 6 show that the coefficient for the interaction of chair human capital and environmental dynamism is positive but not significant ($b=0.02$, $s.e.=0.03$, $p=0.59$). Our further analysis shows that board chair human capital has a similar positive relationship with board reconfiguring capability under high environmental dynamism ($b=0.232$, $s.e.=0.059$, $p=0.000$, where dynamism is one standard deviation above sample mean), moderate environmental dynamism ($b=0.207$, $s.e.=0.041$, $p=0.000$, where dynamism is at the sample mean), and low environmental dynamism ($b=0.183$, $s.e.=0.063$, $p=0.004$, where dynamism is one

standard deviation below sample mean). We present visually in Figure 2c the relationship between chair human capital and board seizing capability under high, medium (moderate), and low environmental dynamism. Overall, these results suggest that the relationship between chair human capital and board reconfiguring capability is not significantly affected by environmental dynamism, and thus provide no support for Hypothesis 6.

INSERT FIGURE 2c ABOUT HERE

Among control variables, board human capital demonstrates a consistent effect on board dynamic managerial capabilities in all models, consistent with the argument that human capital plays a key role in shaping dynamic managerial capabilities. This finding gives us greater confidence in the measurement of board dynamic managerial capabilities. Meanwhile, it suggests that the positive effect we observed in board chair human capital goes over and above the contribution of board human capital. We also found board meeting time to have a positive relationship with board sensing and seizing capabilities, suggesting that boards are more able to develop dynamic managerial capabilities when they spend more time together.

5. Discussion and conclusions

The main purpose of this study was to explore board chair leadership in developing board dynamic managerial capabilities. Building on the resource-based view about strategic leaders' role in organizations (Castanias & Helfat, 1991, 2001) and research linking human capital to the development of dynamic managerial capabilities (Adner & Helfat, 2003; Helfat & Martin, 2014), we predicted that board chair human capital would have a positive effect on the sensing, seizing, and reconfiguring aspects of board dynamic managerial capabilities. Moreover, we predicted that the positive effect of board chair human capital on board sensing, seizing and reconfiguring capabilities would be stronger in more dynamic environments. Four of our six hypotheses were empirically supported, one received weak support and one was not supported. The only hypothesis not supported is the moderating effect on environmental dynamism on the positive relationship between chair human capital and board reconfiguring capability. The results show that chair human capital is positively related to board reconfiguring capability across high, medium, and low levels of environmental mechanism. One possible explanation for this finding is that, unlike sensing and seizing that are more

oriented toward external changes, board reconfiguring capability is more oriented toward the ability to reconfigure organizational activities through internal communications and trust within the board. Thus, it is less influenced by environmental dynamism.

Our theory and supportive findings make a number of important contributions to the strategic management literature. First, this study contributes to the dynamic managerial capabilities literature by drawing attention to the dynamic managerial capabilities of the board of directors and introducing the board chair's human capital as a driver. We show that the underpinning attributes of board chair human capital, such as firm and industry specific knowledge and experience, are positively related to the dynamic managerial capabilities of the board. This finding enhances the understanding of what attributes of individual leaders, in this case the board chair, can contribute to the development of dynamic managerial capabilities at the team level. With these contributions to the dynamic capabilities literature we hope that our work will guide researchers in this area where empirical research has not gained a strong foothold due to the difficulties of measuring dynamic managerial capabilities (Helfat & Peteraf, 2003; Kor & Mesko, 2013). The measure we have developed for dynamic managerial capabilities in this paper should therefore be seen as initial progress to empirically enquire dynamic managerial capabilities. Refinement of these measures will hopefully lead to more accepted ways of measuring dynamic managerial capabilities and will create possibilities to further develop the theoretical rigor.

Secondly, we contribute to recent research on board chairs by moving beyond a static view of them as merely providers of resources; instead, our findings suggest that they can contribute to the firm's dynamic managerial capabilities at the board level. As such, we bring new insights into board chairs and how and how they can contribute to organizational change. Moreover, our results show that board chair human capital has a stronger positive relationship with the board's sensing and seizing capabilities in more dynamic environments. In a recent study, (Withers & Fitza, 2016) suggested that board chairs have greater impact on firm performance when environments are dynamic and uncertain. Our study extends this line of research by exploring the extent to which board chairs can leverage their human capital in the development of board dynamic managerial capabilities under different levels of environmental uncertainty and change. As such, we highlight the strategic leadership actions that board chairs adopt under complex and ambiguous circumstances.

Thirdly, our study adds new insight to the growing literature on board value creation (Huse, 2007). As argued by numerous authors, dynamic managerial capabilities are central to value creation as they determine the quality of strategic leadership and entrepreneurial activity (Augier & Teece, 2008; Eisenhardt & Martin, 2000; Teece, 2007). By examining the relationship between board chair's human capital and the board's sensing, seizing and reconfiguring capabilities, we provide new insight into the strategic and entrepreneurial leadership role through which the chair can enhance board value creation. These are important findings as it has been found that boards are increasingly involved in strategic decisions making (Finkelstein & Mooney, 2003) and entrepreneurial activities (Zahra et al., 2000). This insight complements the dominant views in which board chairs are primarily argued to contribute to value creation through monitoring and resource provisions, based on agency theory and resource dependency theory (Hillman & Dalziel, 2003).

5.1. Limitations and Implications for Future Research

Our study may be followed up and improved by addressing a number of the limitations we have in this study. Firstly, while we found strong empirical relationships that are consistent with our theoretical predictions, we did not directly examine the underlying mechanisms through which board chairs leverage their human capital to facilitate the development of board dynamic managerial capabilities due to data limitations. Future research can survey boards and directly ask how board chairs can contribute to the development of dynamic managerial capabilities at the board level or even at the organizational level. Secondly, because our research design is cross-sectional, we are unable to present changes in dynamic managerial capabilities across time at different levels of environmental dynamism. Future research could adopt longitudinal, multisource data collections through observations and interviews similar to that of (Garg & Eisenhardt, 2016), to better understand board dynamic managerial capability development over time. Thirdly, our study focused only on industry and firm-specific human capital, without considering general human capital. Future research can test the effect of different types of human capital in order to gain a deeper understanding of their contributions to dynamic managerial capabilities. For example, one can examine generic, industry-specific, firm-specific, and board-specific knowledge separately (Castanias & Helfat, 2001). Fourthly, although the Harmon's one factor test did not show a significant threat of common method variance bias to our study, it could still be an issue given that we obtained both the independent and dependent variables from the same individuals. In future research scholars can adopt mixed methods design that include data from multiple sources to address this issue. Finally, our

study only explores boards in the Norwegian governance setting. To test the generalizability of our results, one could extend our examination to nations with governance characteristics that differ from those in Norway.

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Figure 1: Theoretical model

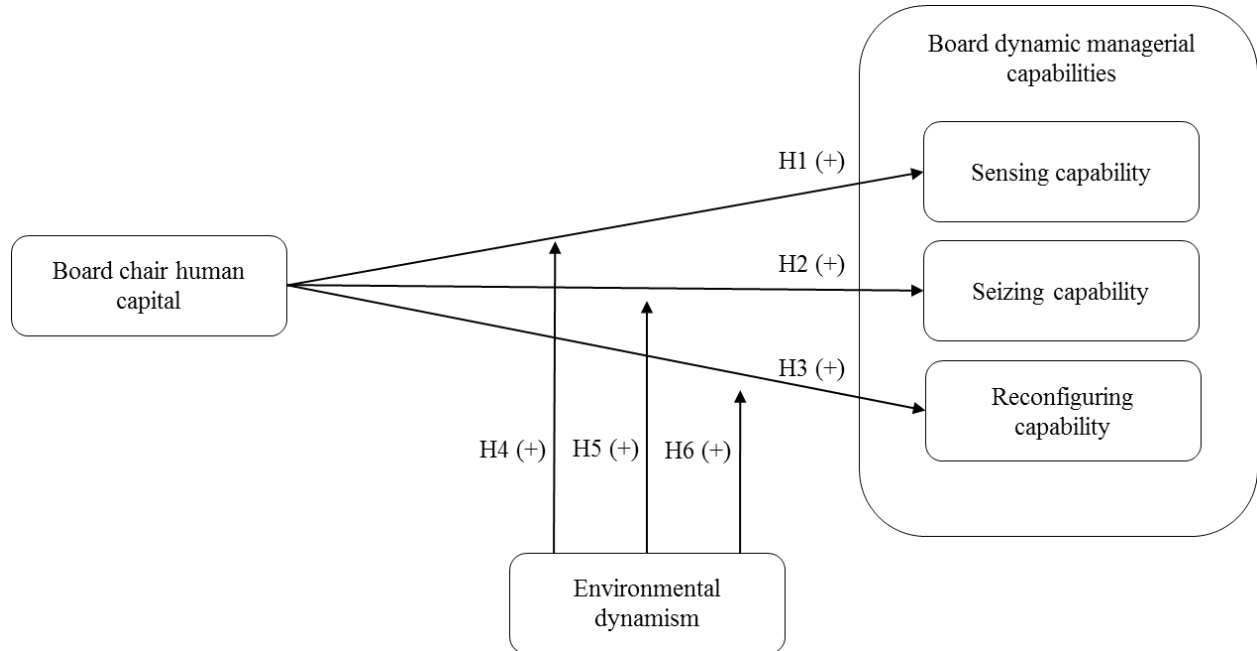


Table 1: Factor loadings and construct reliability

Construct	Measures	Factor loadings	Cronbach alpha
Board sensing capability (Helfat & Peteraf, 2015)	Our board members are very active in finding additional information to reports from management	0.74	0.78
	Our board members ask critical questions regarding proposals from management	0.87	
	Our board members ask critical questions regarding information from management	0.88	
Board seizing capability (Helfat & Peteraf, 2015)	All board members participate actively in board discussion	0.69	0.76
	Our board members present a number of creative and innovative proposals in the meetings	0.90	
	Our board finds a number of creative and innovative solutions	0.89	
Board reconfiguring capability (Helfat & Peteraf, 2015)	Between board members there are common values, attitudes and norms regarding ethics, justice and corporate responsibility etc.	0.65	0.75
	Between board members there are considerable weight on trust when conflicts are to be solved	0.73	
	Our board members appreciate being together in the meetings	0.75	
	Our board members have very good atmosphere together in the board meetings	0.80	
	Our board members communicate their personal preferences and considerations open and freely	0.61	
Chair human capital (Buchholtz et al., 2003)	Our board chairperson has extensive relevant industry experience (in regards to the firm's operations)	0.91	0.77
	Our board chairperson has extensive knowledge of the firm (main operations, key competence, products etc.)	0.91	
Environmental dynamism (Wang & Ahmed 2007)	I regard the firm to be in an industry with fast growth (CEO)	0.45	0.70
	To what extent can your main industry the last two-three years be characterized by the opportunity of product innovation (CEO)	0.74	
	To what extent can your main industry the last two-three years be characterized by the opportunity of technological innovation (CEO)	0.68	
	To what extent can your main industry the last two-three years be characterized by the opportunity of product innovation (Chair)	0.74	
	To what extent can your main industry the last two-three years be characterized by the opportunity of technological innovation (Chair)	0.74	

Table 2: Correlation and Descriptive Statistics

Pearson Correlation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1 Sensing																			
2 Seizing	0.42																		
3 Reconfiguring	0.28	0.51																	
4 Chair human capital	0.14	0.22	0.34																
5 Environmental dynamism	0.11	0.14	0.07	-0.02															
6 Firm size (ln)	0.01	-0.10	0.01	0.00	0.04														
7 Firm age (ln)	-0.03	-0.02	0.01	-0.09	-0.09	0.03													
8 Service	0.01	0.01	-0.03	0.03	-0.06	-0.03	-0.07												
9 Manufacturing	-0.07	0.00	0.01	0.02	-0.02	0.08	0.03	-0.54											
10 Other industry	0.03	0.00	0.03	-0.06	0.06	-0.06	0.03	-0.37	-0.47										
11 High tech	0.04	0.01	0.00	-0.16	0.43	0.09	-0.01	-0.15	0.10	0.05									
12 Board size	-0.08	-0.16	-0.01	-0.11	0.07	0.54	0.11	-0.09	0.04	-0.01	0.13								
13 Board human capital	0.18	0.21	0.25	0.21	0.12	0.07	-0.07	-0.01	0.01	0.00	0.07	-0.01							
14 Meeting time	0.04	0.05	0.06	0.01	0.06	0.10	-0.01	-0.02	-0.01	0.02	-0.01	0.12	0.07						
15 CEO duality	-0.01	0.09	0.09	0.09	-0.04	-0.07	-0.02	-0.03	0.07	-0.02	-0.04	-0.17	-0.10	-0.08					
16 CEO tenure	0.03	0.17	0.08	-0.01	-0.02	-0.08	0.14	0.04	0.02	-0.04	-0.03	-0.10	-0.05	0.01	0.20				
17 Chair has been CEO	0.05	0.05	0.06	0.19	-0.07	-0.07	0.02	0.01	0.06	-0.05	-0.06	-0.20	-0.10	-0.05	0.26	-0.05			
18 Chair tenure	0.03	0.07	0.10	0.06	-0.01	-0.09	0.13	0.02	0.06	-0.06	-0.13	-0.21	-0.05	-0.02	0.16	0.30	0.25		
Mean	4.43	4.28	5.27	5.74	4.26	4.87	3.41	0.29	0.41	0.24	0.37	5.56	5.07	3.81	0.05	7.00	0.17	5.28	
Standard deviation	1.22	1.25	0.91	1.16	1.20	1.26	1.06	0.46	0.49	0.43	0.48	1.97	1.46	3.34	0.22	6.36	0.37	5.53	

N=410

Table 3: Results from regression analyses about the relationship between board chair human capital and board dynamic managerial capabilities

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Sensing			Seizing			Reconfiguring			Sensing			Seizing			Reconfiguring		
	Coef.	Std. Err.	p	Coef.	Std. Err.	p	Coef.	Std. Err.	P	Coef.	Std. Err.	p	Coef.	Std. Err.	p	Coef.	Std. Err.	p
Firm size (ln)	-0.01	0.05	0.81	-0.02	0.05	0.74	0.01	0.04	0.78	-0.01	0.05	0.90	-0.01	0.05	0.84	0.01	0.04	0.76
Firm age (ln)	0.06	0.05	0.31	0.04	0.05	0.47	0.06	0.04	0.16	0.06	0.05	0.30	0.04	0.05	0.46	0.06	0.04	0.15
Service	-0.39	0.25	0.12	0.12	0.25	0.64	-0.04	0.19	0.83	-0.41	0.25	0.20	0.10	0.25	0.67	-0.04	0.19	0.83
Manufacturing	-0.51	0.25	0.04	-0.06	0.24	0.81	-0.02	0.18	0.90	-0.52	0.25	0.09	-0.07	0.24	0.74	-0.03	0.18	0.89
Other industry	-0.22	0.25	0.38	0.10	0.25	0.68	0.04	0.19	0.84	-0.21	0.25	0.50	0.12	0.25	0.59	0.04	0.19	0.83
High tech	0.01	0.13	0.91	-0.14	0.13	0.28	0.03	0.10	0.73	0.02	0.13	0.90	-0.14	0.13	0.28	0.03	0.10	0.73
Board size	-0.07	0.04	0.04	-0.12	0.04	0.00	-0.03	0.03	0.31	-0.08	0.04	0.05	-0.12	0.04	0.00	-0.03	0.03	0.32
Board human capital	0.11	0.04	0.01	0.17	0.04	0.00	0.10	0.03	0.00	0.11	0.04	0.01	0.17	0.04	0.00	0.10	0.03	0.01
Meeting time	0.16	0.04	0.00	0.09	0.04	0.04	0.04	0.03	0.23	0.16	0.04	0.00	0.09	0.04	0.07	0.04	0.03	0.28
CEO duality	0.23	0.33	0.49	0.17	0.33	0.60	0.21	0.24	0.39	0.22	0.33	0.52	0.16	0.33	0.52	0.21	0.24	0.33
CEO tenure	0.00	0.01	0.78	0.04	0.01	0.00	0.01	0.01	0.31	0.00	0.01	0.78	0.04	0.01	0.00	0.01	0.01	0.30
Chair has been CEO	0.22	0.16	0.18	0.18	0.16	0.25	0.08	0.12	0.50	0.22	0.16	0.17	0.19	0.16	0.21	0.08	0.12	0.49
Chair tenure	-0.01	0.01	0.59	-0.01	0.01	0.26	0.01	0.01	0.31	-0.01	0.01	0.62	-0.01	0.01	0.29	0.01	0.01	0.30
Env. dynam.	0.05	0.05	0.39	0.20	0.05	0.00	0.06	0.04	0.12	-0.49	0.26	0.10	-0.45	0.26	0.00	-0.06	0.20	0.19
Chair human capital	0.09	0.05	0.08	0.15	0.05	0.00	0.21	0.04	0.00	-0.31	0.20	0.60	-0.33	0.19	0.01	0.12	0.15	0.00
Chair HC * Env. dynam.										0.09	0.04	0.04						
Chair HC * Env. dynam.													0.11	0.04	0.02			
Chair HC * Env. dynam.																0.02	0.03	0.59
F(df1, df2)	F(15.395)= 3.11			F(15.394)= 6.70			F(15.396)= 5.12			F(16.394) = 3.20			F(16.393)= 6.77			F(16.395)= 4.82		
R ²	0.11			0.20			0.16			0.12			0.22			0.16		
Adjusted R ²	0.07			0.17			0.13			0.08			0.18			0.13		

Figure 2a: The relationship between board chair human capital and board sensing capability under high, medium, and low environmental dynamism

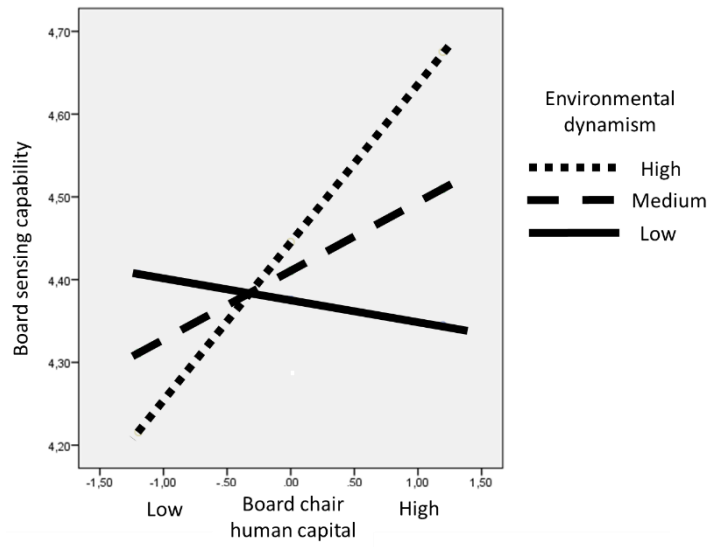


Figure 2b: The relationship between board chair human capital and board seizing capability under high, medium, and low environmental dynamism

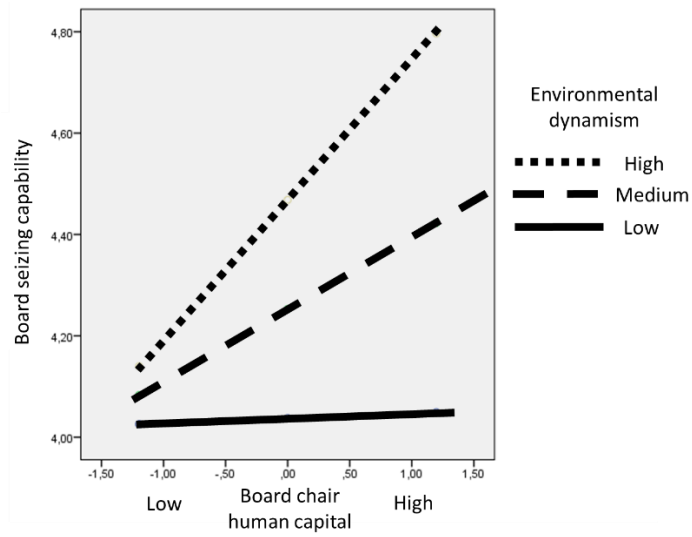


Figure 2c: The relationship between board chair human capital and board reconfiguring capability under high, medium, and low environmental dynamism

