Board of Directors' Surface Level Diversity and Innovation Performance

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This paper seeks to study the potential impact of board of directors on innovation. It more specifically focuses on directors' surface level diversity (gender, ethnic and age diversity) and innovation performance based on an international sample of 97 firms totalizing 1027 directors. As hypothesised, our approach revealed that gender diversity has a positive impact on innovation performance where cultural diversity has a negative influence. On its part, age diversity did not yield a significant result. However, we were also able to conclude of the relevance of having a board that is mainly comprised of independent members, as well as that of contingencies (firm size, region and sector), regarding innovation performance. Overall, our findings are consistent with the resource dependency perspective, robust after addressing some potential endogeneity issues, and contain various implications for both professionals and academics.

Keywords: board diversity, gender, culture, age, innovation performance, resource dependence theory

INTRODUCTION

The Cadbury Report (1992), the Sarbanes-Oxley Act (2002) and the Dodd-Frank Act (2010) demonstrate the continued practical implications of research on corporate governance, dating back to the separation of control and ownership (Berle and Means, 1932) and the possibility of conflicts between shareholders and managers (Jensen and Meckling, 1976). However, as the agency theory performance relationship reaches maturity, the link between board of director (BoD) diversity and performance have gained in interest as resource, network, stewardship and upper echelon theories have enlightened performance outcomes.

A particular line of research has been to investigate factors such as gender, ethnicity and age, what some authors call surface level diversity (Harjoto et al., 2015; Harrison et al., 1998; Torchia et al., 2015) and others "visible/observable diversity" (Forbes and Milliken, 1999; Kang et al., 2007; van der Walt and Ingley, 2003). The relevance of this concept is not limited to the "organizational word" has shown by multiple reports mentioning that many countries have adopted legislations aiming to increase the representation of minorities on firms' boards (Terjesen et al., 2015). These initiatives are mainly rooted in

ethical motives that refer to values such as equality and equity, but it has also been empirically supported that they could be relevant for economic motives (Campbell and Minguez-Vera, 2008).

Indeed, research in this field suggests that surface level diversity can positively influence both innovation (Midavaine et al., 2016; Miller and Triana, 2009) and financial performance (Erhardt et al., 2003, García-Meca et al., 2015). Some explanations are that diverse boards better manage risk (Bernile et al., 2018) and could improve decision-making (Milliken and Martins, 1996), which are certainly part of the regular duties of directors but take another dimension when it comes to discussions about innovation.

Furthermore, BoD diversity would lead to a greater heterogeneity in terms of expertise and knowledge (Bear et al., 2010; Hillman et al., 2002) and bring different perspectives (Daily and Dalton, 2003; Westphal and Milton, 2000), which could facilitate the identification of opportunities to innovate (Miller and Triana, 2009). In summary, it can be argued that board surface level diversity might increase the human and social capital inside the boardroom (Hillman and Dalziel, 2003) and ultimately influence organizational outcomes such as innovation performance.

However, in general, the link between corporate governance and innovation remains equivocal (Honoré et al., 2015; Talke et al., 2010), especially when considering BoD diversity (Balsmeier et al., 2014; Midavaine et al., 2016). Indeed, none of the boards' variables that have been studied to explain an increase or decrease of innovation has yielded consistent results. As innovation is considered a competitive resource for firms (Wu, 2008), it is not surprising that many authors have called for more contributions regarding the link between board diversity and firm innovation (e.g., Arzubiaga et al., 2018; Jaskyte, 2012; Midavaine et al., 2016). Thus, the present paper answers these calls to nurture the literature that analyses the potential impact of board diversity on innovation.

Beyond theses considerations, the scarce literature in this area of research shows a redundancy in the units of measurement used for both governance variables (Boyd et al., 2017; McNulty et al., 2013) and innovation variables (Midavaine et al., 2016; Miller and Triana, 2009). For example, authors tend to systematically rely on measures such as the percentage of women on the board to measure gender diversity and R&D investments to measure innovation. However, the percentage does not allow to capture diversity because a highest percentage would be (wrongly) interpreted as a higher degree of diversity. Indeed, a high representation of women (e.g., 80%) would be considered as a "highly diversified board" when in reality it is not because it would rather reflect an homogeneity around women directors. As for R&D investments, they represent the efforts taken by firms to innovate with no guarantee on an innovation output (Kor, 2006; Midavaine et al., 2016; Miller and Triana, 2009; Zahra et al., 1996). Thus, R&D investments can not adequately measure innovation, because they represent an of innovation.

The previous lines expose many elements that makes the relevance of this study, which are: (1) the need for more studies investigating the link between board diversity and innovation; (2) the methodological shortcomings associated with the scarce literature on this subject, (3) the multiple potential benefits of a greater surface level diversity inside the boardroom that might increase firms' innovation performance, (4) the need to go beyond the ethical aspect of surface level diversity by studying it in relation with economic factors (such as innovation performance) and (5) the importance of the strategic role of directors.

Hence, this paper seeks to study the impact of surface level diversity within the BoD on innovation performance. Based on a resource dependency perspective and an international sample of 97 firms totalizing 1027 directors, the goal is specifically to answer the following research question: What is the impact of directors' surface level diversity on innovation performance? This question leads to three sub questions that this paper will address:

- What is the impact of gender diversity within the BoD on innovation performance?
- What is the impact of cultural diversity (at both the ethnical and nationality level) within the BoD on innovation performance?
- What is the impact of age diversity within the BoD on innovation performance?

Overall, our findings support the relevance of BoD's surface level diversity to explain a firm's innovation performance by highlighting the positive influence of gender diversity and negative impact of cultural diversity. For its part, directors' age diversity did not produce significant results. Besides the analysis of the board' surface level diversity, we were also able to establish a positive and significant effect

on innovation performance of having a BoD that is mainly comprised (more than 50%) of independent directors. Also, Asian firms outperformed their American counterparts, while smaller firms (in terms of number of employees) have proved to be more innovative than their larger peers. These observations suggest the need of adopting a contingency approach (Zona et al., 2013) since the internal and external environments could not only directly influence a firm's innovation performance, but also directors' capacity the latter.

This study features several contributions. First, by using resource dependency theory, this paper supports the relevance of BoD diversity regarding innovation performance while most previous studies have focused on financial performance (Ariff et al., 2017). Second, instead of simply relying on "traditional measures" (e.g., proportion of women directors to measure gender diversity and patents or R&D investments to measure innovation), that have been contested, we propose original measures for independent variables (e.g., cultural diversity calculated by ethnic and nationality diversity) as well as for the dependent variable (innovation premium as reported by Forbes ranking). Third, the significant impact of some control variables shows notably that the environment in which organizations evolve is crucial to innovate. Thus, it suggests that the BoD could have an indirect rather than a direct effect on innovation and calls authors to not omit contingencies as potential moderators or mediators when focusing on the potential directors' contribution to organizational outcomes such as innovation performance. This aspect is even more crucial given that most of previous papers tend to neglect contextual factors when studying the BoD (Boyd et al., 2017; Zona et al., 2013). Forth, most the literature on board diversity considers a very limited number of diversity types (Ariff et al., 2017; Midavaine et al., 2016) and most corporate governance studies are limited to a single country analysis (Kumar and Zattoni, 2019). In this sense, the choice to consider three types of diversity (gender, cultural and age) and an international sample make this research stand out from the rest of the literature.

For organizations, the results suggest the interest of focusing on governance bodies, particularly the BoD, as catalysts for innovation. It enables us to make concrete recommendations regarding the composition of the BoD when the goal is to enhance innovation performance. A firm should make sure to have women and independent directors, as the statistical tests support their positive impact on innovation performance. On the other hand, our statistical manipulations reveal that firms would benefit from maintaining a low cultural diversity when it is expressed both by ethnicity and nationality. In this continuity, it could be more cautious that when BoD' ethnic diversity is enhanced, national diversity is not, and vice versa. These findings support the idea that firms should not only analyze diversity though the prism of ethics and must also consider its economical perspective, for example through its potential to enhance or decrease performance. This could help avoiding debates that confront personal values and beliefs, as it is often the case with the notion of diversity and bring some more rational arguments to the discussion. Furthermore, our findings reveal that organizations should preferably maintain a small size, in terms of employees, as a pursuit of growth in the workforce does not seem to represent a viable path to innovate, on the opposite. Also, the fact that Asian firms perform better than their American counterparts suggest of the relevance of the geographical context to nurture innovation.

The rest of the paper is separated into four parts. In the next section, we present a literature review, our theoretical foundations and formulate our research hypotheses. Then, our methodology will be outlined before presenting the descriptive and analytical results of our statistical tests in the third section. We conclude with the main empirical and practical contributions inherent to this study, as well as some limitations and promising avenues for future research.

LITERATURE REVIEW, THEORETICAL FOUNDATIONS AND HYPOTHESES

The aim of this study is to investigate the link between the BoD' surface level diversity and innovation performance. This section will deal with the three most frequently studied types of surface level diversity in the literature at the BoD level: gender diversity, cultural diversity and age diversity (Erhardt et al., 2003). It will also integrate a theoretical development based on the resource dependence theory (RDT), which led to the construction of our hypotheses. RDT argues that directors should help to mitigate their firm's

dependency towards its external environment (Pfeffer and Salancik, 2003). It more specifically attributes four major roles to the BoD: advising the firm on important issues, help the firm establishing canals of communication with various external actors, providing the firm with a privileged access to the critical resources it needs and bringing to the firm prestige/legitimacy (Hillman et al., 2000, 2008, 2009; Hillman and Dalziel, 2003; Hillman and Dalziel, 2011; Pfeffer and Salancik, 2003). Thus, by helping to fulfill one or multiple of these roles, board diversity could potentially help to enhance innovation performance.

Also, as Forbes and Milliken (1999) have argued is their seminal paper, the composition of the BoD is an important aspect to explain how directors are able to fulfill their roles and board demography is in general a significant predictor of board behaviour. Furthermore, it has been argued that innovation does not only require internal resources but also largely depends on external resources such as its external network (Guan and Liu, 2016; Nordman and Tolstoy, 2016). These facts make RDT premises particularly relevant when the goal is to explain the impact of board diversity on innovation performance.

Gender Diversity and Innovation

The growth of women's involvement in business and more generally in society (Ruigrok et al., 2007) increased the attention towards gender diversity as a BoD characteristic (Torchia et al., 2011). In this continuity, extant studies have unsurprisingly concluded of the low representation of women in BoDs. Kang et al. (2007) examined the 100 largest Australian public firms and found that, on average, only one in ten directors was a woman. More recently, Johennesse and Chou (2017) found that 30% of African Stock Exchange Federation companies had no female directors and 80% had fewer than two. In addition, their results indicate that there were no women on the boards of 25% of Asian and Oceanic Stock Exchange Federation firms, and 70% had fewer than two female directors. These observations illustrate that the scarcity of women directors is a reality in both developing and developed countries. Increasing women's representation on BoD over time was mainly rooted in ethical/political and economic motives (Campbell and Minguez-Vera, 2008). The economic motivation to include more women suggests that a greater diversity leads, in addition to allowing the BoD to be more representative of the firm stakeholders, to a better understanding of firm markets, its customers and employees (Campbell and Minguez-Vera, 2008).

More female BoD representation also facilitates the identification of innovation opportunities (Miller and Triana, 2009) as heterogeneous groups tend to generate more ideas and opportunities, including innovation. On this same position, previous studies have found that on gender diversity has a positive impact on innovation as measured by R&D investments (Chen et al., 2016; Midavaine et al., 2016, Miller and Triana, 2009, Rossi et al., 2017) as well as by the number of patents and citations (Chen et al., 2015). Furthermore, the presence of more women on BoD has been found to lead to several benefits such as increasing the value of the firm (Carter et al., 2003). Among the other benefits to be credited to women directors, it would appear that they show greater attendance than men at board meetings (Adams and Ferreira, 2009), they better assume their supervisory role (Campbell and Minguez-Vera, 2008) and seem to possess excellent information processing capabilities (Gul et al., 2011). Women directors have also been associated with more creativity, higher input of new ideas and better decision-making abilities (Adams and Ferreira, 2009, Bear et al., 2010, Erhardt et al., 2003. Díaz-García et al., 2013, Huse and Solberg, 2006). Additionally, female directors generally benefit from a broader social network, which allows for greater access to information that could positively affect innovation opportunities (Miller and Triana, 2009). The literature on gender diversity inside the boardroom also suggest that women directors usually have superior academic backgrounds and more varied expertise than their male counterparts (Hillman et al., 2002). In addition, they are more communicative (Bear et al., 2010; Hillman et al., 2007) and may bring new insights to the BoD (Daily and Dalton, 2003). In this sense, they bring a different perspective on strategic issues, allowing for a better diversified reasoning (Hillman et al., 2002; Westphal and Milton, 2000).

Gender diversity has also sometimes led to more in-depth analysis through aspects such as "critical mass" to increase firm financial performance (Isidro and Sobral, 2015, Joecks et al., 2013, Johennesse and Chou, 2017, Konrad and Kramer 2006, Konrad et al., 2008) or innovation (Torchia et al., 2011). According to the notion of critical mass, the presence of women on the BoD should not be reduced to a symbolic aspect (only one or two), because a larger number could contribute to accentuate their contribution and influence.

Following a "critical mass logic", Torchia et al. (2011) analyzed the effects of the presence of one, two and three (and more) women on the board on innovation. Their results showed that the presence of three or more women ("critical mass") increased organizational innovation more significantly. Despite these interesting results, more research is required regarding the influence of gender diversity among upper echelons on innovation (Miller and Triana, 2009; Ruiz-Jiménez et al., 2016) as the study of a higher presence of women as a determinant of innovation has only recently been explored more extensively.

Arguments from RDT suggests the importance of directors in the acquisition of critical resources and makes it possible to present several plausible explanations for the contribution of females sitting on the BoD, as the previous lines highlight. Indeed, based on RDT, a woman director is itself a potential strategic resource that could potentially enhance innovation. Indeed, because innovation decisions can be particularly complex, the potential influence of women directors is even more crucial given the various attributes presented earlier (e.g., women directors bring different perspectives and have better decision-making abilities). Other elements mentioned earlier reinforce the prediction of the positive impact boards' gender diversity on organizational outcomes such as innovation performance from a resource dependency perspective (e.g., women directors are more communicative and benefit from a broader social network) as it shows the capacity of women directors to help the firm establish channels of communication between their organization and external actors as well as advising it on important issues; which could be both crucial elements for innovative purposes. Thus, we can anticipate that:

H1: *Gender diversity within the BoD is positively related to innovation performance.*

Cultural Diversity and Innovation

Cultural diversity has often been represented by national or racial/ethnic variation within a group. These terms are often equated through the term "cultural diversity" as their theoretical underpinnings and empirical operationalisations often resemble each other. Cultural diversity is also often closely linked to gender diversity mainly because both refers to similar ethical debates. A rich literature attests of this proximity through studies investigating simultaneously national or ethnic diversity as well as gender diversity at the BoD level (e.g., Brammer et al., 2007, Carter et al., 2010, Miller and Triana, 2009, Ruigrok, 2007, Ujunwa, 2012, van der Walt and Ingley, 2003, Zainal et al., 2013). Interest in the area parallels globalization (Veen and Elbertsen 2008) as the diversity of nationalities could be the consequence of the governance system of the country in which the firm is established, and the fact that large firms are largely multinationals would increase the need for foreign directors. It is therefore surprising that the diversity of nationalities within governance bodies has not received much attention given that it would be an important dimension for strategic decision-making in upper echelons (Nielsen and Nielsen, 2010) and could result in an increase in performance (van Veen and Marsman, 2008). A survey of the 80 largest multinationals found that the number of foreign directors increased from 36.6% to 75% (Staples, 2007) between 1993 and 2003. This rapid increase supports the relevance of studying cultural diversity within the BoD, especially given that only a few studies have explored the role of this concept in the context of multinational organizations.

However, authors that did investigate cultural diversity have associated it various benefits. For example, the appointment of foreign directors would lead to a better attraction of foreign investors in order to foster a firm's internationalization (Oxelheim and Randøy, 2003) and to a greater willingness to penetrate foreign markets (Oxelheim et al., 2013, Ramaswamy and Li, 2001). This could be attributed to the fact that foreign directors would have natural advantages over their local counterparts to process information from their home country and an ease to find solutions that would improve decision-making (Chen et al., 2008; Luo 2005). Another advantage of BoD cultural diversity is that it may generate higher quality and more realistic ideas (McLeod et al., 1996) as members would be selected from a larger pool of candidates (Chen et al., 2008). These elements could partly explain why Miller and Triana (2009) found a positive and significant relation between BoD' racial diversity and innovation; suggesting that diverse ideas, opinions and information brought by racially diverse boards increase firm innovation. More ethnically diverse boards were also found to be positively related with higher market capitalization (Mi Choi et al. 2012; Singh,

2007), seemed to be generally more independent (Mi Choi et al., 2012) and include directors with more advanced studies (Singh, 2007).

However, many other elements support the fact that cultural diversity does not seem to contribute in fostering innovation. For example, Goodstein et al. (1994) pointed out that the diversity of BoD could be a barrier to consensus for important decisions while Carter et al. (2003) argued that ethnic minorities could be marginalized. Because innovation discussions are inherently important and usually require a minimum of consensus, it implies that cultural diversity could curb innovation performance. In addition, Midavaine et al. (2016) similarly suggested that people-related differences tend to pit groups against each other, while Kim and Kim (2015) noted that diversity could, at some point, limit the potential BoD's contributions in terms of resources. Thus, despite the benefits that may be associated with cultural diversity such as a greater internationalization capacity for firms, it seems that a foreign director might constantly be returned to its minority position (Westphal and Milton, 2000) and curbed in its contributions (Ruigrok et al., 2007), which might considerably restrain innovation performance. This position is also supported by a set of other studies whose results are not very eloquent when it comes to cultural diversity, whether in terms of nationality or ethnicity. As an example, Wang and Clift (2009) have not been able to conclude of a significant link between racial diversity and performance. The study by Carter et al. (2010) was more categorical in highlighting its negative impact on specific financial indicators such as ROA and Tobin's Q. More recently, Frijns et al. (2016) made a similar finding based on these same financial indicators.

Under RDT, independent and foreign directors are generally those who assume the resource dependency roles (Johnson et al., 1996) and it should be noted that demographic diversity has generally been associated with poorer communication and increasing conflict (Di Tomaso et al., 2007), which could also represent important barriers to innovate. Overall, cultural diversity seems to be more relevant for internationalization rather than for innovation. This position is consistent with Pfeffer and Salancik's (1978) statements that the recruitment of directors should be in line with the needs of the organization, implying that each type of director would have their own attributes that could benefit their firm. In that case, recruiting culturally diverse board members could mainly be supported by the willingness of a firm to penetrate new foreign markets. Thus, one of the tensions under RDT is the resolution of the relationship among cultural diversity, internationalization and innovation. The main arguments explaining how cultural diversity could increase innovation performance is to state that it could lead to a grater heterogeneity in terms of professional experiences and values (Chen et al., 2008). However, it would not be rational to argue that it would systematically be the case. Indeed, a pool of local directors could be much more diverse in terms of experiences and values than a BoD reporting a strong cultural heterogeneity. Considering these elements, it becomes important to underline that innovation and internationalization strategies are sometimes considered as divergent strategies, and that the second is generally a consequence of the first (Kyläheiko et al., 2011). This could be partly explained by fact that as both strategies usually require colossal investments and inevitably lead to financial losses over a certain period. Thus, if cultural diversity is rather relevant for internationalization purposes, it would be hard to argue that it would also be beneficial for innovation. The present discussion leads to the following assumption:

H2: *Cultural diversity within the BoD is negatively related to innovation performance.*

Age Diversity and Innovation

Although business researchers have paid very little attention to age diversity (Ali et al., 2014) and its relation to innovation (Cady and Valentine, 1999), some authors have expressed a desire to shift attention towards more specific issues like the real importance of diversity types such as age diversity among the BoD (van der Walt and Ingley, 2003). Directors' age diversity is also a concept of interest given the common representation of the BoD has an "old boys club" (Burgess and Tharenou, 2002; Kim, 2005). An explanation can be found in the paper of Kang et al. (2007) which stats that Australian firms seem to place more emphasis on the experience of older directors than on the dynamic and new ideas provided by younger groups. These authors also found that the "70 years and over" and "41 and under" groups were the least

represented on Australian Boards. This observation is supported by the fact that that board members are usually people with significant experience, which leaves very little room for a "generational diversity".

Furthermore, the focus on this variable is particularly relevant given that the scant literature on the subject is rather divided (Ali et al., 2014). This last observation is not solely based on the cross-fertilization of different studies, as mixed results are found within individual articles. For example, (Wegge et al., 2008) concluded that age diversity allows better group performance for routine tasks but had a negative impact on complex tasks. In the same vein, Galia and Zenou (2012) found a positive and significant link between age diversity and product innovation but reported an insignificant relationship with marketing innovation and a negative impact on organizational innovation.

On their side, Mahadeo et al. (2012) noted that age diversity was a positive factor in the presence of other independent variables such as the proportion of women and the proportion of independent directors. As a result, these authors concluded that a heterogeneous BoD was a better choice for performance purposes. In the Italian context, Daveri and Parisi (2015) examined the impact that the age of directors can have on innovation and productivity. Their main conclusion was that having an aged BoD had a negative impact on both. Abdullah et al. (2017) and Ali et al. (2014) also found a negative relationship between BoD age diversity and financial performance in the Malaysian and Australian contexts, respectively. These results could be due to the lack of communication and trust that can result from having a BoD made up of directors from various age groups (Mahadeo et al., 2012). Another argument advanced to explain the negative impact of age diversity suggests that an homogeneity at this level would allow to have directors that represent valuable resources; while conversely, diversity would tend to engender negative behaviors due to psychological groupings (Ali et al., 2014). Kunze et al. (2011) came to a similar conclusion, arguing that age diversity could contribute to the emergence of an age-discriminating climate between more experienced and less experienced directors. In addition, they concluded that the "hostile climate" resulting from this context could negatively affect the overall performance of the firm. In addition to the results supporting the positive or negative impact of age diversity, we also note that some studies have failed to establish a significant link between this variable and organizational benefits such as innovation (Midavaine et al., 2016) or operational efficiency (Siciliano, 1996).

RDT emphasises the role of the BoD in building relationships between the firm and its external environment through the ability of directors to access important resources in their respective environments (Pfeffer and Salancik, 1978). This suggests the need for representation of several age groups, and thus the potential positive effect of age diversity. On the one hand, older directors could certainly add value through the expertise they have developed over the course of their career, the experience they have gained and their in-depth knowledge of the different environments in which they have evolved. On the other hand, the vision and skills of a younger generation, having grown up with the digital revolution and being full of ambition, seem equally essential in a world constantly faced with change; specially given that long tenure leaders tend to resist change (Miller, 1991). In this sense, the BoD can be seen as a sport team in which more experienced players provide some stability and act as advisers. Nevertheless, even if they are recognized for their better judgment and their role in increasing both the independence of the BoD and the performance of the organization, older directors would also generally be more conservative and more risk averse (Muth and Donaldson, 1998). The fact that innovative projects inevitably lead to some risk-taking may suggest that older directors may not support such initiatives. However, the experiences, expertise, knowledge, networks and other resources acquired by these directors during their career remain crucial assets for innovation. In addition, these elements ensure that the BoD will be able to bring legitimacy/prestige to the organization and have a better ability to link their firm to its external environment through their extensive networks, which are two crucial board roles (Pfeffer and Salancik, 1978). On their side, younger directors would bring some "freshness" and be more apt to take risks (Muth and Donaldson, 1998). In the context of this study, it is important to specify that risk is not considered in its pejorative sense, because any innovation implies a certain amount of risk taking. Another significant element regarding younger generations is that they are generally "more connected". Although innovation is not necessarily associated with technology, it remains often closely linked to it. All the benefits provided by older generation could therefore lose their value if they are not aligned with the technological edge or societal evolution. In sum, RDT put forward the

need for diversity by stating that organizations should benefit from all the resources that each director bring to the board (Pfeffer and Salancik, 1978). As such, RDT supports the inclusion of both younger and older directors, rather than the exclusion of one to the detriment of the other. In this sense, we postulate that:

H3: *Age diversity within the BoD is positively related to innovation performance.*

METHODOLOGY

Sample and Data Collection

Our sample consists in the world's top 100 most innovative firms as established by Forbes in 2017. A similar approach has been used by several authors who relied on a sample based on Fortune 500 or Fortune 1000 to study financial performance (e.g., Baysinger et al., 1991, Carter et al., 2003, Pearce and Zahra, 1992). Three firms were excluded for missing data and our final sample accounted 97 firms, totalizing 1027 directors. In order to collect data, we consulted the annual reports of each firm. Directors hired in the reference year were not considered, as their impact on innovation performance during their first months in office would be negligible. "Emeritus" directors and any other non-voting directors were also excluded as suggested by Torchia et al. (2015). Several other sources were mobilised to collect data, including the Boardex database and other specialised websites such as Bloomberg and MorningStar. When necessary, we also contacted some of firms to gather some missing or additional information. It is also fundamental to note that to address endogeneity, and because the impact of BoD' decisions on performance takes a certain time to materialize (Ntim et al., 2012), this study uses a one-year lag between the independent variables and the dependent variable, (Chen, 2014; Coles et al., 2008; Guldiken and Darendeli, 2016).

Independent Variables

Gender diversity has been measured by Blau Index (Bantel and Jackson 1989, Campbell and Minguez-Vera 2008, He and Huang 2011), represented by the formula (1-Σp2i). This measure allows us to observe the dispersion of observations across a given number of categories (Blau, 1977). Midavaine et al. (2016) mentioned its relevance in their study that focused on the influence of BoD diversity on R&D expenditures. In addition, recent scientific papers tend to favor this index in the study of diversity (Heyden et al., 2015, Kim, 2014, Kim and Kim, 2015, Kılıç and Kuzey, 2016, Reguera-Alvarado et al., 2017), even if it presents its share of disadvantages (Rushton, 2008).

The cultural dimension considered in our analysis is quite broad as it considers both racial/ethnic diversity (Carter et al., 2003, 2010; Erhardt et al., 2003; McLeod et al., 1996; Triana, 2009; van der Walt and Ingley, 2003) and nationality diversity (Nielsen, 2010, Ruigrok, 2007, van Veen and Elbertsen, 2008; van Veen and Marsman, 2008). Extant literature shows that the variables "ethnic diversity" and "nationality diversity" have rarely led to conclusive results when considered individually. Thus, the combination of the two may help to avoid this problem and make our approach more salient. There are two categories of cultural diversity. The first relates to directors who are of an ethnicity or nationality different from the majority of which their Board is constituted and the second includes directors from the dominant nationality or ethnicity on the board. We also use a Blau Index to measure this variable.

As for Age diversity measure, our approach is inspired by the categorization of Kang et al. (2007), which was more recently borrowed by Galia and Zenou (2012) and differs a little from that of Mahadeo et al. (2012). It contains five age categories: (1) 40 years and less; (2) 41 to 50 years; (3) 51 to 60 years; (4) 61 to 70 years and (5) over 70 years. The Blau index will be used again to measure this variable. Table 1 summarises the measures of each independent variable.

TABLE 1
SUMMARY OF THE INDEPENDENT VARIABLES

H	Variable	Symbol	Measure
H_1	Gender Diversity	Blau_Gdr	Blau index (1−∑p2i) including two categories.
H_2	Cultural diversity	Blau_Cult	Blau index (1−∑p2i) including two categories.
H_3	Age diversity	Blau_Age	Blau index (1−∑p2i) including five categories.

Control Variables

In order to constitute a broader analytical framework that would consider factors that go beyond the diversity of directors, and to diminish the risk of omitting relevant concepts that could explain innovation performance, several control variables were introduced. Of the five control variables included in our models, two relate to the directors: BoD's independence and size, which is in line with several studies (e.g., Anderson et al., 2003; Chen et al., 2016; Faleye et al., 2011; Hillman, 2005; Muller-Kahle and Lewellyn, 2011; Neville et al., 2019). The other three relate to the organization: size, sector and region of the firm. These variables have also been widely used to control the effect of directors on organizational outcomes (e.g., Ben Rejeb et al., 2019; Doucouliagos et al., 2007; Héroux and Fortin, 2016). Table 2 presents the symbol of each control variable and how it is measured.

TABLE 2
SUMMARY OF THE CONTROL VARIABLES

Variable	Symbol	Measure
Independence of the BoD	IND	Firms with a BoD that is considered as independent (more than 50% of external directors.
Size of the BoD	BoD_Sz	Total number of directors
Size of the firm	Firm_Sz	Natural Log of the total number of employees
Sector	IT_Elec_SM	Computer, electronical and semi-conductorial firms.
	Pharm_Bioteh	Pharmaceutical and biotechnological firms
	CG	Consumer goods firms
	MNF	Manufacturing firms
	SRV	Service firms
Region	AM	Firms based in America (North and South America)
	EU	Firms based in Europe
	AS	Firms based in Asia

Dependent Variable

Our dependent variable is the innovation premium. It is expressed in percentage and obtained using an algorithm from Credit Suisse (Holt). The result comes from the calculation of the difference between market capitalization and the net present value of cash flows (Forbes, 2017). This difference represents a bonus given by investors compared to the estimate of a profitable growth of the company. To be more precise, this indicator is the result of the projection of cash flows (without growth), the analysis of the net present value (NPV) of these cash flows and the comparison between the basic value and the total value (TV) of the company. Thus, firms with a TV higher than the NPV have an innovation premium that is integrated into the price of their shares. Thus, the innovation premium considers to what extent the current valuation of a firm exceeds the present value of business. The main reason is that investors would primarily bid above the actual stock price as they expect growth and that this growth comes mainly from introducing new products and services, and/or entering new markets, which refer to innovation. The innovation premium is even more interesting because it considers various criteria that support the rigour of its conception. For

example, Forbes only considered companies with at least seven years of financial statements and with a market capitalization of at least $ 10 billion. More detailed information on the conception of the innovation premium can be found on Forbes website.

RESULTS AND DISCUSSION

Descriptive Statistics

Our findings indicate that 19.64% of women sit on BoDs of the most innovative firms in the world as ranked by Forbes, while 15% of firms in our sample have no female director and 19% have only one. These results are consistent with many studies reporting the underrepresentation of women directors (e.g., Carter et al., 2003, Galia and Zenou, 2012, Johennesse and Chou, 2017, Kang et al., 2007; Mahadeo et al., 2012, Torchia et al., 2011). It also confirms the unicity of the Norwegian context, which remains an example in terms of increasing the representation of women on BoDs (Kakabadse et al., 2015). However, female directors are more prominently represented in our sample compared to previous studies. As an indication, Miller and Triana (2009) found a female proportion of around 13%, Kang et al. (2007) and Carter et al. (2003) 10%, Torchia et al. (2011) and Reguera-Alvarado et al. (2017) 7%, Galia and Zenou (2012) 6% and Mahadeo et al. (2012) 3%. Our results are closer to those of Midavaine et al. (2016) who reported a proportion of 25%. On the other hand, the relatively high averages of female directors that we found for American and European companies could be a consequence of initiatives taken in recent years by many Western countries (see Terjesen et al., 2015). In this continuity, Lawrence Loh, a professor at the National University of Singapore Business School, pointed out that, except for Malaysia, Asian countries have not followed the trend of setting quotas at this level, which could explain the low gender diversity in the board of Asian firms (Forbes, 2018).

In terms of descriptive statistics related to cultural diversity, we notice a slightly higher proportion (24.07%) than that of women (19.64%). However, this result is far from reflecting the same reality as the one described by Staples (2007) with respect to the rapid growth in the number of foreigners on BoDs of the 80 largest multinationals that made up their sample. Knowing that the process of internationalization is often mentioned as a reason for recruiting foreign directors (Oxelheim and Randøy, 2003, Oxelheim et al., 2013, Ramaswamy and Li, 2001), the fact that European firms stand out in terms of cultural diversity within the BoD can be attributed to their willingness to internationalize their businesses. For their part, firms established in Asia and America would benefit from a "default internationalization", especially because they represented the two main world economic powers, that is, the United States and China.

Regarding age, the average Blau Index (0.6052) reflects a certain diversity given the consideration of five categories. Moreover, we find that this diversity revolves around three categories. These categories are those aged 41 to 50, 51 to 60 and 61 to 70, which is in line with the results of several authors who also noted that the two categories in the extreme (those under 41 and over 70 years) are very poorly represented on BoD (e.g., Galia and Zenou, 2012, Kang et al., 2007, Mahadeo et al., 2012). There seems to be a certain consensus as to directors' age, which results in a reluctance to hire both younger (under 41) and older (over 70 years) members. Table 3, 4 and 5 present the descriptive statistics for continuous and categorical variables, respectively.

TABLE 3
DESCRIPTIVE STATISTICS

Variable	Minimum	Maximum	Mean	Std-Dev	Median
Blau_Gdr	0,0000	0,4959	0,2856	0,1547	0,3367
Blau_Clt	0,0000	0,5000	0,2975	0,1877	0,7025
Blau_Age	0,2778	0,7692	0,6052	0,1020	0,6281
IND	0%	100%	68,36 %	23,85 %	77,78 %
BoD_Sz	5	15	11	2	10
Firm_Sz	205	527180	43572	8267	13 539

TABLE 4
SECTOR DISTRIBUTION

Sector	#	%
IT_Elec_SM	24	24,70
Pharm_Biotech	20	20,60
CG	21	21,60
SRV	15	15,50
MNF	17	17,50
Total	97	100

TABLE 5
GEOGRAPHICAL DISTRIBUTION

Region	#	%
America	53	55,60
Europe	22	22,70
Asia	21	21,70
Total	97	100

Table 6 presents the correlation matrix of all our variables. It shows that Firm size and European firms are negatively and significantly correlated to innovation performance. There is also a significant correlation between gender diversity and cultural diversity. This last result is in line with those of Carter et al. (2003) and Singh (2007) that suggest the increase in the number of women on the BoD is associated with the increase in the number of culturally diverse directors. We also found that Cultural diversity is positively correlated with the independence of the BoD, which is consistent with the findings of Mi Choi et al. (2012) and Carter et al. (2003).

At this stage, we must point out that all conditions have been met in order to drive our regressions. Indeed, the premises related to normality (95% of the standardised residuals are included in the interval [2; +2]), heteroscedasticity (a Levene test for the variable « standardised residuals » revealed a nonsignificant result), linearity (the « P-P plot » of the standardised residuals showed that the points on the graph tend to converge towards the straight line), autocorrelation (the Durbin Watson value of all models is between 1.5 et 2.5) and multicollinearity (the variation inflation factor is smaller than 10 for all variables) have all been respected. Thus, all our measures have been validated and did not required any adjustments.

TABLE 6
CORRELATION MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1														
2	0,05	1													
3	-0,14	0,40**	1												
4	0,05	-0,13	0,28**	1											
5	0,12	0,03	-0,21*	-0,07	1										
6	-0,20*	0,18	0,32**	0,211**	-0,8	1									
7	-0,39**	-0,01	0,05	0,02	0	0,27**	1								
8	0,04	-0,02	-0,18	-0,09	0,47**	0,02	-0,08	1							
9	-0,29**	0,07	0,12	0,08	-0,19	0,13	0,27**	-0,61**	1						
10	0,25*	-0,04	0,09	0,02	0,38**	-0,16	0,18	0,59**	-0,29**	1					
11	0,15	-0,09	-0,19	0,06	-0,04	-0,21**	0,17	-0,02	-0,14	0,16	1				
12	0,15	-0,01	-0,08	-0,01	0,13	-0,14	-0,28**	0,15	-0,05	-0,14	-0,29**	1			
13	-0,08	-0,03	0,10	-0,01	-0,03	0,28**	0,17	0,02	-0,05	-0,03	-0,30**	-0,27**	1		
14	-0,15	0,15	0,08	-0,15	0,06	-0,10	0,14	-0,02	0,11	-0,09	-0,25**	-0,22*	-0,23**	1	
15	-0,09	-0,02	0,12	-0,07	-0,10	-0,02	0,16	-0,13	0,14	0,02	-0,26**	-0,24*	-0,24**	-0,20*	1

Significance (two-tailed): * p < 0,05 ; ** p < 0,01.

Dependent variable: 1.Innovation premium

Independent variables: 2.Blau_Gdr ; 3. Blau_Clt; 4. Blau_Age.

Control variables: 5.IND ; 6.BoD_Sz ; 7.Firm_Sz ; 8.AM ; 9.EU ; 10.AS ; 11.IT_Elec_SM; 12.Pharm_Biotech 13.CG ; 14.SRV ; 15.MNF

Additional notes : Blau_Gdr represents gender diversity; Blau_Clt represents cultural diversity; Blau_Age represents age diversity; IND represents board independence; BoD_Sz represents board size; Firm_Sz represents firm size; AM represents American firms; EU represents European firms; AS represents Asian firms; IT_Elec_SM represents information technology, electronics and semi-conductors firms; Pharm_Biotech represents pharmaceutical and biotechnological firms; CG represents consumer goods firms; SRV represents service firms; MNF represents manufacturing firms

Hypotheses Testing

We test our hypotheses using multiple linear regressions (see table 7). Our results show that Gender diversity is positively and significantly ($p < 0.10$) related to innovation performance in all the models in which it appears, which slightly support H1. Our results align with the argument that women directors are more creative, bring more input into new ideas, and have an ability to help the BoD make better decisions (Adams and Ferreira, 2009; Campbell and Minguez-Vera, 2008; Dalton 2003, Erhardt et al., 2003, Diaz-Garcia et al., 2013, Huse and Solberg 2006, Rossi et al., 2017, Ruiz-Jimenez et al., 2016). Moreover, this result is consistent with studies indicating that female directors contribute to diversifying the BoD in terms of expertise and knowledge (Bear et al., 2010; Hillman et al., 2002), to bringing a different perspective (Daily et Dalton, 2003; Hillman et al. 2002; Westphal et Milton, 2000), and to facilitating the identification of opportunities to innovate (Miller and Triana, 2009). In this sense, our work is in line with the extant literature that have been able to conclude of the positive impact of gender diversity on organizational outcomes such as financial and innovation performance (e.g., Adams et Ferreira, 2009; Böhren et Ström, 2010; Campbell et Mínguez-Vera, 2008; Carter et al., 2003; Chen et al., 2015; Gordini and Rancati, 2017; Mahadeo et al., 2012; Midavaine et al., 2016; Miller and Triana, 2009; Torchia et al., 2011).

In relation to RDT, our findings reinforce the view that considers women directors as valuable resources and would help, among other things, to ensure that the board better assumes its roles in helping the organization build relationships with external actors as well as give it privileged access to the various resources it needs. It should be noted that the positive relationship between gender diversity and innovation performance is even more striking given that our descriptive statistics have shown that female directors are poorly represented. For the same reason, knowing that the average of female director presence was only of 19.64%, this confirms that the minority opinion in the upper echelons could potentially be a source of innovation (Smith and Tushman, 2005). Moreover, our findings suggest that the concept of "critical mass" (Isidro and Sobral, 2015, Johennesse and Chou, 2017, Joecks et al., 2013, Konrad and Kramer, 2006, Konrad et al., 2008, Torchia et al., 2011), which implies that the presence of at least three women on the Bod is required to yield a greater impact on firm performance, could lead to even more significant results. Our study therefore supports initiatives to increase gender diversity within BoDs since it does not represent a hindrance to innovation, but quite the opposite. Thus, even if an initiative to integrate more women directors does not necessarily lead to better financial or innovation performance, organizations could at least benefit from their information processing capabilities (Gul et al., 2011), creativity, higher input of new ideas and better decision-making abilities (Adams and Ferreira, 2009, Bear et al., 2010, Erhardt et al., 2003; Díaz-García et al., 2013, Huse and Solberg, 2006). In this sense, even if some authors rightly argue that a greater gender parity within BoDs is not necessarily a guarantee of better performance (Ruigrok et al., 2007), the view that considered minorities less business-oriented (Wang and Coffey, 1992) become less accepted (Ruigrok et al., 2007), which legitimize even more the need for more women on BoD.

Our second hypothesis (H2), that predicts a negative impact of cultural diversity on innovation performance, is also supported ($p < 0.05$) and is consistent with previous studies that have established a non-significant or negative relationship on performance (e.g., Carter et al., 2010; Frijns et al.; 2016; Wang and Clift, 2009). Thus, it seems that individuals' mental patterns from different horizons on a BoD may represent barriers to innovation performance because of differences in opinions and poor cohesion (Goodstein et al., 1994, Nielsen and Huse, 2010, Punnet and Clemens, 1999). This finding also suggest that culturally diverse directors could constantly be returned to their minority position (Westphal and Milton, 2000), curbed in their contributions (Ruigrok et al., 2007) and marginalized from the decision-making process (Carter et al., 2003, Ruigrok et al., 2007, Westphal and Milton, 2000). Similarly, this reinforces the suggestions of Midavaine et al. (2016), which stipulate differences on a personal level would tend to pit groups against each other. This result is also in line with Kim and Kim (2015) that indicated how diversity may to some extent limit the potential for BoD resources. Beyond these facts, we note that this negative link refers to the same problem identified for gender diversity: low representation. In this continuity, the concept of "critical mass" mentioned above could also be of great relevance when it comes to cultural diversity and could possibly lead to different results.

Age diversity did not yield significant results. We have therefore not been able to support the relevance of having a certain balance at this level (Kang et al., 2007, Mahadeo et al., 2012) along with the negative or positive effect assumptions made by different authors (e.g., Abdullah et al., 2017; Ali et al., 2014, Kunze et al., 2011; Galia and Zenou, 2012, Wegge et al., 2008). Rather, we converge with an important part of the literature that has failed to establish any relationship between the directors' age diversity and various organizational outcomes (e.g., Midavaine et al., 2016, Siciliano, 1996). The problem may lie in the fact that the few contributions that have studied age diversity at the board level show a certain redundancy in its measurement. The authors would therefore benefit from being more original at this level in the future. Another even more plausible explanation is that there seems to be a consensus among organizations regarding the composition of their BoD in terms of age, which our descriptive statistics revealed. Thus, this implies very small variations from one firm to another and makes it difficult to establish links between this board characteristic and innovation performance.

Beyond the independent variables, it also seems relevant to underline the major role that certain control variables seem to play regarding innovation performance. First, having a BoD whose majority of directors are independent has been a determining factor through its positive and significant impact on innovation performance. This finding contradicts several studies who mentioned the benefits of having more internal

directors for innovative purposes (e.g., Deutsch 2005, Hoskisson et al., 2002, Kor 2006, Zahra 1996, Zona et al. 2013, Xie et al., 2003). It could be explained by the fact that being independent is not enough and becomes beneficial only when this type of director has, for example, an extensive experience if the focal industry of its firm (Guldiken and Darendeli, 2016) or that it has completed university studies is Ivy League universities (Dalziel et al., 2011). This suggest that scholars should go beyond the aspect of independence to analyse what is the added value that this type directors bring to the board. As for the size of the firm, the regressions showed that the more it increases, the more the innovation performance of the organization decreases. This is not in line with several past studies that have argued that large firms would be the most innovative (e.g., Miller and Triana, 2009), often under the pretext that they generally have higher financial capacities (Damanpour, 2010). In terms of the region, the regressions showed that Asian firms were more innovative compared to US firms. This observation is rather counter-intuitive, and therefore more interesting. The rise of the Chinese economy in recent years, however, does not make it so surprising.

Given that corporate governance would be endogenous in general (Adams et al., 2010; Adams et al., 2015), it was essential to tackle one of the main problems related to endogeneity: the potential omission of variables that could explain the phenomenon under study. We partially address this concern by considering multiple control variables at various levels (BoD, organization and environment). The results regarding the independent variables remained the same with and without the inclusion of the control variables. Also, another issue with endogeneity is reverse causality (Adams and Ferreira, 2009). It suggests that it might be the most innovative firms that put in place diverse BoD and not necessarily diverse board that are more innovative. To verify the direction of the relationship, we regress the dependent variable on all independent and control variables. The results reveal nonsignificant relationships for all of them, thus supporting that the directions goes from BoD diversity to innovation performance, not the opposite. Thus, the one-year lag between the independent variables and the dependent variable, the inclusion of multiple control variables and the test of reverse causality support the robustness of ours results.

TABLE 7
RESULTS OF THE MULTIPLE LINEAR REGRESSION

Variable \ Model	1	2	3	4
Blau_Gdr		0,042*	0,100*	0,087*
Blau_Clt			-0,095**	-0,094**
Blau_Age				-0,099
IND	0,050**	0,053**	0,051**	0,051**
BoD_Sz	-0,001	0,008	0,001	0,002
Firm_Sz	-0,014**	-0,014**	-0,013**	-0,013**
EU	-0,032	-0,032	-0,029	-0,027
AS	0,053**	0,060**	0,062**	0,061**
IT_Elec_SM	0,004	0,003	0,004	0,005
CG	-0,018	-0,019	-0,025	-0,027
SRV	-0,042*	-0,045*	-0,049*	-0,054*
MNF	-0,014	-0,015	-0,018	-0,0018
R2	0,229	0,232	0,256	0,265
Adjusted R2	0,149	0,143	0,160	0,159
F	2,732***	2,605***	2,659***	2,517***

Significance : * $p < 0,10$; ** $p < 0,05$; *** $p < 0,01$.

Additional notes : Blau_Gdr represents gender diversity; Blau_Clt represents cultural diversity; Blau_Age represents age diversity; IND represents board independence; BoD_Sz represents board size; Firm_Sz represents firm size; AM represents American firms; EU represents European firms; AS represents Asian firms; IT_Elec_SM represents information technology, electronics and semi-conductors firms; Pharm_Biotech represents pharmaceutical and biotechnological firms; CG represents consumer goods firms; SRV represents service firms; MNF represents manufacturing firms

CONCLUSION

The purpose of this study was to investigate on the influence of board diversity on innovation performance based on a sample of 97 firms that included 1027 directors. From a resource dependency perspective, it has shown that surface level diversity of the BoD is indeed likely to affect the organizations' innovation performance. Concretely, our findings highlight the positive and significant impact that gender diversity had on innovation performance. Conversely, cultural diversity was negatively and significantly related to innovation performance. Thus, even though age diversity did not lead to significant results, our findings generally support the argument of Cady and Valentine (1999) suggesting the relevance of "visible characteristics" for explaining organizational outcomes.

Our approach responds above all to the call of several researchers who have emphasized the need to analyze the link between the directors' diversity and innovation (e.g., Jaskyte, 2012, Rao and Tilt, 2016, Torchia et al., 2015). In addition, and while the majority of extant research measure innovation performance by using R&D spending, our use, for the first time, of the innovation premium contributes to add a new measure to the literature that addresses the potential contribution of the BoD to innovation performance. Finally, in addition to identifying the types of surface level diversity that stand out the most through their impact on innovation performance, we have also highlighted the importance of various other factors such as the size of the firm, its sector and the geographical context in which it operates.

From a more practical point of view, having considered companies that are considered as benchmarks for innovation performance, the results of our descriptive statistics and correlation tests alone are interesting lessons to be learned in terms of BoD diversity for all firms seeking to improve their performance at this level. As for the results of multiple linear regression, several concrete recommendations could be made for organizations aiming to improve their innovation performance. First, firms would benefit from ensuring that their BoD are gender diversified. In addition, it would seem more optimal that an increase in cultural diversity does not happen simultaneously through both ethnicity and nationality, as it might enhance problems associated with psychological groupings. For innovation performance purposes, we also recommend that firms ensure that their board is composed of a majority of independent directors and that they keep in mind that being a large firm (in terms of number of employees) is far from being a guarantee of superior performance, on the contrary. Our findings also highlight the need for firms working in the services industry to take initiatives to improve their innovation performance and for US and European organizations to take full stock of the growth of Asian firms at this level.

Despite its originality and contributions, our study has several limitations. These reside mainly in the empirical approach that has been adopted. First, there is no consensual agreement on the measurement of innovation performance, and the use of a variable that is still largely unknown raises questions about its validity. Nevertheless, in the face of criticism of the more conventional measures, we cannot stress enough the need to test other possible measures. In that continuity, it would have been relevant to include R&D investments, which is the most proxy of innovation, in the analysis. However, the fact of having many Asian firms in our sample made if very difficult to obtain such information since the disclosure of these types of information are not as transparent as in other regions. Secondly, our sample (97 firms and 1027 directors) remains small for our results to reach any generalization. Moreover, the fact of considering a classification that groups together what is considered as the most innovative firms implies that it can be contested even if it comes from a reputable source. We must also admit that a study adopting a quantitative approach does not allow for a thorough understanding of the established relationships, although it has its share of advantages. Indeed, the multiple linear regression allow to suppose links that are direct, whereas the link between BoD diversity and innovation performance could also be moderated and/or mediated by other variables.

Forcefully, we insist on the need not to indulge in the facility of taking a categorical position by saying diversity is a "good" or a "bad" thing. Our results lead us to a much more nuanced position by implying that a certain diversity seems to have many benefits, but that too much diversity, or at least certain types and/or combinations of diversity, can be problematic. As a result, we are moving in the direction of Carter et al. (2010) who stated that some functions of the BoD could benefit from the diversity of directors and

others not. Similarly, we support Midavaine et al. (2016) statement indicating that differences can sometimes be beneficial and sometimes rather harmful. Thus, and like Auh and Menguc (2005), we believe that the approach to increase diversity should not be limited to hiring people with diverse profiles. It should be followed by concrete actions such as investments in education, training and diversity management. In addition, there is still no record of the level of diversity that would be optimal. On this basis, we believe that it would be irrelevant to engage in a debate about whether diversity should be promoted or not. Indeed, it would be more useful to question the degree and type of diversity leading to positive organizational outcomes (e.g., in terms of innovation performance), and conversely, on the degree or type of diversity that would be more harmful than beneficial.

Future research could address these issues and would benefit from being conducted in specific contexts. For example, it would be interesting to rely on a sample comprised of firms located in a single country or operating in the same sector. The combination of these two considerations might be ideal to avoid any context-related bias. Moreover, it seems essential that qualitative studies seek to understand the "why" and the "how" of the relationships between the diversity of the BoD and innovation performance. Indeed, establishing statistical links does not allow to put forward concrete explanations. The difficulty of accessing the directors is certainly a major barrier (Leblanc and Shwartz, 2007), but this obstacle would make the results even more rewarding. In addition, the consideration of the entire "chain of governance" (shareholders, board of directors and top management teams) in order to analyze the impact of its composition, and especially its diversity, in terms of financial or innovation performance, represents an ambitious project that would be a great contribution both scientifically and practically.
It might not only inform on the respective influence of each governance group, but also on the impact of the interactions between them.

In conclusion, we note that the contributions, limits and avenues for future research mentioned in the previous lines attest that the relationship between corporate governance and innovation raises many questions. To date, most of them remain unanswered. When considering a concept such as diversity, this relationship becomes even more complex to deal with, as the convergence of different concepts involves the confluence of the complexities of each of them. Paradoxically, the complexity that characterizes this line of research (Governance-Diversity-Innovation) makes it even more interesting, and a field of fertile research, for whoever will try to take up this intellectual challenge.

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