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Learning from Alliance Partners: The Interplay Between CEO Duality And TMT Functional Background Diversity[1]

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ABSTRACT

Purpose – Strategic alliances are essential vehicles for knowledge acquisition from alliance partners especially in the technology related sectors. This research examines the interplay between top management team (TMT) functional background diversity and CEO duality on learning from alliance partners.

Design/methodology/approach – Data for 1012 strategic alliances from Information and Communications sectors (computer equipment, electronics and telecommunications) in US are collected from multiple databases: Firm data is retrieved from Compustat database, strategic alliance date is retrieved from SDC Platinum database, patent data is retrieved from NBER database and finally the TMT information is coded from U.S. Securities and Exchange Commission (SEC) database. We tested our hypotheses using the negative binomial regression model since our dependent variable is discrete and non-negative (patent citation counts).

Findings – CEO duality moderates the relationship between TMT functional background and learning from alliance partner such that the effect of TMT functional background on learning from alliance partner is positive when CEO does not have dual roles and negative when he or she does.

Discussion – This study contributes to the strategic alliance and inter-organizational learning literature by demonstrating the roles of influential actors in the strategy process (i.e., the CEO and TMT). The study findings also extend the scope of upper echelons literatures by establishing the relevance of upper echelons theory for a novel dependent variable (i.e., learning from alliance partners)

1. Introduction

Strategic alliances are long-term agreements between two organizations that are designed for the mutual gain of both organizations (Stuart, 2010). Strategic alliances often involve exchange, sharing, or co-development of products, technologies, or services (Gulati, 1998). A proliferation of strategic alliances was documented over the last two decades (Gulati and Sytch, 2007; Kale et al., 2002). They are important tools for market entry, cost reduction, innovation, and growth (Zoogah et al., 2011). Strategic alliances have particularly become essential vehicles for knowledge acquisition from alliance partners especially in the technology related sectors. Several scholars identified learning from alliance partners as a core outcome of strategic alliances and used it to measure alliance performance (Stuart, 2010).

Learning from an alliance partner —i.e., the acquisition of know-how, knowledge and/or capabilities from the partner firm involved in a strategic alliance with the focal firm— is considered to be one of the primary motives for alliance formation (Mowery et al., 1996) and an important outcome for determining whether a strategic alliance succeeds or fails (Larsson et al., 1998). However, learning from alliance partners is a challenging process because partner's embedded knowledge is not easy to exchange by market transactions and the exchange needs to produce common benefits for both parties (Khanna et al., 1998). Therefore, the level of learning from an alliance partner depends not only on how easily knowledge, know-how, and/or capabilities

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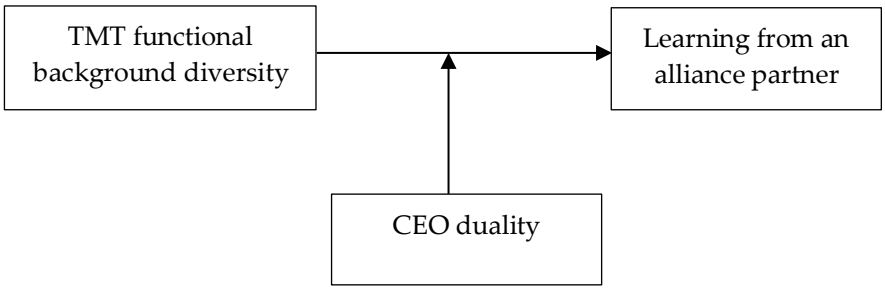
can be transferred, interpreted and absorbed by the focal firm (Doz et al., 1989), but also on the approaches of influential actors in the alliance to learning.

Top Management Team (TMT) members are among the most influential actors in learning from alliance partners, because they are the conceptualizers of the alliance (Eisenhardt and Schoonhoven, 1996). The TMT is 'the dominant coalition' of individuals responsible for setting a firm's direction (Cyert and March, 1963) which is mostly composed of the CEO and his or her direct subordinates (Carpenter et al., 2004). Because alliance formation decisions are characterized by high uncertainty, they necessitate a thorough consideration of the consequences through TMT members' information processing capability. Upper echelons theory suggests that TMT composition based on their background characteristics is an essential determinant of TMT information processing capability (Carpenter et al., 2004; Hambrick, 2007; Hambrick and Mason, 1984), because the diversity on these characteristics implies different perspectives, information and capabilities of the TMT members. In particular, TMT functional background diversity is relevant for learning from alliance partners, because when TMT members have heterogeneous functional backgrounds, they have a larger pool of non-overlapping knowledge and skills (Simons et al., 1999) and a wider personal professional network that enhance their access to unique information (Ancona and Caldwell, 1992). TMT functional diversity also improves the process of valuing, assimilating and applying new knowledge, which leads to a more positive attitude towards learning (Díaz-Fernández et al., 2015; Acikgöz et al., 2016). Therefore, we assert that TMT functional background diversity is positively associated with learning from alliance partners.

Another influential actor in learning from alliance partners is the CEO, since he or she, as the supervisor of other TMT members, regulates the interactions within the TMT. CEOs are reported to be more self-confident considering their position in the organizational hierarchy (Chikh and Filbien, 2011). When this extant self-confidence is further fueled by CEO duality —i.e., when the CEO is the chairperson of the board as well—, the power disparity between TMT members and CEO further widens. Earlier literature report that CEO duality is often associated with poor organizational performance (Zona, 2014; Pearce and Zahra, 1991; Rechner and Dalton, 1991) unless there is effective monitoring of the CEO with dual roles (Chahine and Tohmé, 2009). We assert that the positive effect of TMT functional diversity on learning from alliance partners only materialize when the CEO encourages participation in decision making and does not dominate the team information exchange processes. Unless the CEO and the other members of the TMT are on equal footing, the TMT interaction and learning processes would not benefit from the diverse perspectives and knowledge emanating from the TMT functional background diversity (Buyl et al., 2011). This means the CEO duality moderates the association between TMT functional background diversity and learning from alliance partners. When there is CEO duality, then the learning from the alliance partner diminishes. Figure 1 depicts the conceptual model developed in this research.

Figure 1. Conceptual Model



The contribution of this research is three-fold. First, we add to the strategic alliance literature by demonstrating the central role of CEO and the TMT members play in reaching alliance outcomes. Second, this study extends the organizational learning literature. While the previous studies on organizational learning mostly focused on the learning within a firm, this research probes learning from an external party (i.e., the alliance partner) and identifies the determinants of such external learning. Third, this research contributes to the upper echelons theory by expanding the scope of theory to a novel outcome variable and proposing boundary conditions.

This manuscript is organized as follows: the next section reviews the relevant literature and develops hypotheses. The third section is the methods section that describes the data, measures and the analytical

approach adopted. Fourth section demonstrates the results of the empirical analysis. Finally, the fifth section discusses the implications of the findings for the literature.

2. Theoretical Background and Hypotheses Development

Upper echelons theory proposes that TMT members' cognitive frames, values, perceptions and perspectives can be captured, albeit not completely, by their observable characteristics (Hambrick, 2007). TMT composition in background variables, therefore, determines TMTs' information processing capability which is pivotal in making strategic decisions (Carpenter et al., 2004). Diverse TMTs draw on a vast inventory of knowledge from their different backgrounds when making strategic decisions. By reconciling their distinct knowledge, experiences and perspectives, heterogeneous TMTs are better at approaching cognitively demanding strategic problems (Hambrick et al., 1996), particularly relating to knowledge transfer from alliance partners.

Janowicz-Panjaitan and Noorderhaven (2008) stresses out three different organizational learning processes: programmed learning, autonomous-formal learning and spontaneous organizational learning. While spontaneous organizational learning emanates from the informal interactions between managers, programmed- and autonomous-formal learnings stem from formal interactions between TMT members. When firms make use of these formal learning processes, it is important to consider the individual managers' personal backgrounds (Holmberg and Cummings, 2009). The functional backgrounds of managers are related to the perspective they bring to business problems and their interpretation of problems (De Wit and Herbert, 1958). In that regard, TMT functional background diversity is a frequently studied variable in the literature (Cannella et al., 2008).

Extant literature reports that functional background diversity generates a larger pool of perspectives and skills (Simons et al., 1999), increases access to information due to a larger social network (Ancona and Caldwell, 1992), and leads to consideration of a broader range of alternatives and perspectives when considering strategic choices (Certo et al., 2006). A diversity in functional background in TMT's also enhances the process of valuing, assimilating and applying new knowledge, which prompts a positive attitude towards learning (Díaz-Fernández et al., 2015; Acikgöz et al., 2016).

According to Lee and Park (2006), diverse TMTs with respect to their job-related variables such as functional background facilitate formation of strategic alliances in several ways. First, diverse TMTs share knowledge, perspectives and other information so that they are able to identify the right potential alliance partner. Second, diverse TMTs have broad external networks and are more likely to have greater social capital. Third, as diverse TMTs are capable of absorbing the different points of view, they facilitate the process of creating a mutually beneficial contract for both alliance partners that magnifies the learning from alliance partners as well. Therefore, the first hypothesis of this study is formulated as follows:

Hypothesis 1: *TMT functional background diversity increases the learning from an alliance partner.*

The positive effect of TMT functional diversity on learning from an alliance partner has boundary conditions. Buyl et al. (2011) reported that the richness of information embedded in TMT's functional diversity translates into higher firm performance only when the expertise and shared experience of the CEO facilitates the exchange. CEOs are more likely to dominate the strategic decision-making process when the power disparity between TMT members is high due to high CEO power. Previous literature suggests that CEO duality provides executive managers with high power (Chikh and Filbien, 2011). CEO duality is when the CEO is the chairman of the board of directors —i.e., the head of the governing committee that represents the shareholders of the firm and oversees the executive managers.

Rechner and Dalton (1991) report that firms opting for independent boards consistently outperforms firms that rely on CEO duality. Despite the studies that associate CEO duality with poorer firm performance (Pearce and Zahra, 1991; Rechner and Dalton, 1991; Zona, 2014), others report CEO duality benefits firm performance (Elsayed, 2007). Moreover, Chahine and Tohmé (2009) pose the effective monitoring of the CEO as an essential contingency on the effects of CEO duality.

Beyond the main effects of CEO duality on firm performance, we are interested in its potential effects on the relationship between TMT functional background diversity and learning from alliance partners. CEOs have fundamental effects on TMT interactions, thus on TMT's information processing capability and learning.

Sherlock and Nathan (2008) conclude that CEO's power and the power dynamics within the TMT impact the way the executive managers learn. High CEO power constraints free information exchange within TMT and necessitates more reliance on private reflection which eventually hampers the learning process. The diverse information and different perspectives brought in by the varied functional backgrounds of TMT members facilitate learning only when TMT members feel free to voice their unique points of views (Holmberg and Cummings, 2009). Therefore, the benefits of TMT functional diversity on learning from alliance partners hinges upon the CEO's encouragement of this free expression views in decision making.

When the CEO power is enhanced with CEO duality, team learning and the free information exchange among TMT members suffer from power differences between the CEO and TMT members (Buyl et al., 2011). When CEO activities are inspected by an independent board of directors like the activities of other TMT members, all TMT members feels free to voice their unique ideas. This assists not only selecting alliance partners that the firm has more potential to learn from but also managing the alliance better to achieve the desired learning outcomes. Accordingly, the second hypothesis of this study is formulated as follows:

> Hypothesis 2: *The effect of TMT functional background diversity on the learning from an alliance partner is moderated by CEO duality.*

3. Methods

3.1. Data

Our data set includes a total of 1012 alliances in total. The sample consists of the inter-firm strategic alliances that take place between 1996 and 2000 in the following Information and Communications Technology (ICT) sectors in the United States: computer equipment, electronics and telecommunications. The ICT sector is suitable to test our hypotheses, because inter-organizational learning has been pronounced as one of the essential objectives of alliances in this context (Stuart, 2010). We used multiple databases to construct our dataset. First, we identified the firms that operate in these sectors from the Compustat database and retrieved firm information. Then we identified strategic alliance deals of these firms from the SDC Platinum database. We used NBER patent database from 1991 to 2005 to collect patent citations between strategic alliance partners before and after the alliance took place. Finally, we collected TMT information for alliance partners from the 10K annual reports and proxy statements at U.S. Securities and Exchange Commission (SEC) database.

3.2. Measures

Learning from alliance partner. The dependent variable is operationalized by the total number of patent citations of the focal firm to an alliance partner in the five years after the alliance took place. This enumeration of the patent citations expresses the learning of technological knowledge in alliance relationships (Schildt et al., 2012). A 5-year window is the norm in measuring learning through patent citations (Almeida and Phene, 2004). This enumeration of the patent citations expresses the learning of technological knowledge in alliance relationships (Schildt et al., 2012).

TMT functional background diversity. We coded the functional backgrounds of the executive managers in the TMT into eight categories: operations, research, finance, management, marketing, law, support and other, following the earlier literature (Ndofor et al., 2015; Hambrick et al., 1996). TMT functional background diversity is measured with Blau's index (Blau, 1977), which is also known as the Herfindahl-Hirschman Index. This index is calculated as $1 - \sum p_i^2$, where p_i is the proportion of a TMT member in the ith category of functional backgrounds (Harrison and Klein, 2007). When functional background diversity takes the value 0, it suggests a low diversity, which means that all TMT members are considered as the same. On the contrary, when the diversity takes the value 1, it suggests a high diversity, which means that all TMT members have different functional backgrounds (Bunderson and Sutcliffe, 2002).

CEO duality. CEO duality is measured as a binary variable which takes the value of 1 when the CEO is at the same time the chairman of the board of directors and the value of 0 when the chairman of the board of directors is a different person (Elsayed, 2007).

Control variables. We controlled for several variables that may affect the hypothesized relationships. First, *TMT age diversity, gender diversity, position-tenure diversity and organizational tenure diversity, and TMT size* were included as control variables. We included these variables to single out the effect of functional background

diversity among other TMT characteristics. Age, position tenure and organizational tenure diversity is operationalized with coefficient of variation, dividing the standard deviation by the mean (Harrison and Klein, 2007). Gender diversity is measured by the Blau index (Blau, 1977). TMT size corresponds to the number of members in the executive team. Second, to account for the learning from the alliance partner prior to forming an alliance, we controlled for the total number of *patent citations from the focal firm to the partner firm five years before the alliance.* Third, alliance literature emphasizes the role of experience in alliance formations (Zollo et al., 2002; Rothaermel and Deeds, 2006). Therefore, we also controlled for *the general alliance experience* operationalized as the total number of alliances in the last five year before the focal alliance, and *the partner-specific alliance experience* operationalized as the number of alliances between the alliance partners in the last five years. Fourth, we controlled for *firm size* because larger firms might have larger resource portfolios to conduct learning. We measured firm size as the natural log number of employees. Fifth, the companies belong to one of the three Standard Industrial Classification (SIC) codes: 357, computer and office equipment industry; 366, communications equipment industry; and 367, the electronics industry. To control for *industry effects*, dummy variables were created for the SIC codes. Finally, we included *year dummies* to account for the alliance year from 1996 to 2000.

3.3. Analytical approach

Our dependent variable is based on count data; therefore, it is discrete and non-negative. We consider count regression models which are described in the generalized linear model (GLM) framework (Zeileis et al., 2008). Generally, the Poisson regression model is used for count variables (Hausman et al., 1984). However, because we observe an over-dispersed dependent variable, meaning that its variance exceeds its mean (Zeileis et al., 2008), we adopted the negative binomial regression model to test the hypotheses. This model has as an additional dispersion parameter which captures the extent of over-dispersion and is therefore useful for this research (Ramaswamy et al., 1994). We tested the first hypothesis by the checking the main effects of the independent variable, while we test the second hypothesis by entering the interaction term into the model.

4. Results

Table 1 shows the mean, standard deviations for the study variables and the correlations between them.

Table 1. Descriptive Statistics and Correlations

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. TMT functional background diversity	0,71	0,10	1,00										
2. CEO duality	0,57	0,49	-0,01	1,00									
3. Learning from alliance partner	102,76	498,21	0,09	0,06	1,00								
4. TMT age diversity	0,13	0,03	0,13	0,03	-0,09	1,00							
5. TMT gender diversity	0,13	0,10	0,13	0,04	0,04	0,03	1,00						
6. TMT position tenure diversity	1,25	0,47	0,10	0,01	-0,05	0,09	-0,08	1,00					
7. TMT organizational tenure diversity	0,74	0,28	0,13	-0,02	-0,08	0,09	0,04	0,30	1,00				
8. TMT size	10,33	6,11	0,12	-0,01	-0,14	0,00	0,02	0,25	0,01	1,00			
9. Firm size	10,21	4,41	0,07	0,02	0,10	0,03	-0,03	0,03	0,03	0,14	1,00		
10. General alliance experience	38,14	56,87	0,06	0,03	0,21	-0,05	-0,03	0,04	-0,14	0,36	0,24	1,00	
11. Partner-specific experience	0,17	0,54	0,11	-0,01	0,11	0,01	-0,04	0,08	-0,07	0,12	0,07	0,20	1,00
12. Patent citations to partner before alliance	42,12	204,12	-0,01	0,03	0,12	-0,09	-0,03	0,03	-0,04	0,10	0,07	0,18	0,16

N=1012. Correlations larger than 0,06 and 0,10 are significant at the 0,05 and 0,01 levels, respectively (two-tailed).

In Table 1, we observe a significant correlation between TMT functional background and the learning from alliance partner ($r = 0.06$, $p < 0.05$) as expected. Several control variables are also significantly associated with learning from alliance partner as well, such as TMT size ($r = -0.14$, $p < 0.01$), general alliance experience ($r = 0.21$, $p < 0.01$), partner-specific experience ($r = 0.11$, $p < 0.01$) and patent citations to partner before alliance ($r = 0.12$, $p < 0.01$).

Table 2 demonstrates the results of the negative binomial regression analyses. Model 1 includes the effects of the control variables. Several control variables are found to have a significant effect on learning from alliance

partner. While the TMT composition variables, age diversity (β = -4.63, p < 0.01), gender diversity (β = -2.02, p < 0.01) and tenure diversity (β = -1.04, p < 0.01), negatively affect the dependent variable, general alliance experience (β = 0.01, p < 0.01), partner specific experience (β = 0.75, p < 0.01) and patent citations to partner before alliance (β = 0.004, p < 0.01) have positive effects on learning from alliance partners.

Table 2. Results of the Negative Binomial Regression Analyses

	Model 1	Model 2	Model 3
Constant	3,12***	3,85***	4,23***
	(0,44)	(0,52)	(0,54)
Control variables			
TMT age diversity	-4,63***	-5,27***	-6,08***
	(1,19)	(1,25)	(1,28)
TMT gender diversity	-2,02***	-2,12***	-2,19***
	(0,33)	(0,33)	(0,33)
TMT position tenure diversity	-0,12	-0,09	-0,06
	(0,09)	(0,09)	(0,09)
TMT organizational tenure diversity	-1,04***	-0,98***	-0,95***
	(0,14)	(0,13)	(0,14)
TMT size	0,02	0,02*	0,03**
	(0,01)	(0,01)	(0,01)
Firm size	-0,00***	-0,00***	-0,00***
	(0,00)	(0,00)	(0,00)
General alliance experience	0,01***	0,01***	0,01***
	(0,001)	(0,001)	(0,001)
Partner-specific experience	0,75***	0,73***	0,72***
	(0,09)	(0,09)	(0,09)
Patent citations to partner before alliance	0,004***	0,004***	0,004***
	(0,00)	(0,00)	(0,00)
Independent variables			
TMT functional background diversity		-0,63	1,96**
		(0,39)	(0,95)
CEO duality		-0,34***	-2,61***
		(0,10)	(0,79)
Interaction term			
TMT functional background diversity x CEO duality			-3,12**
			(1,09)
Wald-Chi square	515.12***	542.08***	561.41***

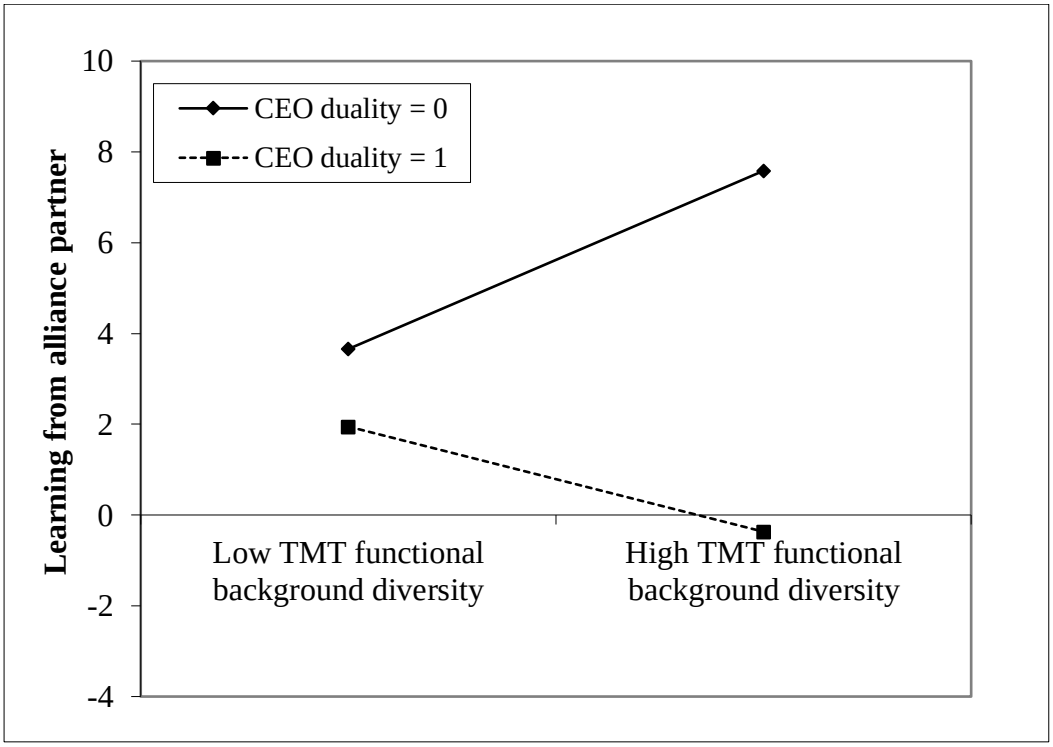
N=1012. Dependent variable is the total number of patent citations of the focal firm to an alliance partner in the five years after the alliance took place. Industry and year dummies are included in all models, but not shown. Standard errors are shown in parenthesis. *, **, and *** indicate statistical significance at the 0,1, 0,05, and 0,01 levels, respectively.

Hypothesis 1 poses the positive effect of TMT functional background diversity on learning from alliance partner. Model 2 enters the CEO duality and TMT functional background to the analytical model. While we observe a negative significant main effect of CEO duality (β = -0.34, p < 0.01), the main effect of TMT functional background is not significantly different from zero (β = -0.69, p = n.s.). Consequently, the empirical results do not corroborate the first hypothesis. We consider the theorized moderating effect of the CEO duality suppresses the main effect of TMT functional background such that the effects of TMT functional diversity at low and high values of CEO duality flatten its main effect. Therefore, we proceed to test our second hypothesis.

Hypothesis 2 proposes that the CEO duality moderates the relationship between TMT functional background and learning from alliance partner such that the effect of TMT functional background on learning from alliance partner is positive when CEO does not have dual roles and negative when he or she does. Model 3 introduces the interaction effect between CEO duality and TMT functional background into the analytical model. We

observe the interaction effect is negative and significant (β = -3.12, p < 0.01), providing evidence supporting Hypothesis 2.

Figure 2. The Interaction between TMT Functional Background Diversity and CEO Duality on Learning from Alliance Partner.



To facilitate the interpretation of the interaction effect, we conducted a simple slopes analysis (Dawson, 2014). Figure 2 depicts the interaction effect of TMT functional diversity and CEO duality on learning from alliance partner. The gradients of the simple slopes differ for both value of the moderator. When CEO duality is one, an increase in TMT functional diversity leads to an increase in learning from alliance partner. Whereas when CEO duality is zero, an increase in TMT functional diversity does not lead to an increase in learning from alliance partners. When CEO is the chairperson of the board of directors, learning from alliance partners do not benefit from TMT functional diversity.

4.1. Robustness checks

We conducted two sets of robustness analyses. First, we winsorized the dependent variable (i.e., learning from alliance partner). The winsorization replaces extreme data points by a data-dependent or a pre-determined value (Gwet and Rivest, 1992). Subsequently, we replaced the lowest 5 points of the bottom and the top 5 of the observations by the values of the 5th and 95th percentile. An additional negative binomial regression was run with the adapted data set in order to check whether extreme observations drive the empirical results. The results of this analysis were similar with the results of the main regression. Second, we operationalized learning from alliance partner using a 3-year time window instead of the 5-year time window we used in our main analysis. The results of the negative binomial regression analysis were qualitatively remained unchanged. Consequently, we consider our results robust.

5. Discussion and Conclusion

We theorized and tested the effect of TMT functional background diversity on the level of learning from alliance partner contingent upon whether the CEO fulfills the chairperson of the board role or not. The number of alliance partner's patents that were cited by the focal firm after an alliance served as the extent to which the focal firm learns from its alliance partner, as it represents the directional inter-organizational knowledge flow from the partner to the focal firm. An empirical analysis of the inter-organizational strategic alliances in the US technology industries showed that while TMT functional background diversity does not have a main effect on learning from alliance partner, it has a significant interaction between with CEO duality. On the one hand,

when the CEO is not the chairperson of the board, TMT functional background diversity is positively associated with learning from alliance partner. On the other hand, when there is CEO duality, the slope between TMT functional background diversity and learning from alliance partner is negative.

This study makes several theoretical contributions to the research on inter-organizational learning and strategic alliances. To the best of our knowledge, there are no prior studies that studied relationship between the level of learning in strategic alliances and TMT composition. Extant literature almost often focused on intra-organizational learning and factors within the firm. We fill this gap by demonstrating the role of TMT functional back in facilitating the learning from alliance partners when there is no CEO duality.

This finding also contributes to the upper echelons research by demonstrating the effect of TMT composition on a novel dependent variable. The previous research studied the effects of diverse TMT functional backgrounds on a wide array of outcome variables (Ancona and Caldwell, 1992; Certo et al. 2006; Simons et al., 1999) but neglected the learning from alliance partners. This adds to the current debate surrounding TMT functional background diversity which is hitherto equivocal. For instance, while Certo et al. (2006) report a negative relationship between TMT functional background diversity and the firm performance, Simons et al. (1999) found a positive influence. Considering learning from alliance partners as a proxy for alliance performance, this study sheds light on a core contingency from corporate governance, i.e., CEO duality, for the positive effect of TMT functional background diversity.

This research further demonstrated the moderating role of CEO duality on the relationship between TMT functional background diversity and learning from alliance partners. The empirical findings also show the main negative effect of CEO duality on learning from alliance partners. This is an important contribution to the CEO duality literature, because it uncovers the dark side of CEO power in TMT interactions. Expanding the previous research (Buyl et al., 2011), CEO duality is found to negatively influence learning in strategic alliances. When the CEO is also the chairman of the board, the CEO's increased power leads to poorer learning from an alliance partner. This finding is in line with the extant research that adopts a contingency view on the effects of functional background diversity (Pelled et al., 1999; Van Knippenberg et al., 2004).

The findings of this research also hold important implications for management practice. First, this study implicates the importance of the role of the TMT members in the learning process through strategic alliances. Because TMTs design the strategy of the alliance and select the collaborating partners (Eisenhardt and Schoonhoven, 1996; Finkelstein and Hambrick, 1990; Hitt et al., 2000), the richness of the knowledge transfers within the team stimulated by the variety of their functional backgrounds matter. Particularly, when TMT members are on equal footing with the CEO, learning from alliance partners increase. Second, despite the importance of transferring knowledge through alliances in order to keep up with the competitive environment (Doz, 1996; Khanna et al., 1998), CEO duality may hamper the learning process. Therefore, it is of essence to consider the role of the CEO within the firm to attain desired learning outcomes from alliance partners.

This study is not without limitations which point to fruitful future research directions. First, we collected the learning data for the five years after the alliance formation, because that is the norm for using patent citations to measure learning (Almeida and Phene, 2004). However, TMT information was only collected for the year the alliance was formed. While this is consistent from a decision-making perspective (i.e., alliance partner selection), there might be changes in TMT members in the following five years. We suggest future researchers to consider the effect of potential changes in the TMTs. Second, we acknowledge that TMT and the CEO are only two of the many potential influential actors in learning from alliance partners. As Zoogah et al. (2011) emphasized, firms often set up an alliance teams who are in charge of ensuring the alliance reach its objectives. The members of alliance teams and their functional background diversity might be important too. Because this information is not officially published by organizations, this study was not able to take these members into account. Nonetheless, future studies may look into the role of these other important actors in the alliance process. On a final note, CEO duality is one of the many proxies for the power executive managers possess. Future research can extent the theoretical arguments raised in this research beyond CEO duality and consider other forms of power disparity within TMTs.

In conclusion, this study was designed to probe antecedents of learning from alliance partners in strategic alliances. We investigated the interplay between CEO duality and TMT functional background diversity on learning from alliance partners. The results show that CEO duality suppresses the positive effect of TMT

functional background diversity on learning, while independent boards promote the positive association between them. These results hold implications for organizational learning, strategic alliances and upper echelons literatures.

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