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Examining the Mediating Nature of Strategic Change in High Tech Firms

Cite:

Triana, M., Richard, O., Su, W. (in press) Gender diversity in senior management, strategic change, and firm performance: Examining the mediating nature of strategic change in high tech industries. *Research Policy*. <https://doi.org/10.1016/j.respol.2019.03.013>

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**Gender Diversity in Senior Management, Strategic Change, and Firm Performance:
Examining the Mediating Nature of Strategic Change in High Tech Firms**

Abstract

Only recently have enough women joined senior leadership positions in high tech firms for research on senior management gender diversity in high tech industries to be possible. We propose that senior management gender diversity fosters strategic change in high tech firms, especially under conditions where alliance formation intensity and top management team (TMT) educational background diversity are high, because the breadth of opportunity and knowledge associated with these conditions facilitates implementation of new ideas. Results show that both inter-organizational strategic alliance formation intensity and TMT educational background diversity positively moderate the relationship between senior management gender diversity and strategic change. We also find support for a moderated mediation model whereby a gender-diverse senior management positively impacts strategic change, which ultimately improves firm performance when the firm exhibits high alliance formation intensity and has a TMT that is diverse across educational background.

Keywords: senior management gender diversity, upper echelons theory, strategic change, high tech, computer industries, organizational learning

1. Introduction

Only in the last few decades have companies made progress in cracking the glass ceiling—an invisible barrier that prevents women from rising to executive management (Maume, 2004). Moreover, only recently have there been enough women in top leadership positions to study senior management gender diversity. According to Catalyst (2018), women comprise 44.7% of employees in the Standard & Poor's 500 and 36.9% of first- and mid-level managers, but shrink to 26.5% of senior-level managers, 21.2% of board directors, and only 5.2% of chief executive officers (CEOs). Although women have made some gains in leadership roles over the past few decades (Echeverri-Carroll, Oden, Gibson, & Johnston, 2018), they are often underrepresented in leadership generally and within the high tech industry specifically (Catalyst, 2018). These statistics allude to persistent barriers that women face in the United States (U.S.). For example, the World Economic Forum publishes a yearly Global Gender Gap Report ranking 144 countries in the world in order (with 1 being the best) of how equally women are treated compared to men with respect to economic participation and opportunity, educational attainment, health and survival, and political empowerment. The U.S. ranked 45 worldwide in gender equality for 2016 but dropped to 49 in 2017 and 51 in 2018 signaling that gender issues are a major issue impacting society (World Economic Forum, 2016, 2017, 2018) and are worthy of investigation.

Because organizations have not had a critical mass of women in top management teams (TMTs) (Andrevski, Richard, Shaw, and Ferrier, 2014; Hoobler, Lemmon, and Wayne, 2009; Hoobler, Masterson, Nkomo, and Michel, 2018), research related to the effects of gender diversity have mostly been limited to investigations of the overall management corps (Dwyer, Richard, and Chadwick, 2003; Richard, Barnett, Dwyer, and Chadwick, 2004; Richard, Kirby, and Chadwick, 2013), with a few instances focusing on the top management team (TMT) (e.g.,

Ruiz-Jimenez and Fuentes-Fuentes, 2016). Previous research has limited implications as it leaves out the reporting level one step removed from the chief executive officer (CEO) which also contributes to strategic decision-making. Based on upper echelons theory (Hambrick and Mason, 1984), but expanding beyond the top five highest paid executives where women have not achieved notable representation (Gilgoff, 2009; Toegel, 2011), this study focuses on senior management gender diversity (of individuals within two reporting levels of the CEO) where strategy formulation broadly occurs (Alexiev, Jansen, Van den Bosch, and Volberda, 2010).

Previous research has investigated the upper echelons by focusing on the CEO, the TMT, or other senior managers to examine their roles in devising strategy (Bromiley and Rau, 2016). We feel that taking a subset approach to investigate only parts of senior management lacks face validity, as all of these high-level executives direct strategy together. In fact, previous research has called for the inclusion of all key players in the strategy formulation process when attempting to study strategic decision-making (Heyden, Reimer, and Van Doorn, 2017; Ling, Simsek, Lubatkin, and Veiga, 2008; Rutherford, 2016). For instance, firms offer managerial discretion to divisional directors who engage in strategic decision-making together with the CEO and TMT. The present study makes a contribution to the upper echelons literature by testing strategic change in the context of gender diversity in a comprehensive senior management group.

We answer a question that has implications for academics and managers: What is the strategic change and financial impact of gender diversity in the upper echelons? We exclude middle- and lower-level managers from our examination, as they are historically part of strategy implementation rather than formulation (Burgelman, 1983) and strategic change emanates from senior level decision-making (Finkelstein and Hambrick, 1990). Following prior research, strategic change is defined as the extent to which a firm changes its resource allocations in key

strategic dimensions to maintain a competitive advantage (Hofer and Schendel, 1978; Miller, 1991; Oehmichen, Schrapp, and Wolff, 2017; Van de Ven and Poole, 2005; Zhang, 2006).

According to upper echelons theory, the characteristics of senior management predict organizational outcomes such as firm innovation and overall organizational effectiveness (Bantel and Jackson, 1989; Hambrick, Cho, and Chen, 1996; Hambrick and Mason, 1984; Ruiz-Jimenez and Fuentes-Fuentes, 2016). Although the role of gender is not explicitly ignored in upper echelons theory, most papers using this theory focus on top management teams without making distinctions between genders and thus ignore gender dynamics within TMTs and the associated implications for strategic change. Indeed, we see this as a missing point of inquiry within the upper echelons literature. Furthermore, because some scholars argue that not all types of group characteristics should be treated the same way and that surface-level diversity, such as gender, may have disadvantageous effects on organizational outcomes (Pelled, 1996; Pelled, Eisenhardt, and Xin, 1999), we believe it is important to develop a framework around gender. Surface-level diversity, such as gender, can trigger both detrimental group outcomes such as conflict (Jehn, Northcraft, and Neale, 1999) and lower cohesion (Webber and Donahue, 2001) as well as beneficial outcomes such as creativity, improved problem-solving, and superior decision-making (Milliken and Martins, 1996; van Knippenberg and Schippers, 2007; Williams and O'Reilly, 1998). Given the mixed findings about the effects of gender diversity on organizational outcomes in the general literature (Joshi and Roh, 2009; van Knippenberg et al., 2004), this study examines these phenomena in the upper echelons of management, where knowledge sharing and dissemination are critical (Hambrick, 2007). Since gender diversity in upper management still represents a rare knowledge-based resource (Jeong and Harrison, 2017; Richard et al., 2013), we assess contexts where senior management gender diversity increases or reduces strategic change.

For example, the present study examines whether inter-organizational strategic alliance formation positively moderates the impact that senior management gender diversity has on strategic change in high tech industries. Strategic alliances have been suggested as a platform for organizational learning where firms explore or exploit knowledge from an alliance partner (Inkpen and Tsang, 2007; Lavie and Rosenkopf, 2006; Rothaermel and Deeds, 2004). Because demographics (e.g., gender diversity) can be related to harmful processes such as conflict and to performance decreases rather than gains (Nishii, 2013; Richard et al., 2013), a firm with an external learning orientation could be receptive to a senior management corps possessing gender-based knowledge. Thus, it is critical to understand how strategic alliance formation intensity moderates the relationship between senior management gender diversity and strategic change.

Furthermore, we propose that TMT knowledge could play an important role in utilizing the perspectives embedded within a gender-diverse senior management. This logic is consistent with the business case for diversity presented by Thomas and Ely (1996) and Lozano and Escrich (2017), which describes that diversity should help business performance by enhancing knowledge, flexibility, creativity, and decision-making. Specifically, we examine whether TMT educational background diversity positively moderates the senior management gender diversity to strategic change relationship. The present study focuses on educational background because one's training represents knowledge brought to group decision-making. If a TMT is diverse in its educational background, it is more likely to consider, understand, and utilize a broad range of ideas generated by senior management, including ideas from women that might otherwise be underutilized (e.g., Kanter, 1977; Ridgeway, 2011; Zelechowski and Bilomoria, 2003). In accounting for both moderators (i.e., alliance formation intensity and TMT educational background diversity), this study makes strides in opening the black box to test intervening

variables (Lawrence, 1997) that link characteristics of the upper echelons to firm outcomes (Hambrick, 2007). We examine under what conditions gender diversity in senior management impacts firm performance by either bolstering or impeding strategic change (Blanco-Oliver, Veronesi, and Kirkpatrick, 2018), a question that should be fully understood as corporations observe more gender diversity in senior management (Hoobler et al., 2018; Rutherford, 2016).

The present study makes several contributions. First, this study examines senior management gender diversity which is not fully understood (Ruiz-Jimenez and Fuentes-Fuentes, 2016). Second, this study tests strategic change as a mediating mechanism (Blanco-Oliver et al., 2018) while simultaneously testing both alliance formation intensity and TMT educational background diversity as moderators. Third, empirically we go beyond cross-sectional research that has been common in the upper echelons and work group diversity literatures by using a longitudinal design to better assess causality. While recent studies employ panel data in longitudinal designs, they continue to only examine main effects and moderators (e.g., Heyden et al., 2017; Opstrup and Villadsen, 2014). Also, designs that introduce mediation still rely on cross-sectional analyses (e.g., Blanco-Oliver et al., 2018). The present study offers a longitudinal research design with a lag between the independent variable (time 1) and mediator (time 2) and dependent variable (time 3).

Theoretically, this study is important, because the business case for diversity has been questioned due to mixed findings (Kochan et al., 2003) while the ethical case for diversity has been championed (Pless and Maak, 2004; Reimer, Van Doorn, and Heyden, 2018; Rabl, Triana, Byun, and Bosch, 2018). This study also sheds light on when the characteristics of a diverse senior management team lead to firm performance. This has implications for organizations by demonstrating that providing equal opportunity for men and women to advance (Pless and Maak,

2004) and enhancing business results can be one in the same. Like Ruiz-Jimenez and Fuentes-Fuentes (2016), we test our hypotheses in the technology industries to understand the financial impact that companies can realize when they crack their gender-based glass ceiling.

2. Theory and Hypotheses

Senior Management Gender Diversity and Its Effect on Strategic Change

This research differs from scholarship that focuses solely on the TMT since we include all individuals within two reporting levels of the CEO who interact directly with the CEO to help shape strategy. Some studies on TMTs in U.S. public firms define the TMT as the top five highest paid executives because the Securities and Exchange Commission requires firms to report information on these executives and those data are readily available (e.g., Carpenter and Sanders, 2002; Dezsö and Ross, 2012). However, other studies have defined the TMT broadly to include executives holding senior offices such as senior vice presidents (Carpenter, Geletkanycz, and Sanders, 2004). These high-level managers interact not only with the CEO but also with others among the top five highest paid executives and definitively influence the formulation of strategy. Thus, we follow the latter definition.

Scholars have theorized that diversity should benefit organizations if it facilitates a broad range of perspectives from which teams can make better choices (e.g., Cox and Blake, 1991; Heavey and Simsek, 2017; Lozano and Escrich, 2017; Richard et al., 2007; Thomas and Ely, 1996). One such decision-making process that senior management teams engage in is strategic change. Strategic change is a problem-solving process (Hofer and Schendel, 1978; Oehmichen et al., 2017), and we expect that a diverse senior management group will exhibit dynamics like those of other diverse groups when implementing strategic change (Kozlowski and Bell, 2003; Nakauchi and Wiersema 2015). We acknowledge that the senior management cadre of an

organization is larger in size compared to TMTs, boards of directors, or other types of lower-level teams. Therefore, we draw from literature examining diversity on TMTs (Lyngsie and Foss, 2017), boards of directors (Triana, Miller, and Trzebiatowski, 2014), other teams/groups (Jehn et al., 1999; Nishii, 2013; Van Knippenberg et al., 2004), and organizational diversity (Richard, Murthi, and Ismail, 2007) to develop a complete picture of the dynamics that can emerge from senior management diversity. Senior management would be considered a specialized type of group because its members are interdependent and they share common goals (Forbes and Milliken, 1999; Kozlowski and Bell, 2003).

Research on diverse groups describes the double-edged nature of diversity, meaning that sometimes it is helpful and other times it is not (Mannix and Neale, 2005; Milliken and Martins, 1996; Nishii, 2013). For instance, diverse groups can generate a broad set of ideas and information since they represent a diverse body of perspectives and knowledge (Amason and Sapienza, 1997; Heavey and Simsek, 2017; Milliken and Vollrath, 1991; Robinson and Dechant, 1997; Schweiger, Sandberg, and Ragan, 1996). However, diversity can also impede group decision-making (Miller, Burke, and Glick, 1998; Tanikawa, Kim, and Jung, 2017) because it may generate relationship conflict (Jehn, Chadwick, and Thatcher, 1997; Joshi, Liao, and Roh, 2011; Mintzberg, 1983) and cause difficulty in decision-making (Goodstein, Gautam, and Boeker, 1994; Joshi and Roh, 2009).

Research on the upper echelons suggests that senior management diversity may hinder strategic change. Miller et al. (1998) reported that executives' cognitive diversity inhibited long-term planning rather than promoting it. Because diversity resulted in divergent opinions, executives were more prone to disagree and have difficulty reaching decisions, which reduced their ability to catalyze change (Miller et al., 1998). This is in accord with reviews of the group

diversity literature which demonstrate that surface-level diversity, such as gender diversity, can reduce group cohesion and cooperation, increase conflict, and ultimately result in slower decision-making and a more difficult process (Joshi and Roh, 2009; Van Knippenberg et al., 2004; Webber and Donahue, 2001; Williams and O'Reilly, 1998). We posit that similar dynamics can operate within a gender-diverse senior management.

However, research over five decades has also shown that diverse groups can generate more creative solutions compared to homogenous groups (Jackson, 1992; Joshi, Liao, and Roh, 2011; Triandis, Hall, and Ewen, 1965). Yet, this diversity of information comes at a cost because the decision-making process will take longer when more perspectives are represented. This might explain why some research finds that it takes diverse teams more time than homogeneous teams before they match and ultimately surpass the performance levels of homogenous teams (Watson, Kumar, and Michaelsen, 1993). The volume of information and number of perspectives considered by a gender-diverse senior management may slow the group's ability to reach decisions, which could reduce the amount of strategic change such a group could initiate (Triana et al., 2014; Quintana-Garcia and Benavides-Velasco, 2016). Nevertheless, information can also enhance the quantity of viable ideas which may result in more strategic changes (Lyngsie and Foss, 2017). Current scholarship ultimately suggests that absent a moderating mechanism that transforms diversity into a source of information and decision-making advantage (Bromiley and Rau, 2016; Lyngsie and Foss, 2017; Richard et al., 2013; Zhang, Wang, Zhu, and Kim, 2018), there are reasons to expect that gender diversity among senior management could positively impact, negatively impact, or have no impact on strategic change (Triana et al. 2014). Next, we discuss the moderators of the relationship between senior management gender diversity and strategic change, and we formulate hypotheses.

The Moderating Role of Alliance Formation Intensity

Diversity scholars have called for research going beyond main effects and investigating contingency factors that explain when knowledge from demographic diversity is more likely to be used, including by the upper echelons (Bromiley and Rau, 2016; Hambrick et al., 1996; Joshi and Roh, 2009; Nishii, 2013; Pieterse, van Knippenberg, and van Dierendonck, 2013; Richard et al., 2007; van Knippenberg and Schippers, 2007). In line with upper echelons theory and gender diversity literature, we propose that gender diversity represents a knowledge-based resource within a firm (Dwyer et al., 2003; Goncalo, Chatman, Duguid, and Kennedy, 2015). However, there is evidence that management-level gender diversity impacts firm performance both positively and negatively depending upon the organizational context (Dezsö and Ross, 2012; Parola, Ellis, and Golden, 2015; Richard et al., 2013; Richard et al., 2004).

We offer two important contingencies, alliance formation intensity and TMT educational background diversity, as moderators of the senior management gender diversity to strategic change relationship. Strategic alliances represent a mechanism for organizational learning because alliances provide a direct interface for participating parties to observe exchanges and absorb knowledge from each other (Inkpen and Tsang, 2007; Koza and Lewin, 2000). The nature of organizational learning through alliances can be further divided into exploration and exploitation (March, 1991; Rothaermel and Deeds, 2004). Koza and Lewin (2000) explain that the intent of exploration alliances involves learning new insights and unknown technologies while the purpose of exploitation alliances is to enhance revenue by combining specific assets unique to each alliance partner. Both types of alliances result in organizational learning, thus we focus on overall alliance formation intensity.

Organizational learning is a source of competitive advantage and positively relates to

firm performance both theoretically (Blettner, He, Hu, and Bettis, 2015; Chadwick and Raver, 2015; Martinez-Costa and Jimenez-Jimenez, 2009) and empirically (Jiang and Li, 2008). For example, Martinez-Costa and Jimenez-Jimenez (2009) suggest that organizational learning increases the likelihood that firms can sense trends in the environment which will improve market share. We propose that if a firm is equipped to learn externally through alliance learning as well as internally through a gender-diverse senior management, the firm will possess superior knowledge-based advantages. Thus, this study tests the joint effects of strategic alliance intensity and gender diversity in senior management on firm performance through strategic change.

Upper echelons theory predicts that managers' demographic characteristics are associated with cognition and preferences (Hambrick and Mason, 1984). Although research has shown that diverse work groups embrace new ideas and search for new alternatives (Cox and Blake, 1991; Joshi and Roh, 2009; Nielsen and Nielsen, 2013), firms that have formed exploration and/or exploitation alliances should be well-positioned to execute strategic changes when they have a gender-diverse senior management with knowledge to convert such alliance activities into a competitive advantage. Therefore, senior management gender diversity should have a positive impact on strategic change for organizations that have initiated strategic alliances. In other words, we propose that it would be most evident for senior management diversity to positively impact levels of strategic change in firms that have formed an abundance of strategic alliances, because this external knowledge and these commitments to alliance partners provide them with the ability and motivation to initiate more strategic change consistent with their gender-diverse senior management knowledge base. Furthermore, in the presence of intense alliance learning, we propose that the gender-specific characteristics of senior managers have more opportunity to make a beneficial difference. Without strong organizational learning externally, we expect senior

management gender diversity to remain a capability that is not fully exploited, resulting in less strategic change. The following hypothesis is posited:

Hypothesis 1. The relationship between senior management gender diversity and strategic change is moderated by a firm's alliance formation intensity. The relationship between senior management gender diversity and strategic change is positive (negative) for organizations with more (less) alliance formation intensity.

Next, we discuss TMT educational background diversity as a moderating factor.

The Moderating Role of TMT Educational Background Diversity

The next prediction is that a gender-diverse senior management representing a variety of perspectives will most likely lead to strategic change when the TMT that interacts with them is diverse with respect to educational backgrounds. Education represents knowledge and the ability to understand and use information while TMT educational background reflects a broader range of skills and information sources used for strategic decision-making (Joshi et al., 2011; Williams and O'Reilly, 1998). Having a variety of educational backgrounds represented in a TMT should maximize the chances that the TMT will solicit knowledge and be able to process and assimilate information from the many different perspectives they encounter among a gender-diverse senior management group. A TMT with different educational backgrounds can enact routines that allow for the knowledge embedded in a gender-diverse senior management group to be more fully utilized because they embrace strategic thinking (Finkelstein and Hambrick, 1996).

Research shows that educational diversity in TMTs is most valuable in facilitating organizational success when the environment is complex. For example, Carpenter and Fredrickson (2001) found that TMT educational diversity predicted firm global strategic posture, particularly under conditions of environmental uncertainty. That study provided evidence that

educational diversity is most likely to facilitate strategic actions that lead to firm success when there is some amount of complexity in the environment. However, we offer an important caveat that has not been considered before. Instead of focusing on the external environment's complexity, we consider the internal environment in terms of the complexity of the human capital pool from which the TMT may draw. We propose that a gender-diverse senior management group can offer the complexity of ideas and perspectives that would be sought after by a TMT diverse in educational background. Indeed, research suggests that TMT educational background diversity affords the broad-based experiences and beliefs (Tihanyi, Ellstrand, Daily, and Dalton, 2000) that we argue are compatible with a gender-diverse senior management. Also, a gender-diverse management group may share more knowledge with an open-minded TMT that represents various educational backgrounds (Opstrup and Villadsen, 2014).

Consistent with upper echelons theory, which suggests that a manager's demographic characteristics could be utilized as proxies for their psychological patterns, preferences, and cognitions (Hambrick and Mason, 1984), a gender-diverse senior management should generate more perspectives than a gender-homogenous senior management. These perspectives then need to be considered by the TMT. A TMT with educational diversity will be more adept at filtering and assimilating information from the senior management group because such a TMT knows more and is in a better position to try new ideas (Li and Lo, 2017; Wiersema and Bantel, 1992).

Therefore, when TMT educational background diversity is high, we predict the most positive relationship between senior management gender diversity and strategic change, because the TMT will have the knowledge to process and be receptive to a variety of ideas and perspectives from a gender-diverse senior management. Such a dynamic can also encourage a gender-diverse senior management group to communicate more ideas to the TMT, thereby

facilitating more strategic change. This is consistent with research showing that employee feelings of social inclusion are positively and significantly associated with participation, idea contribution, and job performance (Pearce and Randel, 2004; Triana, Kirkman, and Wagstaff, 2012). When TMT educational background diversity is low, that is less likely to be the case and the TMT will be less able to absorb new information from a gender-diverse senior management because they have less knowledge and information processing capacity themselves. This could also make a gender-diverse senior management less willing to offer new information to the TMT, which facilitates fewer strategic changes. We offer the following hypothesis.

Hypothesis 2. The relationship between senior management gender diversity and strategic change is moderated by TMT educational background diversity. The relationship between senior management gender diversity and strategic change is positive (negative) for firms with TMT educational background diversity (homogeneity).

Strategic Change as a Mediating Mechanism

Diversity is a human resource that may confer a competitive advantage (Ely, Padaric, and Thomas, 2012), yet one of the uncertainties in the upper echelons literature that remains is by what processes do diverse managers impact firm performance (Hambrick, 2007). Research has relied on cross-sectional designs and methodological issues that limit confidence in the findings (Murray, 1989), suggesting that scholarship must adopt more robust research designs (Plümper and Troeger, 2007) to account for mediating processes and explain mechanisms by which executive demography impacts firm performance. Consistent with recent research that considers mediating factors (Blanco-Oliver, Veronesi, and Kirkpatrick, 2018), we propose that strategic change is one mechanism by which the effect of senior management gender diversity is transmitted to firm performance. Strategic change involves allocating firm resources in a way

that will provide a competitive advantage in the future (Nakauchi and Wiersema, 2015). For example, a company may invest in advertising, research and development, or equipment (Triana et al., 2014) to adjust its capacity to meet the future demands of consumers. These changes may pay off in the long-term because investors may react well and see promise in the firm's strategic actions. Consumers may also respond well to changes that better meet their demands, thereby voting with their purchasing power and allowing the firm to make up the costs of strategic change in the long-run (as reflected in market-based measures such as Tobin's q). Although change does not always work, firms always make strategic changes with the intention of improving performance. The literature on the relationship between strategic change and performance reveals many studies that report a positive effect of strategic change on performance (McDougall and Oviatt, 1996; Zajac, Kraatz, and Bresser, 2000; Zhang and Rajagopalan, 2010).

Therefore, it is proposed that senior management gender diversity also affects firm performance indirectly through strategic change, but we emphasize the critical nature of our two moderators in fully understanding this mediation. As Figure 1 illustrates, we ultimately suggest a moderated mediation model. We describe our theoretical model in detail below.

Alliance formation intensity and TMT educational background diversity moderate the effect of senior management gender diversity on strategic change. Strategic change transmits the effect of senior management gender diversity to firm performance across these two moderators. More specifically, senior management gender diversity's indirect effect on firm performance, through strategic change, will vary at different levels of both alliance formation intensity and TMT educational background diversity. Given that senior management gender diversity increases strategic change when alliance formation intensity is high and TMT educational

background diversity is high, we expect an overall positive effect on subsequent firm performance. In contrast, since we expect senior management gender diversity to limit strategic change when alliance formation intensity is low and TMT educational diversity is low (i.e., homogeneous), we expect to observe a performance decline. Thus, the following comprehensive hypothesis is offered:

Hypothesis 3. The mediating role of strategic change in the relationship between senior management gender diversity and firm performance will be simultaneously moderated by alliance formation intensity and TMT educational background diversity.

3. Empirical Analysis

Sample and Data Collection

The hypotheses were tested in a sample of the U. S. computer industries with variables ranging from 2007 to 2017. The computer industries include software sectors (SIC codes 3571, 3572, 3575, and 3577) and hardware sectors (SIC codes 7371, 7372, 7373, and 7374). The computer technology industry has a history of underrepresenting women (Williams, 2014), but as female managers are emerging recently into senior management levels, it provides a natural setting to investigate how increasing senior management gender diversity affects companies. In addition, computer industries are suitable for testing the hypotheses since they include a diverse population of firms in terms of size, scope, and alliance activities (Yang, Lin, and Peng, 2011). Moreover, the computer industries provide a sample size that is large enough to assure sufficient power to detect effects (Murray, 1989). Also, because it is important to account for industry differences within the high tech sector, we include industry dummy variables (Murray, 1989).

Data on senior managers' gender were gathered from the Equal Employment Opportunity Commission (EEOC) as documented in the Equal Employment Opportunity-1 (EEO-1) Report.

Employers with 100 or more employees in private sectors are required to file an annual EEO-1 report in order to disclose information about their workplace gender composition. Since information from the EEO-1 report is disclosed at a unit/store level, we aggregated EEO-1 subunit data to the firm level and matched it with corresponding Compustat financial information. We collected gender demographics between 2007 and 2010. We started with the year 2007 because it is the first year that the EEOC split the management category into executive/senior level officials and middle level managers. The mean size of senior management groups in our sample is 134, and the median is 55. (The average number of employees for companies in our sample is 6,626; the median number of employees is 1,954). Data on alliances were collected from the Securities Data Company (SDC) Platinum database that includes information such as the partners' identities, the alliance announcement date, the deal of the alliance, and the activities in which the alliance engages. After merging data from different databases and discarding records with missing values, our sample contained 566 firm-year observations.

Measures

Dependent Variable

Firm performance. Firm performance is measured at time $t + 2$ by Tobin's q . Tobin's q is a proxy for a firm's market value that captures the intangible premium of workforce diversity (Richard et al., 2007; Wang, Choi, and Li, 2008). Tobin's q is calculated as the sum of the market value of the firm's equity, book value of long-term debt, and book value of short-term liabilities divided by total assets (Chung and Pruitt, 1994).

Independent Variables

Senior management gender diversity. Firms must report the gender of employees to the U.S. government's Equal Employment Opportunity Commission (EEOC) annually in the EEO-1

form. The EEOC defines executives/senior level officials as those:

"who plan, direct and formulate policies, set strategy and provide the overall direction of enterprises/organizations for the development and delivery of products or services, within the parameters approved by boards of directors or other governing bodies. Residing in the highest levels of organizations, these executives plan, direct or coordinate activities with the support of subordinate executives and staff managers. They include, in larger organizations, those individuals within two reporting levels of the CEO, whose responsibilities require frequent interaction with the CEO. Examples of these kinds of managers are: chief executive officers, chief operating officers, chief financial officers, line of business heads, presidents or executive vice presidents of functional areas or operating groups, chief information officers, chief human resources officers, chief marketing officers, chief legal officers, management directors and managing partners."

We used only these senior level positions as defined by the EEOC to calculate senior management gender diversity. We calculated senior management gender diversity using Blau's index of diversity (1977) at time t . Blau's index is appropriate for and commonly used to measure diversity for categorical variables (Harrison and Klein, 2007). For gender, Blau's index is based on two categories, and the theoretical range is from 0 to 0.5. For senior management gender diversity, we have a mean of 0.26 and a standard deviation of 0.14, implying that females occupy roughly one quarter of these management positions. To stay within the limits of the sample, all interpretations will be restricted to the range of the data. For details about the demographics of the sample broken down by gender and race, see the Appendix. Although women make up 44.7% of the U.S. workforce (Catalyst, 2018), they comprise 31% of the workforce in the high tech industries, and this number narrows at higher organizational levels (27% of management overall, 28% of middle managers, and 15% of top managers).

Mediator

Strategic change. Strategic change is the extent to which a firm changed its resource allocations in key strategic dimensions (Zhang, 2006). Some literature suggests utilizing changes in the product scope of a firm to measure strategic change at the corporate level (Wiersema and

Bantel, 1992), but this approach is not feasible in our study since a majority of computer companies have only one primary SIC code (Stettner and Lavie, 2014). Therefore, we followed Finkelstein and Hambrick (1990) and Zhang (2006) and chose strategic resource indicators to measure the magnitude of strategic change. The indicators are advertising intensity (advertising expenses/sales), R&D intensity (R&D expenses/sales), inventory levels (inventories/net sales), plant and equipment newness (net plant and equipment/gross plant and equipment), nonproduction overhead (selling, general, and administrative expenses/sales), and financial leverage (total debt/total assets).

We calculated the one-year lagged differences in these ratios (a one-year difference between year t and year $t+1$) consistent with previous research (Zajac et al., 2000). We adopted the absolute value of these values because the absolute value is indifferent to the direction of the change. We then created a z-score so we could aggregate these six resource indicators into a single value that captures the amount of strategic change.

Moderators

Alliance formation intensity. Firms may form alliances with different motivations and for various purposes (Koza and Lewin, 1998). Some may form alliances to develop new products; some may form alliances to enter new foreign markets. It is subjective, or arbitrary, to evaluate which types of alliances are more exploratory or exploitative compared to others. Therefore, we measure a firm's alliance formation intensity as the number of alliances the firm formed in the previous three years (sum of number of alliances at year t , $t-1$, and $t-2$).

TMT educational background diversity. TMT educational background was also divided into six categories: arts, sciences, engineering, business/economics, law, and other. We calculated TMT educational background diversity for the five highest paid executives using

Blau's index (1977). The measure was taken at time t .

Control Variables

We controlled for several firm characteristics in order to account for their effects on the dependent variables. These include *firm size*, measured as the log value of the number of employees, as well as *slack*, calculated as current assets divided by current liabilities, because larger companies with more resources may perform better. *Firm age*, computed as the years after initial public offering, was taken into account. Also, firms located in the same geographic area may generate a cluster effect that affects firm strategy. To capture such a location effect, we included a dummy coded variable (*California headquarters*) coded 1 if the corporate headquarters were in California and 0 otherwise. In addition, we included three conventional TMT background variables to control for TMT effects. A firm's top management team includes the CEO, chairman, chief operating officer, chief financial officer, and other C-level executives that firms document in their annual reports. We identified those top managers and their functional backgrounds. Following prior literature (Wiersema and Bantel, 1992), we divided *TMT functional background* into six categories: marketing/sales, production/operating, R&D/technology, finance/accounting, law, and general. We used Blau's index to calculate TMT functional background diversity. We also calculated *TMT average age* and *TMT average tenure* as control variables. Lastly, we included within-industry dummy variables to control for hardware versus software differences and year dummies to control for temporal effects. These variables were omitted from the tables for brevity. All controls were measured at time t .

Analyses

Time series cross-sectional, generalized least squares regressions (GLS) were conducted to test the hypotheses. We chose random-effects models over fixed-effects models for three

reasons. First, the result of the Hausman (1978) test suggested the preferred model was random effects ($p > 0.05$). Second, fixed-effects models reduce degrees of freedom and may generate biased estimates (Wooldridge, 2002). Third, since senior management gender changes quite slowly over short time periods, using a fixed-effects model may severely constrain our analyses (Plümper and Troeger, 2007). We employed a two-year lag on the dependent variable to avoid endogeneity derived from reverse causality.

Results

Table 1 presents descriptive statistics and correlations. No correlation value among the variables is higher than 0.60, suggesting the chance of multicollinearity is low. Moreover, we computed the variance inflation factors (VIF) which are $1/\text{Tolerance}$ to further assess multicollinearity. The econometrics textbook written by Wooldridge (2013: 94) states: “Setting a cutoff value for VIF is arbitrary and not especially helpful. Sometimes the value 10 is chosen” meaning VIF should be under 10. The values of VIFs in our main models for our explanatory variables are all below 2, except for industry dummies. The highest VIF for an industry dummy is 8.2 (which is the prepackaged software dummy, SIC = 7372). Although there is one high VIF in our industry controls, the remaining VIFs of our main explanatory variables are well below the cutoff value of 10. Multicollinearity concerns are, therefore, low.

Table 2 reports the results of GLS estimations. Hypothesis 1 predicts that alliance formation intensity positively moderates the relationship between senior management gender diversity and strategic change. Model 4 of Table 2 provides the results for the moderation effects. The Senior management gender diversity $\times$ Alliance formation intensity interaction term is significant ($b = 0.04, p < 0.001$). We plotted the interaction effect in Figure 2 to further examine the relationships visually. In Figure 2, we generally observe that there is a positive association

between senior management gender diversity and strategic change for firms with high alliance formation (i.e., alliance numbers = 6) but a negative association for firms with low alliance formation (i.e., alliance numbers = 0). Therefore, Hypothesis 1 is supported.

Hypothesis 2 predicts that TMT educational background diversity has a positive moderating effect on the relationship between senior management gender diversity and strategic change. Model 4 of Table 2 provides results for this moderation test. The Senior management gender diversity $\times$ TMT educational diversity background interaction term is significant ($b = 0.45, p < 0.01$). Figure 3 graphically shows the interaction effects. In Figure 3, we observe that in firms with a high level of TMT educational background diversity, strategic change increases as senior management gender diversity increases, but in firms with a low level of TMT educational background diversity, strategic change decreases as their senior management gender diversity increases. Hypothesis 2 is, therefore, supported.

Hypothesis 3 states that the mediating role of strategic change in the relationship between senior management gender diversity and firm performance will be moderated by both alliance formation intensity and TMT educational background diversity. In order to conduct a comprehensive test of our entire model, we ran the Hayes PROCESS Model 9 macro (Hayes, 2015) in SPSS for moderated mediation including both moderators (alliance formation intensity and TMT educational background diversity) in the model. While structural equation modeling is a popular choice for testing mediation when research papers use latent constructs (e.g., Boswell et al., 2012), we opted to use regression with the Hayes PROCESS macro because we do not have latent constructs. Thus, the Hayes PROCESS macro is appropriate for our data (Hayes, Montoya, and Rockwood, 2017; Hayes and Preacher, 2013), and this technique provides statistical output that can be easily interpreted by end users.

Table 3 reveals that strategic change mediates the senior management gender diversity to firm performance relationship (coefficient = $-.101$; standard error = $.044$; lower level of the 95% confidence interval = $-.211$ and upper level of the 95% confidence interval = $-.031$), and the relationship is significant and negative when alliance formation intensity and TMT educational background diversity are both low. This shows the market does not respond as well under these circumstances due to the lack of strategic change because firm performance declines. However, findings show that senior management gender diversity increases firm performance via an acceleration of strategic change when alliance formation intensity is high and TMT educational background diversity is high (coefficient = $.056$; standard error = $.035$; lower level of the 95% confidence interval = $.001$ and upper level of the 95% confidence interval = $.141$). In sum, Hypotheses 1 through 3 are supported.

Supplemental Analyses

We examined whether our moderated mediation results would be consistent if we distinguished between exploration alliance formation and exploitation alliance formation instead of using our combined alliance formation measure. We analyzed each alliance from the SDC database to categorize whether an alliance was exploratory based on March (1991) and counted the number of exploration alliances a firm formed in each year. Following Lin, Peng, Yang, and Sun (2009), Rothaermel (2001), and Yang et al. (2011), we coded *exploration alliance* if the purpose was to discover or to experiment with new technology such as R&D and software development. Next, we counted the number of exploitation alliances a firm formed in each year. If the purpose of the alliance was to utilize resources between alliance partners such as marketing, finance, and transportation, we coded it as an *exploitation alliance*. The pattern of results was similar across exploration, exploitation, and the combined measure of alliances.

Some may wonder whether internal knowledge could come from other experiences such as TMT functional background diversity, TMT non-computer industry experience, and TMT international work experience. Therefore, we investigated these variables as alternative sources of internal knowledge. Regarding TMT functional background diversity, results show that there is no significant moderating effect of TMT functional background diversity on the relationship between senior management gender diversity and strategic change, but the moderating effect of alliance formation intensity remains significant. The lack of moderation may suggest that executives in their functions spend most of their time operating within their own routines (Bermiss and Murmann, 2015; Fligstein, 1987; Ocasio and Kim, 1999). Because each function develops its own set of techniques and processes, functional executives tend to become rivals rather than cooperate across each function (Connelly, Tihanyi, Crook, and Gangloff, 2014).

We also collected data on TMT executives' non-computer industry experience and international experience. We hand collected this information for the 1,370 TMT executives in our sample by conducting a search of their LinkedIn profile, their Bloomberg profile, or a general Google search of information about them at their company web page or other sources. Specifically, we checked each manager's prior work experience. If the manager had work experience outside the U.S., we coded 1, otherwise we coded 0. We also examined all prior jobs the manager had and whether any of them were outside of the computer industry (coded 1 if they had experience outside of the computer industry, 0 otherwise). We then aggregated these data to the firm level and divided by the number of top management team members. In sum, we created two additional TMT background variables: TMT international experience and TMT prior non-computer industry experience. We did not find any significant effects of senior management gender diversity $\times$ TMT prior non-computer industry experience predicting strategic change.

However, we did find a significant moderating effect of senior management gender diversity $\times$ TMT international experience predicting strategic change ($b = 0.81, p < 0.05$). The interaction effect shown in Figure 4 is similar to the moderating effects of TMT educational background diversity and alliance formation intensity. The famous American writer, Mark Twain, once said that: “travel is fatal to prejudice, bigotry, and narrow-mindedness, and many of our people need it sorely on these accounts” (Twain, 1884, reprinted in 2012: 310). It appears that TMT international experience is another TMT characteristic (like TMT educational background diversity) that triggers open-mindedness and embracing of new ideas from a gender-diverse senior management, thereby leading to more strategic change.

Lastly, we conducted an additional test lagging the dependent variable more years. Specifically, we changed our firm performance measure (Tobin’s q) to $t+5$, which corresponds to the year 2017. The results were consistent with our main findings.

4. Discussion

Previous upper echelons research has often focused on the top five highest paid executives, neglecting individuals within two reporting levels of the CEO who interact with the CEO and are executive decision-makers. Our goal is to offer a comprehensive study using a broader definition of the upper echelons that not only aligns with the upper echelons perspective theoretically and practically but also possesses robust predictive validity on strategic change above and beyond previously studied top management team characteristics (e.g., TMT functional background). People within two reporting levels of the CEO are considered senior executives by the Equal Employment Opportunity Commission because they interact with the highest paid executives to shape strategy. We propose that the knowledge-sharing associated with increased senior management gender diversity can be more adequately captured when one defines the

upper echelons as the TMT (the top five highest paid executives including the CEO), together with other senior executives who are involved in executive decision-making such as (but not limited to) presidents or executive vice presidents of functional areas or operating groups, chief human resources officers, chief information officers, and chief marketing officers. Our expanded scope regarding who impacts strategic change and firm performance beyond the TMT has research implications for upper echelons theory.

Theoretical Implications

The present study expands upper echelons research. From a theoretical perspective, there is a need to integrate other research streams with upper echelons theory (Hambrick and Mason, 1984) to more fully determine the mechanisms that explain how diversity contributes to or detracts from firm performance. Hence, we sought to merge the organizational learning literature related to strategic alliance formation and learning with upper echelons theory to provide a more comprehensive framework for studying senior management gender diversity. This study joins macro-level scholarship that places gender at the focal point (Dezsö and Ross, 2012; Nishii, 2013; Triana et al., 2014). The present study utilized a large, longitudinal sample of U.S. computer technology companies as a backdrop to study gender in senior management and find support for the hypotheses. Specifically, results show that senior management gender diversity relates to firm performance through the mechanism of strategic change. Senior management gender diversity is negatively associated with strategic change. Further, both alliance formation intensity and TMT educational background diversity not only moderated the relationship between senior management gender diversity and strategic change but also moderated the mediating effect of strategic change on the senior management gender diversity to firm performance relationship.

Upper echelons theory maintains that a firm's actions are the result of its top executives

applying their own filters to environmental stimuli to interpret the environment (Hambrick and Mason, 1984). Per upper echelons theory, this process of filtering information involves the top executives using their cognitive base, values, selective perception, and interpretation to make strategic choices. Hambrick and Mason (1984: 196) focused on characteristics including “age, tenure in the organization, functional background, education, socioeconomic roots, and financial position.” In this study, we support and extend upper echelons theory by showing that senior management gender diversity, and the company’s level of strategic change influence firm performance. This more detailed look at upper echelons theory supports the original theory since the characteristics of the senior managers influence the firm’s outcomes, such as strategic change and firm performance. It also extends upper echelons theory by taking a more nuanced approach to explain how and under what conditions (i.e., alliance formation intensity, TMT educational background diversity) those senior managers’ characteristics impact firm outcomes in accordance with our theoretical model (see Figure 1).

The present investigation concentrated on gender diversity because of the ambiguity in the diversity literature regarding whether or not it hampers performance, as reviews of the literature predict (Menz, 2012; Williams and O’Reilly, 1998), or bolsters performance, as the value in diversity hypothesis predicts (Cox and Blake, 1991; Richard and Shelor, 2002). Indeed, scholars have characterized gender diversity as a double-edged sword dimension of diversity (Milliken and Martins, 1996; Pieterse et al., 2013). Our integration of the strategic alliance and upper echelons literatures to explain diversity effects may have implications for other visible dimensions of diversity, especially national culture diversity (Pieterse et al., 2013).

Our findings reiterate that gender diversity effects in the upper echelons are nuanced rather than straightforward (Triana et al., 2014). Results show that gender diversity in senior

management facilitates strategic change under conditions of high alliance formation intensity, which promotes organizational learning, and in situations where the TMT has a diversity of educational backgrounds from which to draw when making decisions. Thus, upper echelons theory can be extended to describe that gender diversity in senior management may most positively affect strategic change and firm performance when the organization is predisposed to building alliances and when the TMT has a diverse educational background which may facilitate listening to and learning from a variety of perspectives.

Managerial Implications

The present findings challenge the assumption that demographic diversity represents a problem to be managed rather than a resource to be used for competitive advantage. With the steady increase of women within senior management, gender represents a diversity attribute worthy of investigation for research and practice. Our findings are consistent with research supporting the business case for diversity which found that gender diversity among the upper echelons is associated with more innovation (Miller and Triana, 2009) and weakly but positively associated with firm performance (Jeong and Harrison, 2017; Post and Byron, 2015). The findings suggest that it may be good to have a balance of women and men in firms because gender diversity improves market-based performance by bolstering strategic change when alliance formation intensity is high and the TMT possesses educational background diversity.

We sought to investigate whether firms with varying levels of senior management gender diversity are in a better or worse position to strategically change when they have particular alliance structures and TMTs of different educational backgrounds. Findings show that senior management gender diversity was related to firm performance (Tobin's q) through strategic change and that this mediation effect was moderated by both alliance formation intensity and

TMT educational background diversity. Furthermore, senior management gender diversity appears to be related to firm performance through strategic change in a different manner when considering high versus low levels of the moderators which highlights the critical need to understand the context in which this diversity operates. Taken together, the present findings suggest that cracking the glass ceiling may not only be ethical but also good for business. Senior manager gender diversity has the most positive impact on the future amount of strategic change and firm performance in complex, information-rich environments (i.e., with alliance formation intensity; with TMT educational background heterogeneity).

In sum, results support the business case for diversity (Cox and Blake, 1991; Pless and Maak, 2004; Thomas and Ely, 1996), because they suggest that diverse individuals who represent multiple perspectives can be positively associated with organizational performance. The present findings show that gender diversity in senior management is associated with more strategic change when firms have more alliances and the TMT has educational diversity. This supports the notion that diversity makes the most difference when the environment is receptive and able to utilize the knowledge that diversity has to offer. These findings are consistent with Lozano and Escrich's (2017) ethics theory, which maintains that being tolerant of minority groups is not good enough. Instead, full respect and integration of minority groups into organizations comprised of mostly majority group members needs to be achieved in order for organizations to perform their best. While tolerance is intended to facilitate peace between different groups (like passengers who sit together on a train), if perspectives from different groups of people are not utilized for learning and well integrated into the organization, tolerance does not result in positive interactions with full respect (Lozano and Escrich, 2017). Our findings suggest that organizations may lose an important source of competitive advantage from diverse

employees who can help the organization perform better if they do not have an inclusive culture to achieve integration of the various demographic groups in their workforce.

Limitations and Future Research Directions

Future research may further investigate the practical impact of gender as well as other types of diversity within an alliance and social network context. For instance, the rationale for increasing task-based diversity has dominated the upper echelons literature while surface-level categories, such as gender, have not been considered to represent knowledge and differences in perspectives (Williams and O'Reilly, 1998). However, the basic tenets of upper echelons theory suggest that all of a manager's demographic characteristics could be utilized as proxies for their psychological patterns, preferences, and cognitions (Hambrick and Mason, 1984). Furthermore, van Knippenberg and colleagues (2004) suggest that scholars not put salient traits in a different box than deep-level traits (e.g., values, personality) and propose that future research disentangle when various diversity measures have similar or different effects on outcomes of interest.

Future research should also consider other mediating factors that may link senior management diversity to firm performance (Phelps, Heidl, and Wadhwa, 2012). For example, Andreovski et al. (2014) found that a firm's competitive actions mediated the relationship between overall management diversity (aggregate of lower level, mid-level, and top level) and financial performance. Other process variables such as information elaboration and innovation also offer promise as internal firm mechanisms (Miller and Triana, 2009; Pieterse et al., 2013).

In addition, research should consider other moderating factors. For example, one could consider aspects of relational network ties including structural holes, network tie strength, network tie diversity, and network partner diversity (Phelps et al., 2012) which could offer new insight into senior management diversity effects on performance outcomes. Hence, we call for

future scholarship to examine the moderating effects of social network properties. Additional contextual considerations might be aspects of the external environment such as board of director composition (Miller and Triana, 2009). For example, would it be more effective for the senior management demography to mirror that of the board of directors or should they complement one another by having a different demographic composition between the two entities? Women have been consistently under-represented on boards of directors for many decades (Campbell and Míngues-Vera, 2008; Chapple and Humphrey, 2014; Joecks, Pull, and Vetter, 2013; Wahid, 2018). Might achieving gender representation on boards proportional to the representation of men and women in workplaces help supplement knowledge gaps for firms where women are under-represented in senior management? Future research may investigate these questions.

Research also needs to go beyond investigating inter-organizational strategic alliances to examine intra-organizational networks. Dynamics among executives and the individual ties they have within and outside the firm can have implications for both senior management and their collaborations (Wang, Rodan, Fruin, and Xu, 2014). One limitation of our study is that we do not have demographic data from each firm with which the focal firm has formed an alliance. The degree of similarity between the demographics of senior managers at a given firm and those of the senior managers at a firm with which they create alliances may be telling if there are homophily, or similarity-attraction effects, facilitating alliance formation (Ibarra, 1992, 1993). Cummings (2004) explains that demographic diversity should be most valuable when it exposes members to unique sources of knowledge. Westphal and Milton (2000) also report that demographic minority directors on boards are most influential on a given board when they have network ties to majority members on that same board from an association where those two directors serve together on a different board. It is possible that alliances are most fruitful when

senior managers have a diverse group of acquaintances at other firms and use those connections to provide an influx of information and many alliance partners from which to choose.

We also suggest that human resource management systems, or diversity management practices, might be an important component to include in future research exploring diversity effects. For example, human resource practices such as appraisal and reward systems can be tailored to contribute to job security, promote risk-taking, and foster innovation, which would seem to be important moderators (Patel, Messersmith, and Lepak, 2013). Furthermore, human resource management systems that include participation programs and decentralized decision-making will allow more collaboration, inclusion in decision-making, and, ultimately, more elaboration of task-relevant information among executives within management (Nishii, 2013; Richard et al., 2013; van Knippenberg and Schippers, 2007). Such elements are critical in fostering a climate for inclusion which has been shown to reduce the potential negative processes associated with diversity (Nishii, 2013). In our case, a climate for inclusion could positively moderate the senior management gender diversity to strategic change relationship.

Furthermore, the present study investigates the computer technology industry, so the results best generalize to similar knowledge-intensive industries. Although this allowed us to more adequately test our hypotheses by ruling out industry differences, we sacrificed the potential to make predictions about other traditional industries (e.g., the textiles industry). Thus, future research should test whether our findings generalize to other industries. Moreover, it would be ideal to consider effects that occur not only at the corporate level but also at the subsidiary level. We focused exclusively at the corporate level of analysis because financial data are readily available, but a multi-level approach would account for diversity effects from the subsidiary level to the regional level and up to the corporate level. It could be that one

institutional level drives diversity effects more so than another, depending upon the industry.

Additionally, senior management gender diversity effects can be investigated across nations. Hambrick (2007) noted that because executives have more managerial discretion in the U.S., companies in the U.S. are more likely to observe effects in line with our predictions. However, scholars exploring senior management diversity across national cultures should consider power distance, collectivism, and other cultural dimensions when crafting their hypotheses (Rabl, Jayasinghe, Gerhart, and Kuhlmann, 2014). Then we may fully understand when upper echelons demographic effects are generalizable.

Conclusion

Although challenges remain in fully breaking the glass ceiling in the U.S. (Catalyst, 2018; Hoobler, Lemmon, and Wayne, 2011), the present study reveals that cracks in the glass ceiling pertaining to senior management gender diversity allow firms to realize a competitive advantage from their diversity through strategic change. This study goes beyond the naive approach to understanding diversity effects, which assumes diversity is always good or always bad. Instead, we offer a more sophisticated, holistic approach which examines the influence of senior management gender diversity within the context in which the firm operates (Joshi and Roh, 2009). Developing the role of inter-organizational learning and other organizational features as contexts in which the senior management diversity to firm performance relationship unfolds appears to be a fruitful path for future scholarship. Such a research path can help answer calls from academics and practitioners regarding the impact of gender diversity in the upper echelons, defined broadly and more holistically. Importantly, results support that providing equal opportunity for advancement of both men and women to senior management can also be good for business.

References

- Alexiev, A. S., Jansen J. J., Van den Bosch, F. A., & Volberda, H. W. 2010. Top management team advice seeking and exploratory innovation: The moderating role of TMT heterogeneity. *Journal of Management Studies*, 47, 1343-1364.
- Amason, A. C., & Sapienza, H. J. 1997. The effects of top management team size and interaction norms on cognitive and affective conflict. *Journal of Management*, 23, 495-516.
- Andrevski, G., Richard, O. C., Shaw, J. D., & Ferrier, W. J. 2014. Racial diversity and firm performance: The mediating role of competitive intensity. *Journal of Management*, 40, 820-844.
- Bantel, K. A., & Jackson, S. E. 1989. Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal*, 10, 107-124.
- Bermiss, Y. S., & Murmann, J. P. 2015. Who matters more? The impact of functional background and top executive mobility on firm survival. *Strategic Management Journal*, 36(11), 1697-1716.
- Blanco-Oliver, A., Veronesi, G., & Kirkpatrick, I. 2018. Board Heterogeneity and Organisational Performance: The Mediating Effects of Line Managers and Staff Satisfaction. *Journal of Business Ethics*, 152 (2). pp. 393-407. ISSN 0167-4544
- Blau, P. M. 1977. *Inequality and heterogeneity*. New York: Free Press.
- Blettner, D. P., He, Z., Hu, S., & Bettis, R. A. 2015. Adaptive aspirations and performance heterogeneity: Attention allocation among multiple reference points. *Strategic Management Journal*, 36, 987-1005.
- Boswell, W., Watkins, M., Triana, M., Zardkoohi, A., Ren, R., & Umphress, E. 2012. Second-

- class citizen? Contract workers' perceived status, dual commitment, and intent to quit. *Journal of Vocational Behavior*, 80, 454-463.
- Bromiley, P., & Rau, D. 2016. Social, behavioral, and cognitive influences on upper echelons during strategy process: A literature review. *Journal of Management*, 42(1), 174-202.
- Burgelman, R. A. 1983. Corporate entrepreneurship and strategic management: Insights from a process study. *Management Science*, 29, 1349-1364.
- Campbell, K., & Mínguez-Vera, A. 2008. Gender diversity in the boardroom and firm financial performance. *Journal of Business Ethics*, 83, 435-451.
- Carpenter, M. A., & Fredrickson, J. W. 2001. Top management teams, global strategic posture, and the moderating role of uncertainty. *Academy of Management Journal*, 44, 533-545.
- Carpenter, M. A., Geletkanycz, M. A., & Sanders, W. G. 2004 . Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. *Journal of Management*, 30, 749-778.
- Carpenter, M. A, & Sanders, W. G. 2002. Top management team compensation: The missing link between CEO pay and firm performance? *Strategic Management Journal*, 23, 367-375.
- Catalyst. 2018. Pyramid: Women in S&P 500 Companies. New York: Catalyst.
<http://www.catalyst.org/knowledge/women-sp-500-companies>
- Chadwick I, & Raver J. 2015. Motivating organizations to learn: Goal orientation and its influence on organizational learning. *Journal of Management*, 41, 957-986.
- Chapple, L., & Humphrey, J. E. 2014. Does board gender diversity have a financial impact? Evidence using stock portfolio performance. *Journal of Business Ethics*, 122, 1-15.
- Chung, K. H., Pruitt, S. W. 1994. A simple approximation of Tobin's q. *Financial Management*, 23, 70-74.

- Connelly, B. L., Tihanyi, L., Crook, T. R. & Gangloff, K. A. 2014. Tournament theory: Thirty years of contests and competitions. *Journal of Management*, 40, 16-47.
- Cox, T. H., & Blake, S. 1991. Managing cultural diversity: Implications for organizational competitiveness. *Academy of Management Executive*, 5, 45-56.
- Cummings, J. N. 2004. Work groups, structural diversity, and knowledge sharing in a global organization. *Management Science*, 50, 352-364.
- Dezső, C. L., & Ross, D. G. 2012. Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal*, 33, 1072-1089.
- Dwyer, S., Richard, O. C., & Chadwick, K. 2003. Gender diversity in management and firm performance: The influence of growth orientation and organizational culture. *Journal of Business Research*, 56, 1009-1019.
- Echeverri-Carroll, E. L., Oden, M. D., Gibson, D. V., & Johnston, E. A. 2018. Unintended consequences on gender diversity of high-tech growth and labor market polarization. *Research Policy*, 47, 209-217.
- Ely, R. J., Padaric, I., & Thomas, D. A. 2012. Racial diversity, racial asymmetries, and team learning environment: Effects on performance. *Organizational Studies*, 33, 341-362.
- Finkelstein, S., & Hambrick, D. C. 1990. Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion. *Administrative Science Quarterly*, 35, 484-503.
- Finkelstein, S., & Hambrick, D. C. 1996. *Strategic leadership: Top executives and their effects on organizations*, West Publishing Company, St. Paul, Minneapolis, MN.
- Fligstein, N. 1987. The intraorganizational power struggle: Rise of finance personnel to top leadership in large corporations, 1919-1979. *American Sociological Review*, 52, 44-58.

- Forbes, D. P., & Milliken, F. J. 1999. Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups. *Academy of Management Review*, 24, 489-505.
- Gilgoff, D. 2009. Investing in Diversity. *U.S. News & World Report*, 146(10), 72-74.
- Goncalo, J., Chatman, J., Duguid, M., & Kennedy, J. 2015. Creativity from constraint: How the PC norm influences creativity in mixed-sex work groups. *Administrative Science Quarterly*, 60, 1-30.
- Goodstein, J., Gautam, K., & Boeker, W. 1994. The effects of board size and diversity on strategic change. *Strategic Management Journal*, 15, 241-250.
- Hambrick, D.C., Cho, T.S., Chen, M.J. 1996. The influence of top management team heterogeneity on firms' competitive moves. *Administrative Science Quarterly*, 41, 659-684.
- Hambrick, D. C., & Mason, P. A. 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9, 193-206.
- Hambrick, D. C. 2007. Upper echelons theory: An update. *Academy of Management Review*, 32, 334-343.
- Harrison, D. A., & Klein, K. J. 2007. What's the difference? Diversity constructs as separation, variety, and disparity in organization. *Academy of Management Review*, 32, 1199-1228.
- Hausman, J.A. 1978. Specification tests in econometrics. *Econometrica*, 46, 1251-1271.
- Hayes, A. F. 2015. An index and test of linear moderated mediation. *Multivariate Behavioral Research*, 50, 1-22.
- Hayes, A. F., Montoya, A. K., & Rockwood, N. J. 2017. The analysis of mechanisms and their contingencies: PROCESS versus structural equation modeling. *Australasian Marketing Journal*, 25, 76-81.

- Hayes, A. F., & Preacher, K. J. 2013. Conditional process modeling: Using structural equation modeling to examine contingent causal processes. In G. R. Hancock & R. O. Mueller (Eds.) *Structural equation modeling: A second course* (2nd Ed). Greenwich, CT: Information Age Publishing.
- Heavey, C., & Simsek, Z. 2017. Distributed cognition in top management teams and organizational ambidexterity: The influence of transaction memory systems. *Journal of Management*, 43(3), 919-945.
- Heyden, M. L. M., Reimer, M., & Van Doorn, S. 2017. Innovating beyond the horizon: CEO career horizon, top management composition, and R&D intensity. *Human Resource Management*, 56(2), 205-224.
- Hofer C. W., & Schendel D. 1978. *Strategy formulation: Analytical concepts*. West, St. Paul, MN.
- Hoobler, J. M., Lemmon, G., & Wayne, S. J. 2009. Bosses' perceptions of family-work conflict and women's promotability: Glass ceiling effects. *Academy of Management Journal*, 52, 939-957.
- Hoobler, J. M., Lemmon, G., & Wayne, S. J. 2011. Women's underrepresentation in upper management: New insights on a persistent problem. *Organizational Dynamics*, 40, 151-156.
- Hoobler, J. M., Masterson, C. R., Nkomo, S. M., & Michel, E. J. 2018. The business case for women leaders: Meta-analysis, research critique, and path forward. *Journal of Management*, 44, 6, 2473-2499.
- Ibarra, H. 1992. Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly*, 37, 422-447.
- Ibarra, H. 1993. Personal networks of women and minorities in management: A conceptual

- framework. *Academy of Management Review*, 18, 56-87.
- Inkpen, A. C., & Tsang, E. W. 2007. Learning and strategic alliances. *Academy of Management Annals*, 1, 479-511.
- Jackson, S. E. 1992. Team composition in organizational settings: Issues in managing an increasingly diverse work force. In S. Worchel, W. Wood, J. A. Simpson, eds., *Group process and productivity*, 138-173. Newbury Park, CA: Sage.
- Jehn, K., C. Chadwick, & Thatcher, S. 1997. To agree or not to agree: The effects of value congruence, individual demographic dissimilarity, and conflict in workgroup outcomes. *International Journal of Conflict Management*, 8, 287-305.
- Jehn, K. A., Northcraft, G. B., & Neale, M. A. 1999. Why differences make a difference: A field study of diversity, conflict and performance in workgroups. *Administrative Science Quarterly*, 44, 741-763.
- Jeong, S. H., & Harrison, D. A. 2017. Glass breaking, strategy making, and value creating: Meta-analytic outcomes of women as CEOs and TMT members. *Academy of Management Journal*, 60, 1219-1252.
- Jiang, X., & Li, Y. 2008. The relationship between organizational learning and firm's financial performance in strategic alliances: A contingency approach. *Journal of World Business*, 43, 365-379.
- Joecks, J., Pull, K., & Vetter, K. 2013. Gender diversity in the boardroom and firm performance: What exactly constitutes a “critical mass?” *Journal of Business Ethics*, 118, 61-72.
- Joshi, A., Liao, H., Roh, H. 2011. Bridging domains in workplace demography research: a review and reconceptualization. *Journal of Management* 37(2), 521–552.
- Joshi, A., & Roh, H. 2009. The role of context in work team diversity research: A meta-analytic

- review. *Academy of Management Journal*, 52, 599-627.
- Kanter, R. M. 1977. *Men and women of the corporation*. New York: Basic Books.
- Kochan, T., Bezrukova, K., Ely, R. J., Jackson, S., Joshi, A., Jehn, K., Leonard, J., Levine, D., & Thomas, D. 2003. The effects of diversity on business performance: Report of the diversity research network. *Human Resource Management*, 42, 3-21.
- Koza, M. P., & Lewin, A. Y. 1998. The co-evolution of strategic alliances. *Organization Science*, 9, 255-264.
- Koza, M. P., & Lewin, A. Y. 2000. Managing partnerships and strategic alliances: Raising the odds of success. *European Management Journal*, 18, 146-151.
- Kozlowski, S. W. J., & Bell, B. S. 2003. Work groups and teams in organizations. In W. C. Borman, D.R. Ilgen, R. Klimoski, (Eds.) *Handbook of Industrial and Organizational Psychology*, Vol. 12, 333-375, Wiley: New York.
- Lavie, D., & Rosenkopf, L. 2006. Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49, 797-818.
- Lawrence, B. S. 1997. Perspective-the black box of organizational demography. *Organization Science*, 8, 1-22.
- Li, P., & Lo, F. 2017. Top management teams' managerial resources and international diversification: The evidence under an uncertain environment. *Management Decision*, 55(9), 1999-2017.
- Lin, Z., Peng, M., Yang, H. & Sun, S. L. 2009. How do networks and learning drive M & As? An institutional comparison between China and the United States. *Strategic Management Journal*, 30, 1113-1132.
- Ling, Y.A.N., Simsek, Z., Lubatkin, M.H., & Veiga, J.F. 2008. Transformational leadership's

- role in promoting corporate entrepreneurship: Examining CEO-TMT interface. *Academy of Management Journal*, 51, 557-576.
- Lozano, J. F., & Escrich, T. 2017. Cultural diversity in business: A critical reflection on the ideology of tolerance. *Journal of Business Ethics*, 142(4), 679-696.
- Lyngsie, J., & Foss, 2017. The more, the merrier? Women in top-management teams and entrepreneurship in established firms. *Strategic Management Journal*, 38(3), 487-505.
- March, J. G. 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2, 71-87.
- Mannix, E., & Neale, M. A. 2005. What differences make a difference. *Psychological Science in the Public Interest*, 6, 31-55.
- Martinez-Costa, M., & Jimenez-Jimenez, D. 2009. The effectiveness of TQM: the key role of organizational learning in small businesses. *International Small Business Journal*, 27, 98-125.
- Maume, D. J. 2004. Is the glass ceiling a unique form of inequality? Evidence from a random-effects model of managerial attainment. *Work and Occupations*, 31, 250-274.
- McDougall, P. P., & Oviatt, B. M. 1996. New venture internationalization, strategic change, and performance: A follow-up study. *Journal of Business Venturing*, 11(1), 23-40.
- Menz, M. 2012. Functional top management team members: A review, synthesis, and research agenda. *Journal of Management*, 38, 45-80.
- Miller, C. C., Burke, L. M., & Glick, W. H. 1998. Cognitive diversity among upper-echelon executives: Implications for strategic decision processes. *Strategic Management Journal*, 19, 39-58.
- Miller, D. 1991. Stale in the saddle: CEO tenure and the match between organization and

- environment. *Management Science*, 37, 34-52.
- Miller, T., & Triana M. 2009. Demographic diversity in the boardroom: Mediators of the board diversity–firm performance relationship. *Journal of Management Studies*, 46, 755-786.
- Milliken, F. J., & Martins, L. L. 1996. Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review*, 21, 402-433.
- Milliken, F. J., & Vollrath, D. 1991. Strategic decision-making tasks and group effectiveness: Insights from theory and research on small groups. *Human Relations*, 44, 1229-1253.
- Mintzberg, H. 1983. *Power In and Around Organizations*. Prentice-Hall, Englewood Cliffs, NJ.
- Murray, A. I. 1989. Top management group heterogeneity and firm performance. *Strategic Management Journal*, 10, 125-141.
- Nakauchi M., & Wiersema, M. F. 2015. Executive succession and strategic change in Japan. *Strategic Management Journal*, 36(2), 298-306.
- Nielsen, B., & Nielsen, S. 2013. Top management team nationality diversity and firm performance: A multilevel study. *Strategic Management Journal*, 34, 373-382.
- Nishii, L. 2013. The benefits of climate for inclusion for gender diverse groups. *Academy of Management Journal*, 56, 1754-1774.
- Ocasio, W., & Kim, H. 1999. The circulation of corporate control: Selection of functional backgrounds of new CEOs in large US manufacturing firms, 1981–1992. *Administrative Science Quarterly*, 44(3), 532-562.
- Oehmichen, J, Schrapp S, & Wolff, M. 2017. Who needs experts most? Board industry expertise and strategic change-a contingency perspective. *Strategic Management Journal* 38(3), 645-656.

- Opstrup, N., & Villadsen, A. R. 2014. The right mix? Gender diversity in top management teams and financial performance. *Public Administration Review*, 75(2), 291-301.
- Parola, H.R., Ellis, K.M., & Golden, P. 2015. Performance effects of top management team gender diversity during the merger and acquisition process. *Management Decision*, 53(1), 57-74.
- Patel, P. C., Messersmith, J., & Lepak, D. 2013. Walking the tight-rope: An assessment of the relationship between high performance work systems and organizational ambidexterity. *Academy of Management Journal*, 56, 1420–1442.
- Pearce, J. L., & Randel, A. E. 2004. Expectations of organizational mobility, workplace social inclusion, and employee job performance. *Journal of Organizational Behavior*, 25, 81-98.
- Pelled, L. H. 1996. Demographic diversity, conflict, and work group outcomes: An intervening process theory. *Organization Science*, 7, 615-631.
- Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. 1999. Exploring the black box: An analysis of work group diversity, conflict and performance. *Administrative Science Quarterly*, 44, 1-28.
- Phelps, C, Heidl, R, & Wadhwa A. 2012. Knowledge, networks, and knowledge networks a review and research agenda. *Journal of Management*, 38, 1115-1166.
- Pieterse, A. N., van Knippenberg, D., & van Dierendonck, D. 2013. Cultural diversity and team performance: The role of team member goal orientation. *Academy of Management Journal* 56, 782-804.
- Pless, N. M., & Maak, T. 2004. Building an inclusive diversity culture: Principles, processes and practice. *Journal of Business Ethics*, 54(2), 129-147.
- Plümper, T., & Troeger, V. E. 2007. Efficient estimation of time-invariant and rarely changing

- variables in finite sample panel analyses with unit fixed effects. *Political Analysis*, 15, 124-139.
- Post, C., & Byron, K. 2015. Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, 58, 546–1571.
- Quintana-Garcia, C., & Benavides-Velasco, C.A. 2016. Gender diversity in top management teams and innovation capabilities: The initial public offerings of biotechnology firms. *Long Range Planning*, 49(4), 507-518.
- Rabl, T., Jayasinghe, M., Gerhart, B., & Kuhlmann, T. M. 2014. A meta-analysis of country differences in the high-performance work system-business performance relationship: The roles of national culture and managerial discretion. *Journal of Applied Psychology*, 99(6): 1011-1041.
- Rabl, T., Triana, M., Byun, S. Y., & Bosch, L. 2018. Diversity management efforts as an ethical responsibility: How employees' perceptions of an organizational integration and learning approach to diversity affect employee behavior. *Journal of Business Ethics*.
<https://doi.org/10.1007/s10551-018-3849-7>
- Reimer, M., Van Doorn, S., & Heyden, M.L.M. 2018. Unpacking functional experience complementarities in senior leaders' influence on CSR Strategy: A CEO-Top management team approach. *Journal of Business Ethics*, 151, 977-995.
- Richard, O. C., Barnett, T., Dwyer, S., & Chadwick, K. 2004. Cultural diversity in management, firm performance, and the moderating role of entrepreneurial orientation dimensions. *Academy of Management Journal*, 47, 255-266.
- Richard, O. C., Kirby, S. L., & Chadwick, K. 2013. The impact of racial and gender diversity in management on financial performance: How participative strategy making features can

- unleash a diversity advantage. *International Journal of Human Resource Management*, 24, 2571-2582.
- Richard, O. C., Murthi, B. P. S., & Ismail, K. 2007. The impact of racial diversity on intermediate and long term performance: The moderating role of environmental context. *Strategic Management Journal*, 28, 1213-1233.
- Richard, O. C., & Shelor, R. 2002. Linking top management team age heterogeneity to firm performance: Integrating two mid-range theories. *International Journal of Human Resource Management*, 13, 958-974.
- Ridgeway, C. L. 2011. *Framed by gender: How gender inequality persists in the modern world*. New York: Oxford University Press.
- Robinson, G., & Dechant, K. 1997. Building a business case for diversity. *Academy Management Executive*, 11, 21-31.
- Rothaermel, F. T. 2001. Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22, 687-699.
- Rothaermel, F. T., & Deeds, D. L. 2004. Exploration and exploitation alliances in biotechnology: A system of new product development. *Strategic Management Journal*, 25, 201-221.
- Ruiz-Jimenez, J. M., & Fuentes-Fuentes, M. 2016. Knowledge combination capability and innovation: The effects of gender diversity on top management teams in technology-based firms. *Journal of Business Ethics*, 135, 503-515.
- Rutherford, A. 2016. The effect of top-management team heterogeneity on performance in institutions of higher education. *Public Performance & Management Review*, 16, 40(1), 119-144.
- Schweiger, D. M., Sandberg, W. R., & Ragan, J. W. 1996. Group approaches for improving

- strategic decision making: A comparative analysis of dialectical inquiry, devil's advocacy, and consensus. *Academy Management Journal*, 29, 51-72.
- Stettner, U., & Lavie, D. 2014. Ambidexterity under scrutiny: Exploration and exploitation via internal organization, alliances, and acquisitions. *Strategic Management Journal*, 35, 1903-1929.
- Tanikawa, T., Kim, S., & Jung, Y. 2017. Top management team diversity and firm performance: exploring a function of age. *Team Performance Management*, 23(3/4), 156-170.
- Tihanyi, L., Ellstrand, A. E., Daily, C. M., & Dalton, D. R. 2000. Composition of the top management team and firm international diversification. *Journal of Management*, 26(6), 1157-1177.
- Thomas, D. A., & Ely, R. J. 1996. Making differences matter: A new paradigm for managing diversity. *Harvard Business Review*, 74(5), 79-90.
- Toegel, G. 2011. Disappointing statistics, positive outlook. *Forbes*, February 18, <http://www.forbes.com/2011/02/18/women-business-management-forbes-woman-leadershipcorporate-boards.html>.
- Triandis, H. C., Hall, E. R., & Ewen, R. B. 1965. Member heterogeneity and dyadic creativity. *Human Relations*, 18, 33-55.
- Triana, M., Kirkman, B., & Wagstaff, M. F. 2012 Does the order of face-to-face and computer-mediated communication matter in diverse project teams? An investigation of communication order effects on minority inclusion and participation. *Journal of Business and Psychology*, 27, 57-70.
- Triana, M., Miller, T., & Trzebiatowski, T. 2014. The double-edged nature of board gender diversity: Diversity, firm performance, and the power of women directors as predictors of

- strategic change. *Organization Science*, 25, 609-632.
- Twain, M. 1884. Reprinted by Amazon Kindle in 2012. *The innocents abroad*.
- van de ven, A. H., & Poole, M. S. 2005. Alternative Approaches for Studying Organizational Change. *Organization Studies*, 26, 1377-1404.
- van Knippenberg, D., De Dreu, C. K., & Homan, A. C. 2004. Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, 89, 1008-1022.
- van Knippenberg D, Schippers, M. C. 2007. Work group diversity. *Annual Review of Psychology*, 58, 515-541.
- Wahid, A.S. 2018. *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-018-3785-6>
- Wang, C., Rodan, S., Fruin, M., & Xu, X. 2014. Knowledge networks, collaboration networks, and exploratory innovation. *Academy of Management Journal*, 57, 484-514.
- Wang, H., Choi, J., & Li, J. 2008. Too little or too much? Untangling the relationship between corporate philanthropy and firm financial performance. *Organization Science*, 19, 143-159.
- Watson, W. E., Kumar, K., & Michaelsen L. K. 1993. Cultural diversity's impact on interaction process and performance: Comparing homogeneous and diverse task groups. *Academy Management Journal*, 36, 590-602.
- Webber, S. S., & Donahue, L. M. 2001. Impact of highly and less job-related diversity on workgroup cohesion and performance: A meta-analysis. *Journal of Management*, 27, 141-162.
- Westphal, J. D., & Milton, L. P. 2000. How experience and network ties affect the influence of demographic minorities on corporate boards. *Administrative Science Quarterly*, 45, 366-

398.

Wiersema, M. F., & Bantel, K. A. 1992. Top management team demography and corporate strategic change. *Academy of Management Journal*, 35, 91-121.

Williams, J. C. 2014. Hacking tech's diversity problem. *Harvard Business Review*, 92(10), 94-100.

Williams, K., & O'Reilly, C. 1998. Forty years of diversity research: A review. In B. M. Staw and L. L. Cummings (Eds.), *Research in organizational behavior*, vol. 20, 77-140. Greenwich, CT: JAI Press.

Wooldridge, J. 2002. *Econometric analysis of cross-section and panel data*. MIT Press: Cambridge, MA.

Wooldridge, J. M. 2013. *Introductory Econometrics A Modern Approach*. 5th Edition, South-Western Pub, Mason.

World Economic Forum. 2016. *Global Gender Gap Report 2016*.

World Economic Forum. 2017. *Global Gender Gap Report 2017*.

World Economic Forum. 2018. *Global Gender Gap Report 2018*.

Yang, H, Lin, Z. J., & Peng, M. W. 2011. Behind acquisitions of alliance partners: Exploratory learning and network embeddedness. *Academy of Management Journal*, 54, 1069-1080.

Zajac, E. J., Kraatz, M. S., & Bresser, R. K. 2000. Modeling the dynamics of strategic fit: A normative approach to strategic change. *Strategic Management Journal*, 21, 429-453.

Zelechowski, D. D., & Bilimoria, D. 2003. The experience of women corporate inside directors on the boards of Fortune 1000 firms. *Women in Management Review*, 18, 376-381.

Zhang, Y. 2006. The presence of a separate COO/president and its impact on strategic change and CEO dismissal. *Strategic Management Journal*, 27, 283-300.

- Zhang, W., Wang, S., Zhu, Y., & Kim, K. 2018. The moderating effect of emotional intelligence on the performance of top management team. *International Journal of Business and Public Administration*, 15(1), 95-106.
- Zhang, Y, & Rajagopalan, N. 2010. Once an outsider, always an outsider? CEO origin, strategic change, and firm performance. *Strategic Management Journal*, 31, 334-346.

Table 1. Descriptive statistics

		Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1.	Firm performance (Tobin's q)	0.98	0.33	1										
2.	Strategic change	0.01	0.23	0.07	1									
3.	Firm size	1.16	1.05	-0.05	-0.10*	1								
4.	Slack	2.23	1.74	0.10*	-0.10*	-0.07	1							
5.	Firm age	12.36	7.39	-0.19*	-0.17*	0.53*	-0.06	1						
6.	California headquarters	0.32	0.47	0.06	-0.02	-0.05	-0.04	-0.06	1					
7.	TMT functional background diversity	0.61	0.10	0.10*	-0.05	-0.04	0.04	-0.05	0.08	1				
8.	TMT average age	49.48	2.81	-0.11*	0.01	0.10*	-0.06	0.10*	-0.06	-0.09*	1			
9.	TMT average tenure	10.00	4.44	0.00	-0.05	0.06	0.01	0.06	-0.09*	0.10*	0.29*	1		
10.	Senior management gender diversity	0.26	0.14	0.06	-0.07	0.03	-0.18*	0.03	0.00	-0.01	0.01	0.00	1	
11.	Alliance formation intensity	1.75	2.62	-0.05	-0.07	0.29*	-0.12*	0.17*	0.10*	0.12*	-0.05	-0.04	-0.07	1
12.	TMT educational background diversity	0.51	0.21	0.21*	-0.00	-0.17*	-0.07	-0.05	0.25*	0.33*	-0.23*	0.08*	0.03	0.15*

$N = 566$; * $p < 0.05$

California headquarters is coded as 1 if the corporate headquarters are in California and coded as 0 otherwise.

Table 2. Results of GLS models for senior management gender diversity on strategic change

	Model 1	Model 2	Model 3	Model 4
Firm size	-0.01**	-0.02***	-0.01**	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Slack	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Firm age	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
California headquarters	-0.00	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
TMT functional background diversity	-0.07*	-0.06†	-0.09**	-0.05
	(0.03)	(0.03)	(0.03)	(0.03)
TMT average age	-0.00	0.00†	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
TMT average tenure	-0.00	-0.00†	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Senior management gender diversity		-0.16***	-0.13***	-0.38***
		(0.02)	(0.02)	(0.08)
Alliance formation intensity			-0.00*	-0.01***
			(0.00)	(0.00)
TMT educational background diversity			0.03	-0.09*
			(0.02)	(0.04)
Senior management gender diversity × Alliance formation intensity				0.04***
				(0.01)
Senior management gender diversity × TMT educational background diversity				0.45**
				(0.15)
Constant	0.21**	0.22**	0.22**	0.21**
	(0.07)	(0.07)	(0.07)	(0.08)
Wald Chi-square	173.77***	364.85***	452.02***	280.42***
N	566	566	566	566

Note: 4-digit industry dummies and year dummies are included. Standard errors are reported in parentheses. Two tailed tests. † $p < 0.10$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3. Moderated-mediation results presenting 2 way interaction effects of senior management gender diversity $\times$ alliance formation intensity and senior management gender diversity $\times$ TMT educational background diversity on performance through strategic change

	Alliance Formation Intensity	TMT Educational Background Diversity	Firm Performance (Tobin's q)			
			Indirect Effect	SE	LL 95% CI	UL 95% CI
Senior Management Gender Diversity Effects Through Strategic Change	Low	Low	-0.101	0.044	-0.211	-0.031
	Low	Moderate	-0.054	0.025	-0.116	-0.012
	Low	High	-0.008	0.022	-0.06	0.029
	High	Low	-0.037	0.042	-0.115	0.059
	High	Moderate	0.009	0.031	-0.032	0.105
	High	High	0.056	0.035	0.001	0.141

Note: $N = 566$. Bootstrap sample size = 10,000.

Values for the moderators are the mean (moderate) and +1 SD (high)/ -1 SD (low) from the mean.

LL = Lower level and UL = Upper level bias-corrected CI (confidence interval)

Values in bold indicate statistical significance at $p < .05$.

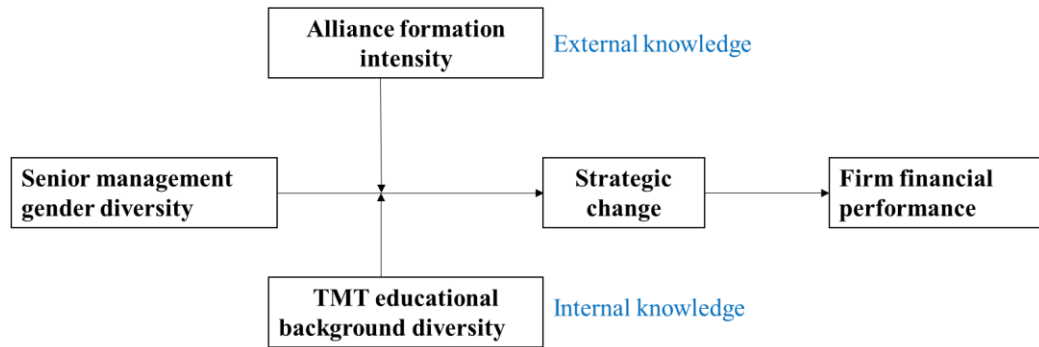


Figure 1. Conceptual model of senior management gender diversity effects.

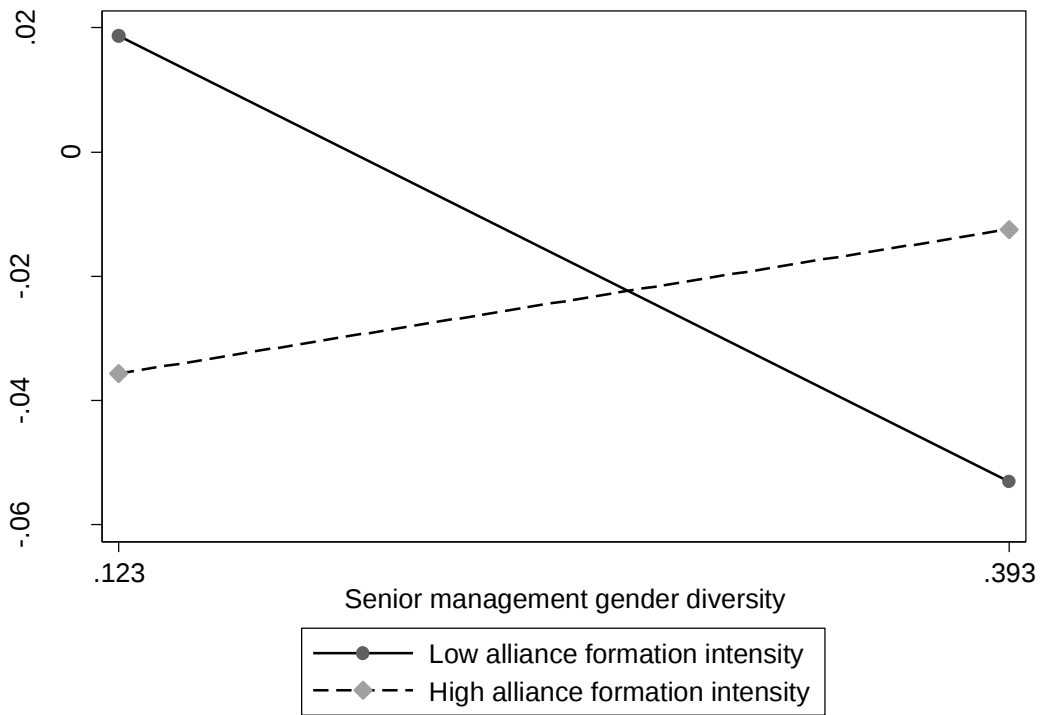


Figure 2. Interaction effect between senior management gender diversity and alliance formation intensity on strategic change.

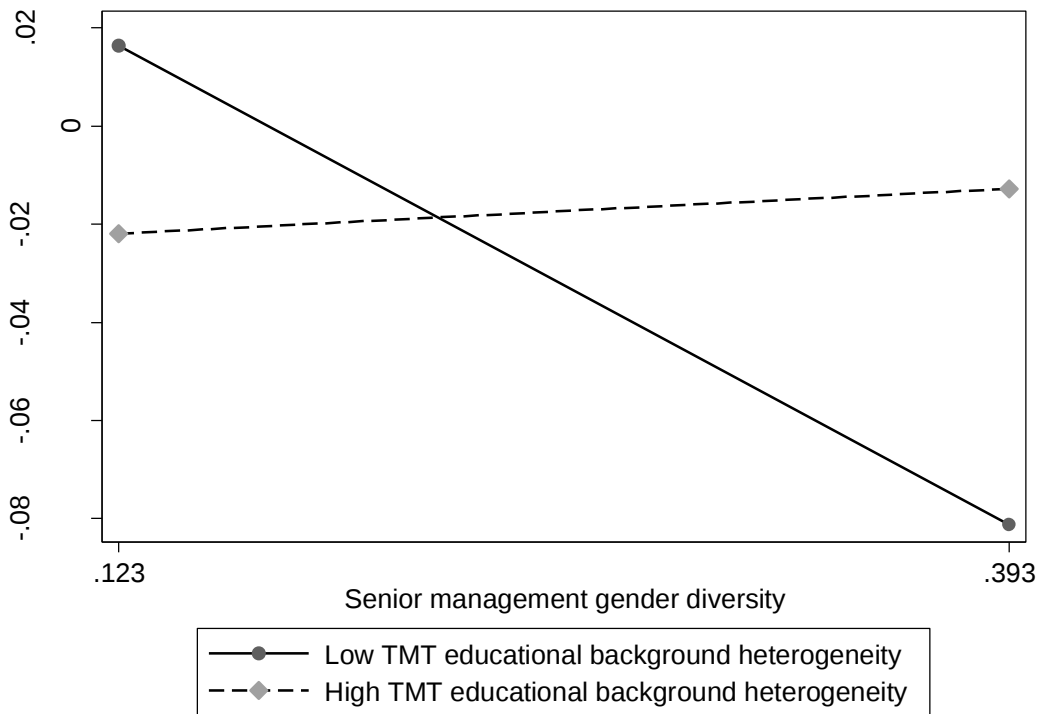


Figure 3. Interaction effect between senior management gender diversity and TMT educational background diversity on strategic change.

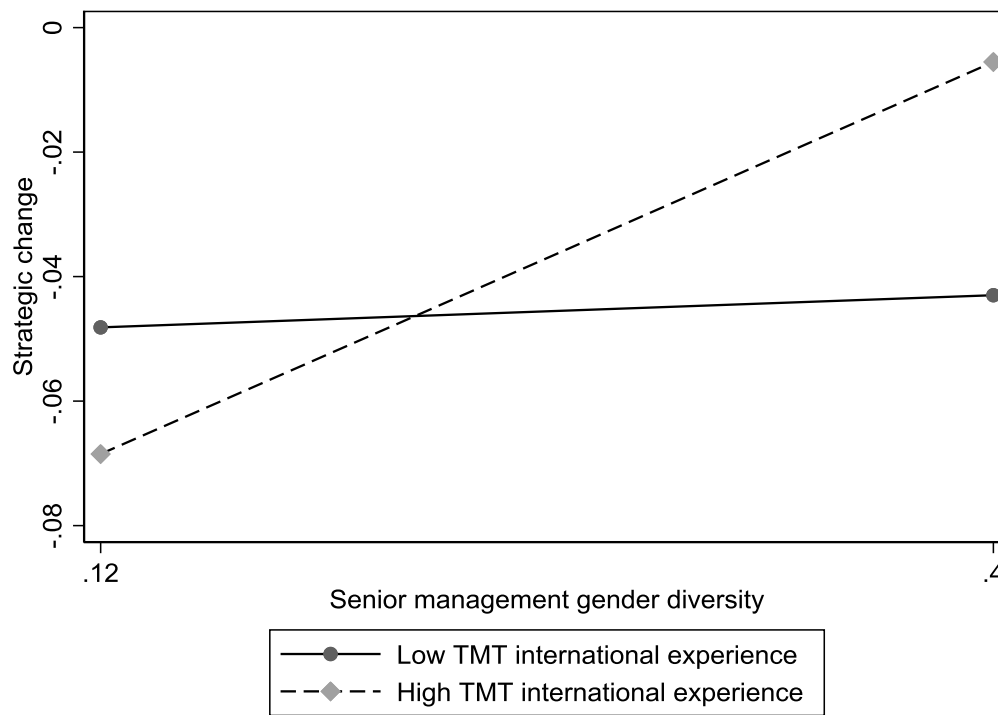


Figure 4. Interaction effect between senior management gender diversity and TMT international work experience on strategic change.

Appendix: The Composition of Gender and Race in the Computer Industries Sample

Rank	Composition ratio	Mean	S.D.	Rank	Composition ratio	Mean	S.D.
Top managers	White male ratio	0.73	0.17	Middle managers	White male ratio	0.56	0.14
	Black male ratio	0.01	0.02		Black male ratio	0.02	0.02
	Hispanic male ratio	0.02	0.05		Hispanic male ratio	0.03	0.04
	Asian male ratio	0.09	0.13		Asian male ratio	0.11	0.14
	Native American male ratio	0.00	0.01		Native American male ratio	0.00	0.00
	White female ratio	0.14	0.10		White female ratio	0.22	0.11
	Black female ratio	0.00	0.02		Black female ratio	0.01	0.02
	Hispanic female ratio	0.00	0.03		Hispanic female ratio	0.01	0.02
	Asian female ratio	0.01	0.03		Asian female ratio	0.04	0.04
	Native American female ratio	0.00	0.00		Native American female ratio	0.00	0.00
Management overall	White male ratio	0.58	0.13	Firm overall	White male ratio	0.48	0.13
	Black male ratio	0.01	0.02		Black male ratio	0.03	0.03
	Hispanic male ratio	0.02	0.02		Hispanic male ratio	0.03	0.04
	Asian male ratio	0.11	0.13		Asian male ratio	0.13	0.13
	Native American male ratio	0.00	0.00		Native American male ratio	0.00	0.00
	White female ratio	0.22	0.10		White female ratio	0.21	0.10
	Black female ratio	0.01	0.02		Black female ratio	0.02	0.03
	Hispanic female ratio	0.01	0.02		Hispanic female ratio	0.02	0.03
	Asian female ratio	0.03	0.03		Asian female ratio	0.06	0.04
	Native American female ratio	0.00	0.00		Native American female ratio	0.00	0.00