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Board structure and firm capability: An environment-embedded relationship between board diversity and marketing capability

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ABSTRACT

The role of the firm's top governance team, the board, is largely missing in the capability literature. This paper takes the first step to link board diversity, one of the most critical traits of the board, to marketing capability. Further, this relationship is embedded into a contingency-based model involving a set of environmental factors, munificence, turbulence, and competition intensity. This model illustrates how the internal top governance traits and external factors may jointly and dynamically affect firm competency. The empirical results show that board diversity significantly increases marketing capability. This effect is stronger when a firm faces unfriendly market situations characterized by low munificence, high turbulence, and intensified competition. This study generates meaningful theoretical implications for marketing capability-building of business firms, especially in the business-to-business (B2B) settings in which reciprocal organizational engagements are more emphasized. It also advances firm governance theories and business environment studies, and provides useful guidelines for managerial practices.

1. Introduction

Within the marketing management domain, firm capability of managing its markets is a subject that has captured strong research interests because of its prevailing influences on firm consumer metrics such as new product offerings, satisfaction, market positions (Chang, Park, & Chaiy, 2010; Mithas, Krishnan, & Fornell, 2005), and financial outcomes such as profitability, revenues, and shareholder value (Angulo-Ruiz, Donthu, Prior, & Rialp, 2014; Mishra & Modi, 2016; Xiong & Bharadwaj, 2013). Marketing scholars have explicitly indicated that firm capability stands for one of the essential instruments that managers can use to build and secure a firm's long-term advantages (Vorhies and Morgan, 2005; Wilden & Gudergan, 2015). Researchers share unanimous opinions that firm capabilities such marketing capability (MKCAP hereafter) are not simply acquired from external entities. Rather, these capabilities are built through long-term learning processes that occur at the functional units and their supporting entities (Day, 2011; Kale & Singh, 2007; Vorhies & Morgan, 2005). This picture is even more manifest in the business-to-business (B2B) relationships because firms and their business customers are motivated to create, maintain, and refine co-developmental interactions that lead to continuous improvement of marketing skills and planning precision (Chen, Tsou, & Ching, 2011). However, the existing understanding of MKCAP-building has two evident limitations. First, although the market-side function is one of the strategic modules of the firm and its capability-building will surely benefit from its tactical activities such as interacting with customers, channel members, and partners, its formation may be fundamentally driven by the top governance group that not only determines the firm's development paths that guide the firm's market development directions but also practically creates the structural configuration of marketing departments by appointing key management positions or setting specific constraints (García-Meca, García-Sánchez, & Martínez-Ferrero, 2015). Therefore, the endeavors of the firm for building a strong marketing competency at the strategic unit level may be driven by the top governance team that prioritizes the firm's resource configuration as well as directs the firm's business orientations. For example, in B2B relationships, firms will be highly sensitive to the preferences of key clients and thus they are motivated to take the whole firm efforts to build more capable marketing units tailored to these preferences (Crespin-Mazet & Ghauri, 2007). This important mechanism, however, is largely absent in the literature. Second, although environmental factors are often modeled with marketing strengths for the analysis of their performance implications, little work goes beyond examining their parallel influences on firm outcomes onto

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a new stage that explicitly considers environmental factors as the key antecedents of building MKCAP. This knowledge vacancy indicates a significant empirical oversight of the long-held notion that marketing skill sets are the connection between the firm and the external world, and thus they should be highly influenced by those outside factors (Mishra & Modi, 2016).

The popular upper echelon theory describes that the board serves as the delegated representative of the firm's shareholders and it is designated to supervise the firm (Bjornali, Knockaert, & Erikson, 2016). The board has received notable emphasis in literature regarding its effects on firm outcomes (e.g., Erhardt, Werbel, & Shrader, 2003; Harris & Raviv, 2010; Zona, 2014). In particular, board diversity plays a pivotal role in this theory stream. It reflects the heterogeneous background characteristics of the board members and has been confirmed to affect firm performance measures such as profit, firm value, and social welfare (e.g., Carter, Simkins, & Simpson, 2003; Harjoto, Laksmana, & Lee, 2015; O'connell and Cramer, 2010). This recognition of the importance of board diversity (hereafter referred to as BODIV), however, fails to disclose whether it can drive firm capability. Exploring this missing link is critical because capability, rather than performance, may be the immediate result of governance structure. Board characteristics are unlikely to directly change performance without first shaping the firm's managerial functionality such as capabilities. Motivated by these thoughts, this paper takes the first attempt to theoretically connect BODIV and firm MKCAP and empirically test this relationship. Along with that, we incorporate a set of environmental factors, munificence, turbulence, and competition intensity to examine the relationship between BODIV and MKCAP in a moderated framework. This model explores how the inner association of board and marketing can differ under varying outside circumstances. We collect a large set of sample firm data and use multiple robust analytical methods to examine the proposed model.

Answering the research questions formulated in this study is expected to generate a set of key contributions to theories and also provide useful guiding implications for business practitioners. These intended contributions and implications serve as the essential reasons for developing this research. Foremost, the link between board characteristics and MKCAP is particularly meaningful for B2B marketing settings because business clients are more attentive to firms' structural changes in governance than final consumers (Hatton et al., 2017). Thus, clarifying the role of BODIV will give researchers in this area a novel and clear guideline for understanding the fundamental driving force for gaining marketing-side strengths. More importantly, business organizational relationships are more likely to have multi-departmental engagements as well as leadership teams' interactions. This nature of B2B firms makes our study particularly impactful because the board represents the highest governance echelon and its influences on MKCAP will vividly demonstrate the fundamentals of capability-building that involves the organizational influences beyond the functional units such as marketing. Further, our research will be one of the very few studies that aim to bridge corporate governance theories and firm capability theories, and it is also the first attempt to link board composition to one of the most important firm capability types, MKCAP. Understanding this relationship significantly broadens the horizons of board functions that have previously been directly linked to firm financial and social outcomes but have neglected the authentic role of the board for constructing firm capabilities. It is this role of the board that makes its performance effects possible because capabilities are the essential drivers and facilitators for realizing firms' financial goals (Mishra & Modi, 2016; Xiong & Bharadwaj, 2013). More fundamentally, our research aims to extend the knowledge scope of capability-building that has been limited to the strategic unit and functional department levels. None of the extant studies has traced the determinants of firm capability to board characteristics. Yet, this exploration is necessary because the board might play a foundational role in establishing the architectural and structural formation of firm assets, resources, and roles, which are essential for creating firm capabilities (Ararat, Aksu, & Tansel Cetin, 2015; Midavaine, Dolfsma, & Aalbers, 2016). Specifically, MKCAP is a firm element at the frontier between the firm's internal and external environments (Lavie, 2006). Thus showing the BODIV's influence on MKCAP validates the theoretically long-held but not empirically confirmed notion that the board not only guides a firm's internal management but also directs the firm to better cope with the environment. Additionally, the proposed moderating effects of environmental factors enhance the understanding of BODIV and MKCAP by creating a comprehensive and meaningful model that simultaneously considers top leadership profiles and external conditions related to firm MKCAP changes. This contingency-based view yields richer insights about how the two areas that are practically close but theoretical lack connections may have joint effects on firm capability through both internal and external dimensions. Our research is also designed to provide useful practical implications for firms to build better MKCAP via top-down influence flows that are realized by the enhanced boardroom diversity. Further, this research, with the supporting knowledge of the environmental factors, should produce important guidelines for firms to improve their coping mechanism for external challenges by adapting their governance structure. In addition, our research has potentials to create knowledge for other marketing management aspects such as resource configuration and corporate coordination.

This paper is organized as follows: after the introduction, we review the literature and build the theoretical framework to generate a set of hypotheses. Next, we discuss the data sources, measure methods, and the empirical analysis approaches; this is followed by the results discussion and implications for theories and practices.

2. Theoretical foundation and hypotheses development

2.1. Board and BODIV

The objectives of the board. The upper echelon theory views the boardroom as the entity that represents the owners and thus it serves as the connection between the shareholders and firm management (Alazzani, Hassanein, & Aljanadi, 2017; Boyd, Haynes, & Zona, 2011; Filatotchev & Bishop, 2002). Four essential goals underpin this general tenet. First, the board as an entity is entitled to solve the prevailing principal-agent problems in firm governance (Lynall, Golden, & Hillman, 2003; Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). Managers may pursue personal goals and interests at the cost of the firm's welfare, and thus the board is the mechanism to minimize this threat. Second, the individual board member selection is a result of shareholder decisions based on the shareholders' power and interests (Combs, Ketchen, Perryman, & Donahue, 2007). Shareholders may differ significantly on these dimensions, so each board member may represent the interests of certain stakeholder groups. Thus, the delegation effect of the entire board in fact is a combination of heterogeneous and sometimes skewed representations of the stakeholders (Miller & del Carmen Triana, 2009). Third, the objective of the board is not limited to regulating management teams. A more fundamental goal of this group is to support the development of the entire firm by exerting top governance influences (Bear, Rahman, & Post, 2010; Miller & del Carmen Triana, 2009). In this sense, the board is expected to not only supervise the internal management conditions but also track firm environmental conditions to make timely board decisions. Fourth, the board's objective goes well beyond the evaluation of the firm's past and current performance, as more importantly, it emphasizes the assessment of the forward-looking propensity of the firm that matches the long-term version of shareholder value (Callahan, Millar, & Schulman, 2003). This objective determines that the board will be particularly interested in identifying the firm factors that may lead to sustained competitive advantages (Murphy & McIntyre, 2007).

The functions of the board. Given the above-mentioned objectives, the board exerts important power on firm management and its related

capacities and capabilities. Previous studies have identified a wider array of functions of the board. In general, these functions can be summarized into three main themes. The first theme is the resource-dependence view. In this domain, the board is considered as an entity that has intensive resource connections with outside stakeholders or partners, as board members may come from specific industries, and/or hold key positions in business, professional, or regulatory organizations, and control abundant informational, financial, and human resources (Hillman & Dalziel, 2003). These resources can be leveraged by the board to the firm and facilitate the firm's operations (Casciaro & Piskorski, 2005; Dalziel, Gentry, & Bowerman, 2011). In addition, the resource-dependence function is enhanced by the integration and coordination within the board that seeks the optimal resource configuration that best satisfies the firm's needs (Miller & del Carmen Triana, 2009). This within-board resource sharing and optimization constitute an important competitive advantage for the firm. The second theme involves the consulting-guidance theory. Under this theme, the board is looked as the top governance group that is tasked to support the firm by providing consulting opinions and key guidelines for the firm's operations (Heemskerk, Heemskerk, & Wats, 2017). While the resource-dependence theory has a greater focus on the board's connections with the external world, the consulting-guidance theme is tailored to internal management support. In this role, the board will not only be involved in corporate goal-setting but will also oversee the firm's functional departments' development paths and direct the firm to be in line with the value maximization for the shareholders (Campbell et al., 2012). The third theme that pertains to the board's function is the signaling effect. Unlike the previous two functions that are directly linked to managerial outcomes, the signaling function of the board involves the imagery assets of this group as well as the whole firm (Bear et al., 2010; Connelly, Certo, Ireland, & Reutzel, 2011). The board's composition, behaviors, and ethics are under the eyesight of an array of stakeholders including customers, partners, regulatory agencies, and employees (in addition to shareholders). A board's characteristic that is positively interpreted by stakeholders will likely increase their willingness-to-support (Bear et al., 2010; Grosvold, Brammer, & Rayton, 2007). For example, improving the gender equality in the board motivates the female employees to generate higher contributions (Dezsö & Ross, 2012).

Board composition and diversity. Although the objectives and functions of the board are unanimously recognized, they have not been the main interest of business researchers. Instead, the board composition has captured the key focus because forming the board requires intensive strategic thinking that will influence the governance outcomes (Harjoto et al., 2015; Hillman, 2015). BODIV is defined as the heterogeneous background dimensions of the board members (Bernile, Bhagwat, & Yonker, 2018). These dimensions come from two major categories. The first includes the observable dimensions such as gender, ethnicity, age, and tenure in the firm. The second includes the less observable factors such as work experience, professional background, and skills that come as a result of holding specific positions in related organizations (Erhardt et al., 2003). Previous researchers have either focused on certain single dimensions or comprehensively enclosed multiple dimensions into a composite diversity measure. In this paper, we follow the latter to include an array of diversity dimensions because in business practice, all the dimensions of the board members are presented simultaneously and they produce impacts all together (e.g., Harjoto et al., 2015). Therefore, the dimensions of board members are essentially inseparable.

BODIV has been linked to a number of firm financial performance measures such as profitability (Campbell & Mínguez-Vera, 2008; Carter et al., 2003) and social impacts such as corporate social responsibility (Bear et al., 2010; Rao & Tilt, 2016). The majority of the existing studies suggest that BODIV provides the firm a positive support by performing functions related to resource acquisition, firm strategic guidance, and firm image improvement (see the literature summary in Table 1). However, a salient missing logic is that it is unlikely that the performance gain will be realized unless BODIV can shape a firm's capabilities. Therefore, capabilities may be the mediating agent between BODIV and firm performance. This effect deserves notice and becomes the focus of this study.

2.2. BODIV and MKCAP

Firm capability scholars consider the firm as a bundle of resources that are deployed at various skill levels specific to each firm. In this conceptualization, a firm constitutes its capability set that eventually determines the firm's performance (e.g., Barney, 1991; Feng, Morgan, & Rego, 2015). Firm capability is deeply embedded in the firm's operations and cannot be simply acquired from other sources (McGrath, Medlin, & O'Toole, 2019). Rather, a firm's capability is built through the firm's learning processes that integrate both management logics as well as the interactions with the environment (Calantone, Cavusgil, & Zhao, 2002). For example, in the field of B2B marketing, this nature is especially evident for two reasons. First, firms will have direct connections and interactions with their business clients and thus they are motivated to optimize and cultivate the relationships via creating specially designed mechanisms and capability sets (Vesalainen & Hakala, 2014). Second, the organizational transactions between business partners incur more departmental involvements across the leadership hierarchies and thus are more likely to trigger organizational learning functionalities that facilitate capability-building (Zhang, Jiang, Shabbir, & Du, 2015). This special nature of firm capability enables it to be one of the strongest sources of the firm's long-term competitive advantages because it precisely fits the valuable, rare, inimitable, and non-substitutable (VRIN) criteria of firm assets leading to superior performance (Lin & Wu, 2014). Scholars in this area further suggest that firm capability is better viewed by examining specific functional areas such as marketing, operations, innovation, and supply chain (Dutta, Narasimhan, & Rajiv, 2005; Krasnikov & Jayachandran, 2008; Nath, Nachiappan, & Ramanathan, 2010; Vorhies & Morgan, 2005; Wu, Yeniyurt, Kim, & Cavusgil, 2006). This approach not only recognizes the heterogeneous nature of a firm's functional areas and thus strongly deepens the understanding of firm capability toward a more precise and more reality-based stage but also broadens the reach of firm capability horizontally to other strategic areas and vertically to upstream and downstream management levels (Helfat & Winter, 2011). Among all firm capability types, MKCAP has received a particular emphasis because marketing is a firm function bridging the internal operations and external demands (Chen & Wu, 2011; Krush, Sohi, & Saini, 2015). The capability in this area is the key for the firm to gain financial revenues from the markets and is one of the major focuses of firm management and shareholders (Chang et al., 2010; Trainor et al., 2011). Further, MKCAP has been found to have the strongest power in protecting the firm from threats because a firm with high MKCAP is able to create necessary operations and social complexity that suppress the imitation activities from competitors and thus sustain competitive advantages (Krasnikov & Jayachandran, 2008). Given this rationale, linking BODIV and MKCAP is of special importance because they are among the most critical factors that influence firm outcomes. However, to date, there is little existing knowledge on this association.

The above-mentioned theories jointly create a strong foundation for developing the link between BODIV and MKCAP. This link can be illustrated in four main areas. First, building MKCAP requires resource inputs. For example, finding a qualified marketing manager is a precondition for the marketing department; industry insiders' information allows the firm to restructure marketing teams to cope with new situations; and relational ties with government agencies allow the firm to build quick responding mechanisms in its marketing function (Germann, Ebbes, & Grewal, 2015; Song, Wang, & Parry, 2010). These needs for building MKCAP can be well-supported by BODIV. A high diversity board is found to improve resource acquisition such as human talent, market information, and relational stocks, which reinforce the

Table 1
Literature Summary for Findings Related to Board Diversity.

Board Diversity Construct	Outcome Variable (s)	Sample Frame	Findings	Study
A composite index including gender, age, ethnicity, educational background, financial expertise, and breadth of board experience	Stock return volatility, policy persistence, financial and investment policies, innovation efficiency, performance	US public listed firms	Board diversity reduces stock return volatility, enhances policy persistence, and leads to policies associated with lower financial risk, and it increases innovation efficiency as well as performance	Bernile, Bhagwat, & Yonker (2018)
Diversity of gender, age, tenure, education	R&D investment	Fortune 500 firms	Gender and education diversities increase R&D investment, while tenure diversity decreases R&D investment	Midavaine, Dolfsma, & Aalbers (2016)
Percentage of female directors and independent directors	Tobin's Q and ROA	Listed companies in 47 countries	Gender and independence diversities are positively associated with Tobin's Q and ROA	Terjesen, Couto, & Francisco (2016).
Percentage of women and foreigners in the board	Tobin's Q	Listed banks in nine countries	Percentage of women is positively associated with Tobin's Q; percentage of foreigner is negatively associated with Tobin's Q	García-Meca, García-Sánchez, & Martínez-Ferrero (2015)
Diversity of gender, age, race, director experience, tenure, director power, and expertise	Firm corporate social responsibility	Public listed firms	Board diversity positively affects corporate social responsibility	Harjoto, Laksmana, & Lee (2015)
Diversity of gender, age, education, nationality, independence	Market-to-book,ROE	Large and liquid firms in the Bourse Istanbul	Mixed findings of the relationships, but in general, board diversity increases firm performance	Ararat, Aksu & Tansel Cetin (2015)
Diversity of gender and ethnic profile	Corporate information environment	S&P 1500 firms	Board diversity increases the firms' information transparency	Upadhyay & Zeng (2014)
Diversity of gender, race, and outside directors	Institutional strength and technical strength	Publicly traded Fortune 500 companies	Gender and race diversities are positively associated with institutional strength and technical strength	Zhang (2012)
Diversity of director resources and the number of women on the board	Firm reputation and strengths	Health care companies	A greater number of women in the board positively and significantly increases institutional and technical strengths, and reputation	Bear, Rahman, & Post (2010)
Gender and racial diversities	Innovation and firm reputation	Fortune 500 firms	Both gender and racial diversities increase innovation; racial diversity also increases firm reputation	Miller & del Carmen Triana (2009)
Percentage of women on the board	Firm value	Non-financial firms listed on the continuous market in Madrid	Percentage of women on the board is positively and significantly related to firm value	Campbell & Mínguez-Vera (2008)
Board members' age, insiders, gender, minority status	Firm value	Fortune 1000 firms	Board diversity is generally found to positively drive firm value	Carter, Simkins, & Simpson (2003)
Ethnic and gender representation on boards	ROA and ROI	Large public companies in various industries	Board of director diversity is positively associated with both ROA and ROI	Erhardt, Werbel, & Shrader (2003)

marketing functions (Erhardt et al., 2003; Miller & del Carmen Triana, 2009). This resource support provided by BODIV originates from the wider connections and differential backgrounds of the diverse board members and thus creates a useful base to leverage resources to the firm (Bear et al., 2010). Second, the board is tasked to calibrate the firm's operations (Bernile et al., 2018; Terjesen, Couto, & Francisco, 2016). Among these operations, marketing is a major focus. For one thing, the customer market is the emphasis of the shareholders because the future cash flow largely relies on market performance (Anderson et al., 2004). Additionally, the marketing function's effectiveness can trigger a chain effect in the upstream B2B value chain sectors, such as in production and procurement (Samiee, 2008). Thus, the board has a particular interest in effectively directing marketing development paths to optimize these business relationships (Tuggle, Schnatterly, & Johnson, 2010). A diverse member group is found to more precisely understand the needs of the firm and to provide more accurate guidance for the firm so that it can advance its service levels to customers (Bear et al., 2010; Carter et al., 2003). Third, the ability of the marketing function, such as manifested in the sales teams or the supporting groups, is highly dependent on human involvement. Motivated employees are found to more effectively perform selling and services that lead to customer satisfaction (Ahearne, Mathieu, & Rapp, 2005). BODIV plays an important role here because previous studies find that employees are inspired by the fair diversity of board representations and are more willing to become involved in firm activities if a high degree of BODIV is observed (Grosvold et al., 2007). This signaling effect further supports the marketing function by engaging other functional departments towards a better customer support capability (Verhoef & Leeflang, 2009). Fourth, in addition to the resource level and consulting advantages, the high BODIV firm possesses a particular advantage regarding the within-board coordination and innovation. Bear et al. (2010) find that a diverse board team is likely to configure the available resources in a way that maximizes the utility and innovation outputs. These benefits will facilitate firm MKCAP because they allow the firm to use the best practice to enhance customer relationships. For example, researchers illustrate that in the B2B firms, the optimized organizational routines and enhanced innovativeness significantly support the firms to build better skills to satisfy their key clients (e.g., Heirati & Siahtiri, 2019; Theoharakis, Sajtos, & Hooley, 2009). With these theoretical logics, we hypothesize:

H1: BODIV will be positively related to firm MKCAP.

2.3. Environmental dimensions and MKCAP

The notion of firm capability illustrates that it is developed to help the firm face the challenges of a fast-changing environment. However, this widely shared rationale raises an unanswered question: how is the environment, in its different dimensions, related to firm capability? In the literature, two opposite views exist in this direction. The first view suggests that the environment will enhance a firm's capability (Argote & Miron-Spektor, 2011). For instance, unfavorable external conditions, such as a high level of competition, will spur the firms' initiatives for building stronger capabilities to cope with these adverse situations (Weerawardena, O'Cass, & Julian, 2006). Indeed, firms in those conditions will be more strongly motivated to improve their strategic effectiveness (Koka, Madhavan, & Prescott, 2006).

However, the first view suffers from one serious limitation: a firm that have initiatives or motives for changing itself does not necessarily mean that the firm can achieve the goal, as an unfriendly environment incurs constraints and barriers that invalidate the firm's endeavors (Madrid-Guijarro, Garcia, & Van Auken, 2009). This leads to the second view that supports an opposite direction, i.e. unfriendly environment conditions may undermine firm capability, especially the marketing-side competency (Slotegraaf & Dickson, 2004). For example, quick market trend shifts will soon make the firm's marketing knowledge, skills, and assets obsolete and thus significantly reduce the firm's MKCAP (Boyne & Meier, 2009). Nokia and Kodak are salient examples indicative of this rationale.

In addition to this, the literature also points out that the possible negative impacts of specific environmental conditions can be addressed by the firm's possession of certain assets or traits. For example, a firm's management functional heterogeneity gives the firm a better position to deal with environmental uncertainty (Auh & Menguc, 2005); market orientation helps the firm neutralize competitor threats (Cadogan, Cui, & Li, 2003). Therefore, it is necessary to look for possible moderators in order to understand specific situations in which environmental challenges are no longer effective. The current study explicitly aims to bridge these gaps by formulating the moderating roles of a set of environmental dimensions.

Regarding the selection of environment dimensions, there is a popular adopted set of environmental dimensions, including munificence, turbulence, and competition intensity (e.g., Ang, 2008; Gligor, Esmark, & Holcomb, 2015). This set of dimensions is a result of a comprehensive investigation of an intensively long list of factors, and achieve a balance between inclusiveness and actionability, and thus becomes a preferred framework for understanding firm behaviors and outcomes (Tsai & Yang, 2013).

2.4. Environmental munificence, BODIV, and MKCAP

Environmental munificence measures the growth rate of an industry (McArthur & Nystrom, 1991). High munificence in an industry indicates the environment is supportive of further development and is characterized as having abundant resources and easy-to-acquire assets to facilitate a firm's operations (Goll & Rasheed, 2004). There is a sound theoretical basis that points to the relevance of munificence on firm MKCAP. First, marketing requires a firm's resource support to fully reach its functionality. For example, a friendly environment provides abundant financial support for the sales team to experiment best-selling protocols (Slater & Olson, 2000). In contrast, a low munificence environment restricts the firm's freedom of launching alternative marketing campaigns and may force the firm to adopt a suboptimal alternative and thus harm the firm's capabilities (Escribá-Esteve, Sánchez-Peinado, & Sánchez-Peinado, 2009). Second, a low growth industry suffers problems such as talent churn to other high growth industries (Ford & Wooldridge, 2012). This is particularly applicable in marketing sections because managers face more pressure to achieve market performance due to the low environmental munificence (Slater & Olson, 2000). Therefore, the marketing team cannot retain qualified human resources to ensure management and service quality. Third, low munificence often means that the customer markets reach the mature stage in which the consumption pattern is stagnant (Beverland, 2005). This condition creates special obstacles for the firm to improve MKCAP due to the established pattern. When BODIV is added to the framework, we expect its relationship will differ in a high versus a low munificence environment. It is obvious that the resource support function of BODIV may play a stronger role in low munificence industries because firms in these industries place high demands on the board members to leverage external resources, which means these resources may yield a higher marginal effect in supporting marketing functions to improve MKCAP. In contrast, in a high munificence environment in which the resource availability is already abundant, the resource advantages of BODIV will not be as critical (Sirmon, Hitt, & Ireland, 2007). Externally, the board members may bring in key insights about the markets and enable the marketing sectors to obtain timely and broader customer intelligence (Miller & del Carmen Triana, 2009). BODIV thus will facilitate more in a low munificence environment in which the firms are looking for not only market opportunities but also new ways of satisfying customers (Gligor et al., 2015), which leads to BODIV's higher power for enhancing MKCAP. Thus we hypothesize that:

H2: BODIV's positive effect on MKCAP will be stronger in a low munificence environment than in a high munificence

environment.

2.5. Environmental turbulence, BODIV, and MKCAP

Environmental turbulence reflects the uncertainty rates of an industry (Lichtenthaler, 2009). In this type of environment, business conditions may change quickly, and thus firms have a low possibility to predict the future. The shifting external conditions place significant challenges on the firm's resource configurations (Wilden & Gudergan, 2015). In the marketing sector, this effect is more severe because marketing is the firm function that is most tightly connected to the external environment (Cadogan et al., 2003; Wilden & Gudergan, 2015). Turbulent markets thus undermine the firm's ability to better satisfy its customers, as they raise the challenge of knowledge acquisition (Lichtenthaler, 2009). For example, in a market with fast-changing customer preferences, the firms are not able to develop ideal skill sets that are consistently tailored to customer needs. In addition, Atuahene-Gima (2005) has explicitly noted that capabilities may display a certain rigidity that resists changes. Also, Vergne and Durand (2010) support the idea that firm capability is path-dependent in nature. This means that the turbulent environment disturbs the building of the firm's MKCAP development route. Furthermore, changing environments create a special challenge for acquiring reliable market intelligence, which serves as the foundational basis for a firm to build MKCAP and to best cater to customer markets (Jarratt & Fayed, 2001). Information ambiguity, with the compounded difficulty of resource configuration, will likely profoundly undermine MKCAP levels. Given this pattern, BODIV may display differential roles in high versus low turbulence industries as they influence the firm's MKCAP. The resource advantages of BODIV are more desired by firms in high turbulence industries because these firms have the disadvantages of acquiring, retaining, and properly deploying resources to satisfy customers (Carpenter & Westphal, 2001). The diverse body of a board thus provides a two-fold support for these firms. First, the heterogeneous background of the members makes the firms' governance team more aware of environmental changes because of the increased connections to different aspects of the environment (Upadhyay & Zeng, 2014). In this way, the firm more reliably predicts the market and hence facilitates the building of its MKCAP. Second, the relational stock held by the diverse board members will likely create an extended network with other stakeholders or partners and thus enable the firm to be less affected by the environmental changes (Caiazza & Simoni, 2015). Therefore, this advantage of externality provides the firm's marketing teams with a more stable platform to build best marketing tactics. Thus we hypothesize that:

H3: BODIV's positive effect on firm MKCAP will be stronger in a high turbulence environment than in a low turbulence environment.

2.6. Competition intensity, BODIV, and MKCAP

Competition intensity is defined as the number and relative strengths of the firms playing in the same industry (Anderson et al., 2004). High competition intensity means there are many similar firms competing in the market (Kurt & Hulland, 2013). In these industries, firms seek effective ways to neutralize the competitors marketing effectiveness. Martinez-Miera and Repullo (2010) find that in competitive markets, the firms' power of controlling markets is reduced due to the counter offers from rivals. For example, customers' churn increases because of the influence of aggressive marketing campaigns or new solutions from the competitors (D'Alessandro, Johnson, Gray, & Carter, 2015). A severe consequence is that a firm facing these challenges often has to deviate from its strategic routes to create new ones (Porter, 2008). This type of deviation is likely to result in a double-fold problem involving less customer satisfaction and more resource waste. For example, shifting away from an established marketing route will annoy older customers who constitute a significant portion of market performance (Yuksel & Mryteza, 2009). Another example is the situation in which a firm has to develop new sets of activities to cope with the competitors' promotional campaigns and has to drastically deviate from its best route and engage in unwillingly activities, such as price wars (Zhang, Jahromi, & Kizildag, 2018). This direction will not allow the firm to achieve ideal performance with reasonable inputs, leading to inferior marketing effectiveness. In addition, intensified competition also forces the firm to analyze an extended range of their rivals' situations that are often vague and hard to discern, and therefore decreases the firm's controllability of the market situation, leading to less efficient marketing practices (Moorman, Du, & Mela, 2005). BODIV is expected to more strongly support the firms in highly competitive industries. First, as mentioned above, the relational stock of the diverse board members will be highly desired by the firms that face hard competition (Bear et al., 2010; Miller & del Carmen Triana, 2009). The relational connections of the top leadership team have been confirmed to be necessary resources for the firm to design and implement marketing campaigns (Maignan, Ferrell, & Ferrell, 2005). Additionally, resource support, such as key market information involving competition, will also be valuable for the firm in developing MKCAPs in a competitive environment. Second, the professional experience of board members will be particularly relevant for the firm in coping with competition. A diverse board further enhances this advantage by providing a wider scope of alternatives available to the functional departments such as marketing (Walt & Ingley, 2003). For example, ethnic diversity greatly assists a firm to have deeper insights about certain key customer groups, leading to better marketing skills (Carter et al., 2003). Third, the positive image of diversity of the governance team itself supports marketing by offering signaling benefits. The enhanced image not only supplements marketing strategies but also directly impacts the customer market and other stakeholders (Cretu & Brodie, 2007). Thus, these benefits jointly provide the firm's marketing teams a supportive environment for launching campaigns. Thus we postulate that:

H4: BODIV's positive effect on firm MKCAP will be stronger in a high competition intensity environment than in a low competition intensity environment.

3. Data and measures

The data are collected from a set of carefully selected sources such as Compustat, the RiskMetrics Directors database, the Business Segment database, and supplemented by the firms' annual reports information. The sample frame contains North America public listed firms (whenever available across these databases) in a comprehensive spectrum of industry sectors such as oil and gas, construction, food products, industrial and commercial machinery, electronics, communication, electric services, retail, wholesale, and business services (ranging from year 2000 to 2015). These data sources meet the criteria for the current study for six key reasons. First, these databases have been popularly used in business studies and the reliability and quality have been well documented (e.g., Fang, Palmatier, & Steenkamp, 2008; Jo & Harjoto, 2011; Masulis & Mobbs, 2014). Second, these databases cover firm from different industry sectors, which is necessary for ensuring the external validity of our study. Third, the key measures resulting from these secondary databases are immune from problems such as perception bias, which is often detected in perception-based methods such as interviews and surveys. This is particularly important for examining factors such as firm capability because informants' assessed scores of capability may be seriously biased due to their specific roles in the firms and their incomplete and skewed knowledge scope about the industries and competition. Fourth, choosing multiple databases also reduces the threat of common method bias. Fifth, this data approach also allows researchers to have access to a large number of sample firms to increase the advantages of representativeness. Sixth, the data items collected span a time period covering multiple years and enable researchers to

Table 2
Variable Descriptive Information and Correlations.

		Mean	SD	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
Marketing Capability	V1	0.59	0.22												
Board Diversity	V2	0.71	0.09	0.07 ***											
Env. Munificence	V3	1.06	0.03	−0.06 ***	−0.01										
Env. Turbulence	V4	0.52	0.07	−0.07 ***	0.08 ***	0.44 ***									
Competition Intensity	V5	0.79	0.18	−0.13 ***	−0.47 ***	−0.10 ***	−0.22 ***								
Board Size	V6	9.90	1.98	0.06	0.23 ***	−0.01	0.02	−0.18 ***							
Market Breadth	V7	1.08	0.48	0.14	0.18 ***	−0.01	−0.01	−0.20 ***	0.16 ***						
Firm Age	V8	3.27	0.62	0.09 ***	0.22 ***	0.00	0.05 **	−0.18 ***	0.35 ***	0.30 ***					
SG&A	V9	0.22	0.18	0.03	−0.08 ***	−0.02	−0.02	0.00	−0.01	−0.11 ***	−0.04 **				
Resource Level	V10	0.21	0.32	0.14 ***	0.03 *	−0.06 ***	0.02	−0.05 **	0.08 ***	0.07 ***	0.18 ***	0.09 ***			
Asset Growth	V11	0.10	0.32	0.05 **	−0.07 ***	0.08 ***	0.01	0.01	−0.10 ***	−0.05 **	−0.12 ***	0.01	0.01		
Firm Leverage	V12	0.23	0.17	0.03	0.04 **	−0.01	0.07 ***	0.08 ***	−0.05 **	0.02	−0.05 **	−0.16 ***	−0.28 ***	0.02	
Performance Uncertainty	V13	0.23	0.09	0.02	0.12	0.00 ***	0.10	−0.11 ***	0.05 ***	−0.05 **	−0.04 **	0.16 *	0.21 ***	0.04 ***	−0.24 *

*p < .10, **p < .05, ***p < .01.

use more rigorous panel data estimation tools to increase the precision of estimators. The final merged dataset contains 3978 non-missing observations from 575 firms. The descriptive information is presented in Table 2. The variable measure methods are discussed below.

3.1. Board diversity (BODIV)

To sufficiently reflect the diversity of the board, previous studies (e.g., Erhardt et al., 2003) support that both the observable dimensions, such as demographic characteristics, and unobservable dimensions, such as skill- and experience-based variables, should be included. This view is particularly relevant to our current study because the marketing sector has long been viewed as a construct connecting to all the aspects of the firm and thus the inclusive measure of diversity better reflects this trait. In addition, the inclusive measure enhances the notion of diversity by focusing on a double-fold heterogeneity, which is the diversity within each dimension such as younger and older in the age dimension, and the diversity across different dimensions such as age and ethnicity. In this sense, the inclusive view of BODIV more precisely echoes the diversity theory. The RiskMetrics Directors database provides an extended set of board members' information, including age, gender, ethnicity, tenure in the board, management position, other directorship positions, and expertise types, so it becomes a preferred source for measuring BODIV. We follow Harjoto et al. (2015) and use Blau's index to measure each dimension's heterogeneity expressed as $1 - \Sigma P_i^2$, where p is the individual category's portion in a specific dimension and i is the number of the categories. However, for variables with different numbers of variations, Blau's index have different ranges. Therefore, we normalize each individual factor against the range within each dimension (Harjoto et al., 2015; Wang & Hsu, 2013; Zhang, 2012). Because the board composition may have systematic variations due to the fact that the firms are in different industries, we further normalize the Blau's index of each firm against the industry means. This way makes the data measures more comparable across industries and also it further removes the concern of multi-collinearity when BODIV is modelled with the set of environmental variables. We then compute the average score to obtain a composite score to represent the BODIV (Harjoto et al., 2015; Wang & Hsu, 2013).

3.2. Marketing capability (MKCAP)

Firm capability is conceptualized as the degree to which a firm can deploy its controllable resources to achieve performance. MKCAP therefore reflects how well a firm can translate its marketing resources into market performance (Lieberman & Dhawan, 2005; Morgan, Clark, & Gooner, 2002; Vorhies & Morgan, 2005). This notion can be seamlessly operationalized by the econometric tool stochastic frontier model (SFM), which adopts an input–output approach to gauge the efficiency level of each subject. This method of measuring capability can be found in all major business research fields, such as management, marketing, operations, and innovation (e.g., Lieberman & Dhawan, 2005; Nath et al., 2010). We carefully select a set of marketing inputs to run the SFM. All these inputs have solid support from previous studies to be the preferred measures of marketing resources in specific areas. The main input items are collected from Compustat. We include selling, general, and administrative expenses (SG&A) to capture the marketing expenditure involving sales, advertising, promotion, and other supporting activities (Dutta et al., 1999). We use receivables (RECEV) to proxy the customer relationship resource because it signifies the willingness of the firm to extend credit to its customers (Nath et al., 2010). We include intangible assets (INTASSET) because it is highly relevant for driving customer acceptance (Cretu & Brodie, 2007). We include the installed base (INSTB) as measured by previous sales volume because the current install base will influence customers' continuity (Dutta et al., 1999). We also include firm slack resources (SLARES), which are measured as the principal component of working capital and retained earnings (Fang et al., 2008). We use market share and gross profit margin to measure marketing outcomes that should be reflected by both volume and profitability. The SFM is expressed as a Cobb–Douglas production function on panel data as follows:

$$Ln(MARKET\ SHARE_{it}) = \alpha_0 + \alpha_1 \times Ln(SG\&A_{it}) + \alpha_2 \times Ln(RECEV_{it}) + \alpha_3 \times Ln(INTASSET_{it}) + \alpha_4 \times Ln(INSTB_{it}) + \alpha_5 \times Ln(SLARES_{it}) + \varepsilon_{it(\alpha)} - \eta_{it(\alpha)}$$

$$Ln(PROFIT\ MARGIN_{it}) = \beta_0 + \beta_1 \times Ln(SG\&A_{it}) + \beta_2 \times Ln(RECEV_{it}) + \beta_3 \times Ln(INTASSET_{it}) + \beta_4 \times Ln(INSTB_{it}) + \beta_5 \times Ln(SLARES_{it}) + \varepsilon_{it(\beta)} - \eta_{it(\beta)}$$

where i denotes firms and t represents time; $\varepsilon_{it(\alpha)}$ and $\varepsilon_{it(\beta)}$ are random shocks; $\eta_{it(\alpha)}$ and $\eta_{it(\beta)}$ are the inefficacy scores that capture the distance between each firm's ability and the best performer's ability to convert its resources into outcomes. The mean of the reversed final scores, (1- $\eta_{it(\alpha)}$) and (1- $\eta_{it(\beta)}$), from these models becomes the measure of MKCAP.

3.3. Environmental factors

Environmental munificence stands for the growth rate of an industry. Keats and Hitt (1988) formulate a time-series regression with industry sales volume as the dependent variable (y_t) and year as the independent variable (t), over each five-year window.

$$y_t = b_0 + b_1 t + \varepsilon_t$$

The coefficient of the time (b_1) thus reflects the overall growth trend of this industry. We follow this method to obtain the munificence measure (Withers & Fitza, 2017). *Environmental turbulence* measures the volatility of the industry revenue volume over a time period. In the literature, there are multiple approaches for capturing this effect. Numerous scholars, such as Fang et al. (2008), propose using the coefficient of variation (COV) to measure turbulence. In our main model, we adopt the same approach. This method is expressed as $COV = (\frac{\sigma}{\mu})$ where σ is the standard deviation of the industry sales in a time period and μ is the mean of sales in the same time frame. We also use the Sridhar, Narayanan, and Srinivasan's (2014) measure method in the robustness check. Both of the two measures yield consistent results. To measure *competition intensity*, there is a consensus in the literature of using the Herfindahl-Hirschman Index (HHI). The HHI measures the concentration rate of an industry ($HHI = \sum_{i=1}^{N} S_i^2$, where S is the market share of individual firms in a certain industry), and 1-HHI thus captures the degree of competition (Anderson et al., 2004).

3.4. Control variables

In additional to the main effects, MKCAP may also be influenced by other factors. We carefully selected a set of control variables based on the supporting literature. We control for market diversification because market scope may affect a firm's knowledge breadth and thus influence the firm's MKCAP. Using the Business Segment Database, we collect the number of markets of operations for each firm and adjust it by the industry sectors' range (Bowen & Wiersema, 2005). We control for a firm's age because knowledge accumulation associated with a firm's age is relevant for building stronger capability. We collect the number of years that a firm is publicly listed and a log-transformation is applied (Anderson & Reeb, 2003). We control for the firm's marketing emphasis level and its resource level by including the SG&A/Sales and slack resource volume variables. These two variables control for the effect that may occur when the firm's marketing function is supported with a higher resource commitment. Because the board characteristics not only include diversity but also include size, we control for this effect and add the number of members on the board as board size. Further, we control for both the growth trend measured by asset growth and the performance fluctuation measured by cash flow volatility to account for the firm's performance metrics' impact on the firm's marketing-side strengths. Because firms' debt may influence a firm's orientation of resource allocation, we control for this effect by using firm leverage, as measured by the ratio between long-term debt and asset size (Mishra, Ewing, & Pitt, 2019). In addition, we also add a time dummy variable set and an industry set to account for the time and industry related heterogeneities on the firm's MKCAP.

4. Analysis methods

Because changes in MKCAP resulted from firm structural variation may display a lag effect, we use $MKCAP_{(t+1)}$ as the dependent variable to capture this effect. Doing so also reduces the concern of reversed causality. The full model is specified as follows:

$$\begin{aligned} Marketing\ Capability_{it+1} = {} & \beta_0 + \beta_1 \times BODIV_{it} \\ & + \beta_2 \times Environmental\ Munificence_{jt} \\ & + \beta_3 \times Environmental\ Turbulence_{jt} \\ & + \beta_4 \times Competition\ Intensity_{jt} \\ & + \beta_5 \times BODIV_{it} \times Environmental\ Munificence_{jt} \\ & + \beta_6 \times BODIV_{it} \times Environmental\ Turbulence_{jt} \\ & + \beta_7 \times BODIV_{it} \times Competition\ Intensity_{jt} \\ & + \beta_8 \times Board\ Size_{it} \\ & + \beta_9 \times Market\ Breadth_{it} \\ & + \beta_{10} \times Firm\ Age_{it} \\ & + \beta_{11} \times SG\&A_{it} \\ & + \beta_{12} \times Resource\ Level_{it} \\ & + \beta_{13} \times Asset\ Growth_{it} \\ & + \beta_{14} \times Firm\ Leverage_{it} \\ & + \beta_{15} \times Performance\ Uncertainty_{it} \\ & + Time\ Dummy\ Variables \\ & + Industry\ Dummy\ Variables + \varepsilon_{it} \end{aligned}$$

where i means firms, j denotes industries, and t means time periods (years). This model specification has a number of merits for the purpose of the current study. First, the use of different firm types across a comprehensive list of industries allows the model to account for the sufficient heterogeneity and therefore captures the essential relationships and achieves higher external validity. Second, the panel data structure enables a more holistic examination of the relationships over a number of time periods and it provides estimators that minimize the bias due to a single time span's specific situation. Third, the heterogeneities of the firm's attributes and their joint influences on firm capability are sufficiently controlled by the firm's characteristic variables, such as firm age, assets/resource metric, growth potentials and performance volatility. Fourth, the whole set of the main effects of the environmental factors serves as an adequate solution for accounting for the external conditions. Fifth, the year and industry dummy variables control for the time and firm group effects, and BODIV is thus estimated under a multi-layer multi-dimensional control model specification. For this model specification, two additional concerns remain. First, firms may display systematic similarity due to being in similar industries or to having close endowment configurations or development paths. These characteristics increase the possibility that the variance of a dependent variable is unproportionally explained by certain clusters of firms. Thus, heteroscedasticity becomes a threat. Second, although panel structure data do have benefits, they may induce problems of autocorrelation over the time span. Given these considerations, we carefully select three robust regression methods to handle the panel data. We first use the Newey-West robust regression, which generates Newey-West standard errors following

$$X'\hat{\Omega}X = X'\hat{\Omega}_0 X + \frac{n}{n-k}\sum_{l=1}^{m}\left(1 - \frac{l}{m+1}\right)\sum_{t=l+1}^{n}\hat{e}_t\hat{e}_{t-l}(x'_t x_{t-l} + x'_{t-1}x_t)$$

where x_t stands for the row of X matrix that is observed at time t; m is the first-order autocorrelation; n is the number of observations and k is the number of predictors. The standard errors generated by this method are heteroscedasticity-autocorrelation consistent (Newey & West, 1987; Rego et al., 2009). To ensure the robustness of the method choice, we further run the same model by using the White-Cluster robust

Table 3
Empirical Analysis Results.

	Control Variables		Main Effects		Full Model (Newey-West Robust Estimation)		Full Model (White-Cluster Robust Estimation)		Full Model (Feasible GLS Estimation)	
	Coeff.(t)	Sig.	Coeff.(t)	Sig.	Coeff.(t)	Sig.	Coeff.(t)	Sig.	Coeff.(z)	Sig.
Board Diversity			0.060	**	0.119	***	0.119	**	0.119	***
			(1.98)		(3.48)		(2.38)		(4.25)	
Env. Munificence			0.000		0.018		0.018		0.018	
			(0.01)		(0.76)		(0.74)		(0.89)	
Env. Turbulence			−0.080	***	−0.139	***	−0.139	***	−0.139	***
			(−2.62)		(−3.87)		(−3.00)		(−5.42)	
Competition Intensity			−0.163	***	−0.205	***	−0.205	***	−0.205	***
			(−5.32)		(−6.29)		(−4.41)		(−8.48)	
Board Diversity × Env. Munificence					−0.044	**	−0.044	**	−0.044	**
					(−2.32)		(−2.33)		(−2.31)	
Board Diversity × Env. Turbulence					0.089	***	0.089	***	0.089	***
					(3.45)		(3.14)		(3.77)	
Board Diversity × Competition Intensity					0.079	***	0.079	**	0.079	***
					(2.77)		(2.17)		(3.52)	
Board Size	0.083	***	0.069	***	0.070	***	0.070	**	0.070	***
	(3.70)		(3.10)		(3.18)		(2.25)		(3.74)	
Market Breadth	0.008		−0.008		−0.015		−0.015		−0.015	
	(0.35)		(−0.34)		(−0.65)		(−0.42)		(−0.78)	
Firm Age	0.043	*	0.025		0.024		0.024		0.024	
	(1.66)		(1.00)		(0.97)		(0.63)		(1.23)	
SG&A	−0.039		−0.026		−0.021		−0.021		−0.021	
	(−1.33)		(−0.99)		(−0.81)		(−0.58)		(−1.04)	
Resource Level	0.114	***	0.118	***	0.124	***	0.124	***	0.124	***
	(4.05)		(4.49)		(4.81)		(3.38)		(6.38)	
Asset Growth	0.046	**	0.046	**	0.046	**	0.046	**	0.046	***
	(2.29)		(2.23)		(2.21)		(2.09)		(2.79)	
Firm Leverage	0.026		0.015		0.011		0.011		0.011	
	(0.88)		(0.53)		(0.37)		(0.25)		(0.51)	
Performance Uncertainty	0.112	***	0.109	***	0.119	***	0.119	***	0.119	***
	(4.31)		(4.22)		(4.57)		(3.01)		(5.86)	
Time & Industry Dummies	Included		Included		Included		Included		Included	
Adj. R^2	0.185		0.344		0.361		0.361		0.361	

*p < .10, **p < .05, ***p < .01; Variance Inflation Factors are all lower than 10; Incremental contribution of variables across models are significant.

regression, which generates White standard errors to address heteroscedasticity by using

$$Var(\hat{\beta}) = (X'X)^{-1}X'\Omega X(X'X)^{-1}$$

and utilize intra-firm clustering to account for autocorrelation (Cuneo, Milberg, Benavente, & Palacios-Fenech, 2015; Mizik & Jacobson, 2009). Beyond that, we also use the Feasible Generalized Least Squares (FGLS) method and all the three methods yield consistent results.

5. Results and discussion

The empirical analysis results are presented in Table 3. We first run the model with only control variables, then add main effects, and finally run the full model. There is no significant inconsistency found in the control/main effects across the models. We also conduct partial-F tests to check the incremental contributions of the main effects and interactions and we find both of them are significant ($F = 13.40$, $p < 0.01$; $F = 6.63$, $p < 0.01$). Further, the Durbin–Wu–Hausman test shows that endogeneity is not a concern in this model. We also calculate the variance inflation factors (VIF) and no VIF is greater than 10, thus multi-collinearity doesn't pose a threat to the model. In the control variables, board size is found to have a positive effect on MKCAP. This echoes the resource-dependence function of the board from a volume angle in that the increased board team may bring in a higher level of key resources including market information and marketing assets that collectively contribute to the refinement of MKCAP. Tuschke, Sanders, & Hernandez (2014) document that board team aggregately support the firm's market intelligence collection, which in turn improves the skills of managing the markets. In a similar vein, the resource level is found to positively affect MKCAP because building firm marketing competency requires necessary resource support, such as salespersons' training, cross-market conferences, technology support, and higher pay for qualified managers. Asset growth is positively related to MKCAP. The momentum of firm asset expansion may give firms good conditions for experimenting different entrepreneurial approaches and thus improve the marketing effectiveness (Eshima & Anderson, 2017). It is also interesting to find that performance uncertainty is positively related to MKCAP. This finding is aligned with firm risk management literature that has strong evidence illustrating firms that have uncertainties in its financial performance will be more motivated to establish coping methods such as restructuring its marketing assets to aim at smoothing future revenue flows (Irvine & Pontiff, 2008).

The H1 postulates that BODIV positively drives firm MKCAP. This hypothesis is significantly supported by the analysis results ($\beta = 0.119$, $p < 0.01$). This finding reveals two crucial traits of corporate governance. First, board characteristics indeed have an impact on escalating functional capability. This notion is theoretically supported in the literature, and our work is the first one that empirically confirms such an existence. Second, previous studies also document the negative aspects of having a diverse board composition that may undermine firm decision making. Our research shows that for firm capability such as MKCAP, a diverse board strongly benefits the firm. The fundamental reason is that BODIV achieves resource advantages, improves resource configuration, and optimizes the firm's environment by creating imagery assets that seamlessly meet the needs for building a strong MKCAP.

The results show that the main effect of environmental munificence is not significant. This insignificance reveals several interesting roles that industry growth will play on firm capability. Supportive industry conditions may offer firms favorable factors, such as an increase in the number of market segments and an elevation of demands for the firm to

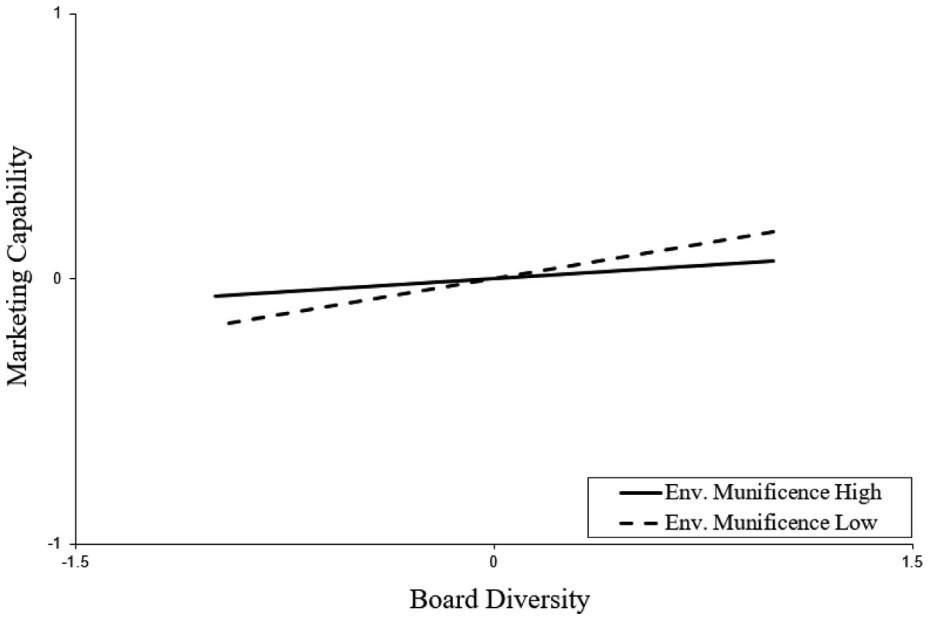

Fig. 1. The Moderating Effect of Environmental Munificence on BODIV and MKCAP.

improve marketing skills. For example, a firm in a growing industry may continuously leverage their knowledge into new customer groups and meanwhile keep updating its knowledge sets to satisfy customers. However, this type of condition also creates challenges for knowledge transfer. For example, firms may have strong inertia for updating their marketing skills and orientation due to their previous effectiveness and thus munificence fails to generate the motivation for MKCAP changes. This joint effect explains the insignificance of the main effect of environmental munificence. However, the interaction between BODIV and munificence is significant ($\beta = -0.044$, $p < 0.05$), supporting H2. The interaction is illustrated in Fig. 1. BODIV shows greater strength in increasing MKCAP in a low munificence industry than in a high munificence industry. This reinforces the logic behind the insignificant main effect of munificence. Firms show more willingness to change when they observe low growth rates and a less friendly industry. In these conditions, they are more willing to resort to the benefits offered by the diverse board team.

In support of H3, the interaction between BODIV and turbulence is found to be significant ($\beta = 0.089$, $p < 0.01$). The effect is illustrated in Fig. 2. It is interesting to observe that in a low turbulence environment, BODIV does not play a significant role in influencing MKCAP, but it becomes strongly effective in a high turbulence environment. This finding seamlessly reflects the theoretical reasoning that BODIV has advantages related to resource availability, information sources, and professional opinions, as well as to relational stocks. These advantages are highly desired in turbulent markets because the firm in that situation will need these inputs to cope with uncertainties. This view is also in line with that of Calantone, Garcia, and Dröge (2003) who suggest that in turbulent markets, seeking a diverse base of strategic inputs is recommended. In very stable market conditions, the firm's marketing function may be self-sufficient in acquiring those assets and thus is less reliant on the leadership team for the supports. The research of Jüttner, Christopher, and Baker (2007) also points to this direction.

The main effect of environment turbulence is significantly negative ($\beta = -0.139$, $p < 0.01$). This finding is important because traditional thinking tends to conclude that a challenging environment would improve a firm's marketing skills, but the empirical study shows the opposite. Theoretical evidence can be found in the literature. For example, Zhou and Li (2010) note that capability needs to be developed to cope with a turbulent environment. In other words, the turbulent environment will soon make the capability outdated. This is a sound logic that supports the empirical finding in our research. Lavie (2006) denotes that firm capability is path-dependent and rigid to certain degree. Thus, the changing environment creates challenges for the firm to build consistent skills to deploy resources and lower the marketing competency. For example, a sudden change of the customer trend will make the firm's current marketing strategies less relevant and the firm will have to start from scratch to create new capability sets to meet the environmental change. Our analysis results show that the presence of BODIV may reshape the negative impact of turbulence. The effect pattern is illustrated in Fig. 4. When BODIV is low, environmental turbulence exerts a strong negative impact on MKCAP. However, when BODIV is high, turbulence's negative effect becomes minimal. When BOIDV is even higher, turbulence will actually increase MKCAP. This further demonstrates the necessity of having a sufficiently diverse board composition because the resources and experience they bring into the firm will significantly benefit the firm in coping with turbulent markets.

H4 posits that BODIV will perform differently for different competition intensity levels. This hypothesis is supported ($\beta = 0.079$, $p < 0.01$). In a highly competitive market, BODIV is found to strongly increase MKCAP (Fig. 3). This is in line with the theoretical framework in which BODIV is in fact one source of competitive advantages. Our results indicate that this advantage of BODIV is achieved via the enhanced MKCAP. In highly competitive situations, board members with diverse backgrounds attract important assets, such as network stocks, that enable the firm to perform well in challenging circumstances.

The negative main effect of competition intensity also deserves discussion. The similar relationship can be found in recent studies (e.g., Feng et al., 2015). In general, competitors will disturb the firm's marketing resources and will also likely redirect customer trends and invalidate the firm's current MKCAP. This explains the negative impact. However, adding BODIV changes the pattern (Fig. 5). When BODIV is low, increasing competition will strongly reduce MKCAP. However, when BODIV is high, competition's effect becomes marginal; when BODIV is extremely higher, competition no longer exerts undesirable effects on MKCAP. This pattern, similar to turbulence's effect, illustrates that BODIV is a mechanism that protects the firm from unfavorable environmental conditions and guards its marketing competency. For example, although turbulence and competition may drastically challenge the firm's current capability, with the support of a diverse board, these conditions may be valuable knowledge pools for the firm to use to streamline marketing assets.

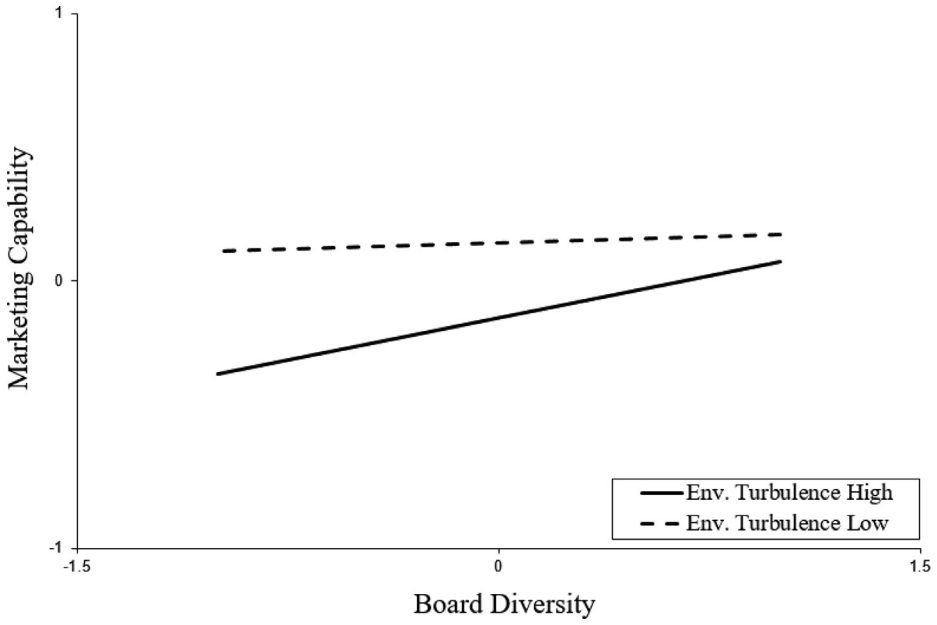

Fig. 2. The Moderating Effect of Environmental Turbulence on BODIV and MKCAP.

5.1. Robustness checks. To ensure the robustness of our empirical results, we also conduct a series of additional studies. As mentioned in the methods section, we adopt both the Newey-West and White-Cluster robust regressions to run the data, and the results are consistent. We also try the Feasible GLS analysis on panel data, and the results are consistent again (Table 3). Further, when measuring MKCAP, we use a normal-half normal assumption in the SFM formulation. We also use normal-exponential and normal-truncated assumptions to obtain the MKCAP scores, and the hypothesized relationships all hold. In the main model, we use the coefficient of variation as the measure of firm turbulence, and we also use Sridhar et al.'s (2014) approach to obtain the alternative turbulence measure, and we find no changes in the relationships. To ensure the theoretical soundness of the assertion that BODIV positively affects firm capability, we also formulate a model that examines BODIV's impact on innovation capability as reflected by the R &D efficiency (Knott, 2008). We collect innovation capability data from the Research Quotient. The results are presented in Table 4. BODIV is found to significantly increase the capability of the technology sector of the firm, and this result reinforces the main theoretical reasoning of the paper and thus ensures the robustness of our findings by cross-validating the link of board composition and capabilities.

6. Implications for theory

The findings of this study firstly yield special implications for B2B firms. Traditional view of marketing capability-building in business markets are mainly limited to partners' business transactions such as supply chain coordination, service options, and business relationships through functional departments' reciprocal activities. However, researchers are increasingly realizing that B2B firms are more likely to engage in organizational interactions in addition to business transactions, and thus the organizational changes may be a significant force to

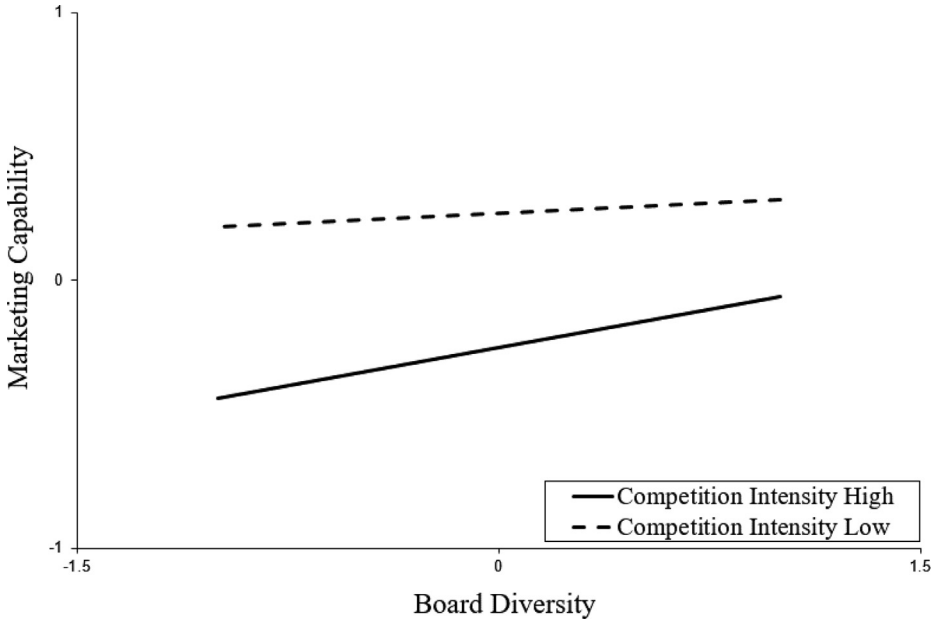

Fig. 3. The Moderating Effect of Competition Intensity on BODIV and MKCAP.

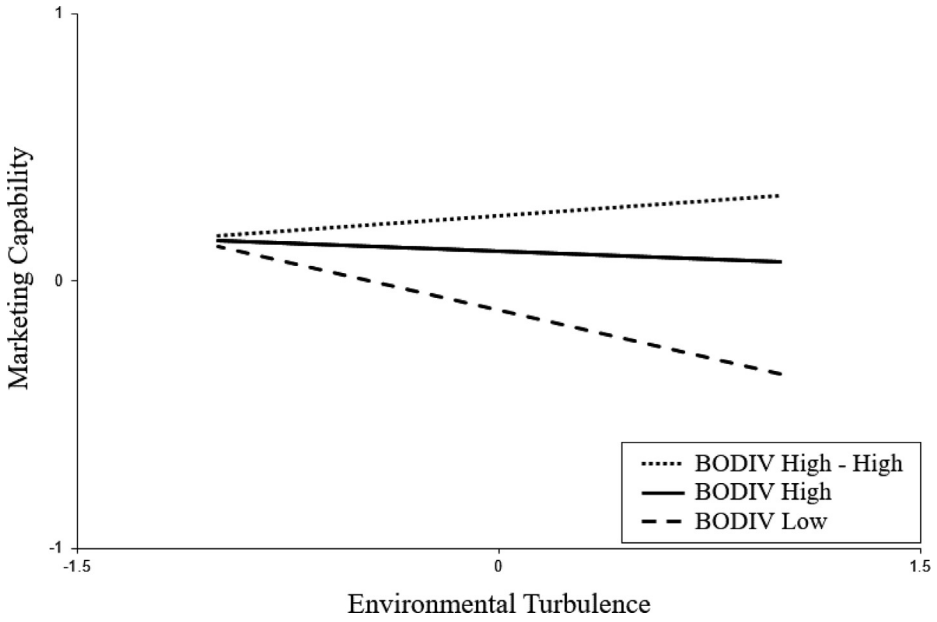

Fig. 4. The Moderating Effect of BODIV on Environmental Turbulence and MKCAP * The BODIV High – High is a further median split within the high BODIV firms.

shape the firm's marketing-side strategies as well as the capabilities of realizing these strategies. Our studies, from the unique angle of boardroom diversity, confirms and further advances this rationale by supporting the importance of incorporating firm governance traits into understanding the firms' market-side competency.

This study further generates implications for board diversity theories. The extant knowledge about BODIV is limited to its association with an array of financial and social outcomes. This view largely neglects the inherent mechanism regarding the way BODIV finally realizes the firm's outcomes. If the board fails to change the functional effectiveness of a firm, the financial performance is not feasible. The incorporation of MKCAP as a direct outcome of BODIV bridges the theoretical gaps and legitimates the role of the board by explicitly directing its power into a new area. This extension of the role of BODIV thus can lead to at least two important contributions to corporate governance theories. First, the new focus on MKCAP as the outcome of BODIV draws a clear blueprint showing how top governance teams shape firm specific strategic units and thus allows researchers in this area to more clearly understand the influence paths of the board. Second, linking the board and marketing is of particular interest because this link vertically crosses the hierarchies of the firm management structure regarding building firm competency and illustrates the fundamental goals of firm management.

The inclusion of environmental factors further enhances the model toward a deeper understanding of a theoretical model with leadership characteristics, inherent effectiveness, and external conditions. This view more realistically accounts for the actual situation of each firm that simultaneously has internal coordination and external influences and thus better illustrates the interactions between these key factors. When building a theoretical model involving board characteristics, researchers should pay extra attention to this trait. In addition, marketing is a functional area that also has a strong connection to both the

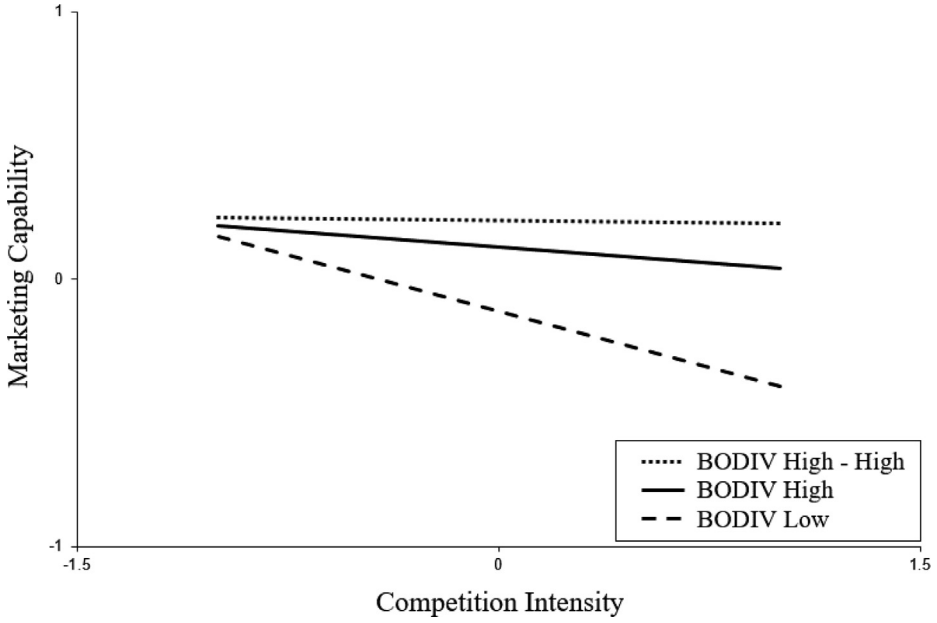

Fig. 5. The Moderating Effect of BODIV on Competition Intensity and MKCAP * The BODIV High – High is a further median split within the high BODIV firms.

Table 4
Robustness Analysis Results Using Innovation Capability as the Dependent Variable.

	Model (Newey-West Robust Estimation)		Model (White-Cluster Robust Estimation)		Model (Feasible GLS Estimation)	
	Coeff.(t)	Sig.	Coeff.(t)	Sig.	Coeff.(z)	Sig.
Board Diversity	0.115	*	0.115	*	0.115	**
	(1.82)		(1.72)		(2.13)	
Env. Munificence	0.032		0.032		0.032	
	(1.24)		(1.15)		(1.12)	
Env. Turbulence	−0.053	**	−0.053	*	−0.053	*
	(−2.20)		(−1.75)		(−1.88)	
Competition Intensity	−0.062	*	−0.062		−0.062	**
	(−1.87)		(−1.18)		(−2.45)	
Board Size	0.069	**	0.069		0.069	***
	(2.32)		(1.58)		(2.76)	
Market Breadth	−0.044		−0.044		−0.044	*
	(−1.55)		(−1.05)		(−1.68)	
R&D Levels	−0.110		−0.110		−0.110	**
	(−1.52)		(−1.19)		(−2.27)	
Firm Age	−0.050	*	−0.050		−0.050	*
	(−1.77)		(−1.21)		(−1.89)	
SG&A	−0.225	***	−0.225	**	−0.225	***
	(−3.14)		(−2.42)		(−4.34)	
Resource Level	0.151	***	0.151	***	0.151	***
	(4.35)		(3.44)		(6.76)	
Asset Growth	−0.018		−0.018		−0.018	
	(−0.64)		(−0.59)		(−0.81)	
Firm Leverage	0.037		0.037		0.037	
	(0.93)		(0.70)		(1.50)	
Performance Uncertainty	−0.011		−0.011		−0.011	
	(−0.39)		(−0.29)		(−0.47)	
Time and Industry Dummies	Included		Included		Included	
Adj. R^2	0.308		0.308		0.308	

*p < .10, **p < .05, ***p < .01; Variance Inflation Factors are all lower than 10.

internal and external environments of the firm. This commonality of the traits between the board and marketing makes the consideration of environmental factors a necessity and a meaningful advancement. A more interesting fact is that the frontier roles of the board and marketing occur at different level of the firm, making the link between these two constructs particularly meaningful under the influence of the external environment.

For the firm capability theories, our study provides three theoretical implications. First, the extant understanding about capability-building is primary limited at the strategic levels. Although theorists have emphasized the importance of top management teams' support for capability-building, no empirical work has shown the concrete evidence of this. Our study extends this notion and paves the roads for future researchers to consider board characteristics as a driver for firm-specific capability types. The positive relationships between BODIV and MKCAP/innovation capability in our empirical work clearly demonstrate this direction. Second, our research finds evidence that highly turbulent and highly competitive environments will likely undermine firm MKCAP levels. However, with the presence of high BODIV, the negative influences of environment can be neutralized. This finding creates a new knowledge set about how the well-designed firm governance teams may guard firm strengths, and thus this finding not only validates the hidden assumption embedded in the firm capability theories but also further extends the understanding into an environment-based coping mechanism that includes board composition. Third, compared to the vast studies in firm capabilities that focus on the outcome metrics of firm capabilities, academic endeavors invested on finding the determinants are surprisingly scant. Our research serves this goal and assists researchers in this field to investigate building strong capabilities.

More importantly, our measure of MCAP incorporates both the firm inputs and firm performance indicators including market share and profitability (the input–output approach). Therefore, our finding of the positive relationship between BODIV and MCAP signifies the far-reaching force of board characteristics in achieving firm market performance via the enhanced firm functional strengths because MCAP in this measure gauges how well a firm may utilize its assets to realize performance. From another angle, the finding of BODIV's effect on MCAP, combined with the well-documented evidence of MCAP's beneficial effects on firm financial performance such as firm value, stock return, and financial risks (e.g., Angulo-Ruiz et al., 2014; Mishra & Modi, 2016), contributes to decoding the working mechanism underlying the traditional view of the BODIV-firm performance link by emphasizing the pivotal role of MCAP in this framework. In this regard, our research provides essential supports to the complete understanding of the board's influences on firm outcomes.

Our study also sheds lights on the upper echelon theory, which has a long history of calling for more studies on the link between firm top leadership team and firm strategic units. Traditional focus of upper echelon theory is largely limited to the management related fields such as human resources, operations, and products/production and no existing evidence demonstrates how firm governance team's traits may affect marketing capability. In this sense, our research extends the horizon of the influence of upper echelon characteristics into a critical strategic area. Marketing researchers, on the other side, may find this study useful because it urges them to more actively explore the firm's inner factors that have potentials to affect marketing capability-building beyond the traditional thinking that marketing capability is primarily from outside interactions with customers.

7. Implications for practice

For firm managers, our research also provides a set of useful practical guidelines. For example, marketing managers are often confused about how to build strong capability tailored to better customer satisfaction because a large number of factors may be involved. In addition, the environmental factors play strong roles in affecting a firm's marketing functions. In this case, placing more weight on the board's guidelines may be more meaningful. As an example, the board, especially a board with diverse backgrounds, may bring in valuable insights about the markets and enables marketing managers to more accurately capture the trends of the industry. In addition, the board represents the shareholders and a diverse board may have less bias in their representation and decision making, leading to their better guiding the functionality in the firm's strategic units. Therefore, marketing managers may develop marketing routines and skill sets more aligned with shareholder value and thus maximize the coherence with the firm's core value and avoid conflicts and resource misuse. In addition, the diversity of the board may be utilized by managers to motivate employees, such as salespeople, by emphasizing the improved social image and employee relationships, leading to better marketing competency.

In B2B marketing domains, interactions with customers are largely built upon organizational exchanges, which require firms to establish operational connections at different levels of the management. In this setting, building marketing capability will go beyond merely understanding customer needs through the marketing function. Rather, the whole firm should function as a unified system towards the optimized customer relationship via the implementation of corporate-supported marketing campaigns. In this process, the boardroom's diverse characteristics play interesting roles, as confirmed in our empirical results. Industrial marketing teams, therefore, should fully leverage the advantages of having a diverse board group that are superior in resource heterogeneity, relationship network, and guidance effectiveness. In this sense, B2B firm owners should purposefully emphasize the formation of

the boardroom with diversity to facilitate the firm's aim along the market-oriented development path.

The varying external environments provides additional opportunities and/or threats for managers in the capability-building process. As our findings indicate, when the environment is low in munificence, high in turbulence, or high in competition, having a diverse board will be particularly important for improving firm marketing capability. These findings are important because in practice managers may not sufficiently consider such a comprehensive pack of factors. For one thing, board and functional units such as marketing have an obvious vertical distance in the firm's managerial hierarchy. For another, the board/marketing are firms' internal entities, but munificence, turbulence, and competition are outside conditions and there exists a horizontal distance among these factors. Our research purposefully bridges these vertical and horizontal separations and provides explicit evidence in which board diversity will help firms' build stronger marketing capability, especially in unfriendly environmental conditions. Firms in those conditions should pay extra attention to utilize the benefits of a diverse board group.

For firms with low board diversity, our research provides useful evidence for possible strategy renovation. As shown in the empirical work, the low diversity firms are particularly sensitive to the adverse environment influences such as high market turbulence and competition. For these firms, capability-building seems to be a challenging task and they are less likely to efficiently cope with these negative environmental conditions. Thus low diversity firms are highly suggested to absorb the findings in our research and reconsider their governance characteristics to ensure the diversity, which will turn out to be one significant factor of helping the firms deal with the environmental negativities and creating better marketing-side competitive competencies.

8. Limitations and future research directions

Although the main stream management theories support the role of board on firm functional strengths, there is a possibility of reverse causality in which firm functional departments may exert influences on firm's governance formation. In our empirical study, we mainly focus on the path of board diversity → marketing capability and we use lagged dependent variable to control for reverse causality. Future research may further explore this new direction using a different set of techniques such as Vector Autoregressive Models to map out the two-way impacts.

The current study adopts a cross-sectional approach of viewing the board characteristics and MKCAP. However, researchers may further consider the longitudinal pattern that may depict how board structure may affect MKCAP along the time line. This advancement is rewarding because theoretically firm governance and leadership should yield long-lasting influences on firm strategic units regarding their strengths. Thus the longitudinal exploration of this relationship should significant complement the finding of our current study.

In recent year, researchers in capabilities are further exploring different capability types. For example, Mu et al. (2018) provide an excellent example of using survey methods to obtain the measure of outside-in marketing capability. This is a valuable advancement in this research stream because it allows future researchers to understand the inherent ramifications of a general capability type. In this sense, future studies can be implemented to use perceptual data to examine how board diversity may affect these more specialized capability types and this way should greatly advance the knowledge about the links between firm governance and strategic units.

The current research is mainly emphasized on the role of board diversity as the driver for marketing capability. This way is designed to show the direct influence of firm governance and to formulate the contingency effects of the external environment. Beyond this research scope, future researchers may consider the moderating effect of board profile on the relationship between marketing capability and firm financial performance. This effort may reveal the joint contribution of the board and marketing-side competency on firm outcomes, and thus create a new research avenue along this direction.

The RiskMetrics Directors database doesn't have specific data items involving every board member's experience in functional sections of the firm such as operation, marketing, and so on. This information, however, may be highly important and valuable for further checking how the functional expertise profile in the boardroom may exert influences on the firm's competitive advantages. To complement this data deficiency, future researchers may implement new data collection approaches such as longitudinal panel survey and track the firms' boardroom characteristics of functional expertise. This research direction is likely to depict more detailed influences of the boardroom.

9. Concluding remarks

The missing link between firm governance characteristics and firm marketing sector's strengths calls for imperative research attention because bridging this gap allows academic researchers to constitute a complete picture showing the fundamental mechanism with which firms achieve better functional capabilities. Our research realizes such a goal and demonstrates how board diversity, one of the most important firm top leadership traits, significantly drives firm marketing capability. This relationship is further modelled with three key environmental conditions, munificence, turbulence, and competition. The interactions greatly enrich the theocratical contributions and the practical meaningfulness of the research framework. The results that show the role of board diversity become stronger in challenging environments render a further strong support for the essential function of the board and the benefits of its diversity. Management/marketing theorists as well as firm managers can gain valuable insights and implications from these findings regarding firm leadership configuration and capability improvement in an environment-embedded framework.

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