



Diversity in Boardrooms and Firm Performance: The Role of Tenure and Educational Level of Board Members

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DIVERSITY IN BOARDROOMS AND FIRM PERFORMANCE: THE ROLE OF TENURE AND EDUCATIONAL LEVEL OF BOARD MEMBERS

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Abstract

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Diversity on corporate boards has been studied from different perspectives in recent decades. The present study aims at investigating the impact on firm performance of two demographic diversity traits in boardrooms: tenure and educational diversity. The extant literature does not provide aligned findings on this topic, thus further research is still needed. The authors hypothesize that both tenure and educational diversity of board members have a positive effect on firm performance. To measure firm performance two dependent variables are used, applying two models for each hypothesis investigated Tobin's Q and return on assets. The study is conducted using sample data of 187 listed firms within the European area, covering a 9-year period, from 2010 to 2018. Diversity dimensions are measured through indexes constructed on the basis of the mix among the directors in terms of educational level and tenure. The outcomes highlight a significant and positive relationship between tenure diversity on corporate boards and firm performance. In terms of the impact of educational diversity, no evidence indicating a positive effect on firm performance is found. The research carried out is unique because it considers two personal attributes of diversity calculating diversity indexes and measuring their impact on the firm's performance. The econometric approach used has not been extensively applied in previous research. In fact, the majority of previous empirical studies have measured diversity through percentages or dummy variables, depending on the type of diversity aspect being analyzed, and then used it as the independent variable.

Keywords: Board Diversity, Corporate Governance, Tenure Diversity, Educational Diversity, Firm Performance

Authors' individual contributions: Conceptualization — B.S.M., G.P., and L.P.; Methodology — B.S.M., G.P., and L.P.; Formal Analysis — B.S.M., G.P., and L.P.; Writing — B.S.M., G.P., and L.P.; Investigation — B.S.M., G.P., and L.P.; Project Administration — B.M.; Visualization — G.P.; Supervision — L.P.

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1. INTRODUCTION

For several decades, the diversity issue within the board of directors (BoD) has been investigated from various perspectives. Nowadays, the most studied aspect of diversity remains gender, mainly because, in the last twenty years, various countries have adopted mandatory requirements or voluntary recommendations regarding the minimum amount of board seats held by the less represented gender. Nevertheless, diversity is an extensive concept that should be investigated in several aspects and not only in terms of gender. Leveraging on this last consideration, recent research has shown heightened interest in attributes of diversity other than gender as drivers of the impact that heterogeneity may have on firm performance. Among the numerous features affecting the level of heterogeneity in boardrooms, scholars have given increasing interest to diversity in educational levels (usually identified as cognitive diversity) and the tenure of board members. However, international literature presents contrasting opinions on the composition of the board along with these variables. Some studies support a more homogeneous board of directors since this could lead to a common vision for approaching problems and finding solutions in a more rapid and efficient way. On the contrary, others underline how heterogeneous mindsets, raising from different educational levels, could represent new perspectives in coping with strategic issues.

Recent studies are investigating particular aspects of board diversity, other than genders, such as cultural background (Braendle, Stiglbauer, Ababneh, & Dedousis, 2020) and personal traits of directors such as educational level. As regards the impact educational levels may have on board performance, recent studies show mixed results. For example, Fernández-Temprano and Tejerina-Gaite (2020), focusing on a sample of 87 Spanish non-financial firms, investigate how diversity attributes and their influence on specific types of directors (inside directors and outside directors) impact on firm performance. The authors consider various diversity attributes and find that educational diversity has a negative and significant impact on outside directors. The authors relate this result to the social identity theory (Smith et al., 1994; Lau & Murnighan, 1998) in that educationally diverse backgrounds could result in a non-cohesive work environment. Similarly, a recent study by Boadi and Osarfo (2019) examines the educational diversity of board members on performance in the banking sector, finding that the educational qualifications of board members are relevant to the financial performance of banks. More specifically, the study underlines that board members with a first degree have a markedly positive influence on board effectiveness and bank performance while this is not the case for board members with PhDs, where a negative effect is found.

Likewise, opposite conceptual frameworks and findings can be identified referring to board-member tenure. In fact, a strand of research highlights how long-tenured members, having a better knowledge of the company, boost the growth of the firm through rapid and efficient decisions; while others put in evidence that short-tenured members bring in more innovative ideas. For example, Ombaba and

Kosgei (2017) investigate a number of board composition features (namely size, director independence, tenure, multiple directorships, and financial expertise) in relation to firm distress. Their findings indicate a positive relationship between long-tenured boards and financial distress, concluding that a long tenure could have a negative effect on a firm's performance.

Since tenure and educational level represent different aspects of the diversity issue, sometimes they are analyzed together. For example, Jebran, Chen, and Zhang (2020) measure their effects on the risk of a future stock crash. Specifically, the authors investigate a sample of Chinese firms in a ten-year period considering four attributes of diversity which they classify into relation-oriented diversity (age-gender) and task-oriented diversity (tenure and education). The results support the concept that diversity has a positive effect on performance and can lower the risk of a stock crash. In terms of education and tenure, they argue that diversity enhances monitoring capacity and improves how boards perform, thus also lowering the risk of a stock crash.

It is evident that there is a rising interest in how diversity attributes, such as educational level and tenure of board members, can affect the way in which directors approach and carry out specific tasks and, consequently, the economic and financial outcomes of the firm. Thus, if decisions concerning how to form a board have an impact on the outcomes of the firm, the question addressed in this study is whether a mix of tenured members, long and short, as well as a mix in the educational level of the directors, could actually be the winning option for bringing in all the benefits coming from these different features. The aim of this paper is to contribute to the extant literature providing more empirical evidence of the effects of tenure and educational diversity in boardrooms on firm performance.

To empirically test and measure the impact that the educational level and the tenure of board members have on firm performance, this study adopts an econometric approach based on the construction of some indexes as proxies of the diversity dimensions taken into consideration. In fact, while the majority of previous empirical studies measure diversity through percentages or dummy variables, depending on the type of diversity aspect being analyzed, and use them as independent variables, in our study, the diversity dimensions are measured through indexes. Specifically, in view of the focus of this work, these indexes are constructed on the basis of the mix among the directors in terms of the level of education and tenure. Moreover, to calculate the level of diversity, we use the standard deviation for the continuing variable (tenure), and the relative entropy for the categorical variable (education). The sample is composed of panel data of listed firms, 187 over a nine-year time span, from 2010 to 2018.

Within this theoretical and methodological framework, the paper is structured as follows. In Section 2, we present an in-depth review of the literature on the topic to show the increasing attention paid by scholars to how diversity in educational level and tenure of board members affects firm performance, followed by our research

hypotheses. The empirical model together with the dependent, independent, and control variables are described in Section 3. The results obtained are described in Section 4. The discussion of research findings is presented in Section 5. Lastly, the conclusion and limitations of the study, used as a basis to trace future research on the topic, are presented in Section 6.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The board of directors is the governing body that guides the firm and monitors the managers' behavior. Among the different roles, usually attributable to corporate boards, one of the most analyzed from a theoretical framework and empirically investigated is its duty as an institution endogenously determined to solve the agency problems characterizing all organizations (Hermalin & Weisbach, 2003). Although for ages there has been a common agreement on the relevance and the need for a company to have a board of directors (Villalonga, Trujillo, Guzmán, & Cáceres, 2019; Burkart, Miglietta, & Ostergaard, 2018; Jensen, 1993), it is relevant to highlight that they are highly costly governing bodies. Thus, it is important to understand the optimal features they should present in order to work effectively.

Acting within the agency theory framework (Jensen & Meckling, 1976; Fama & Jensen, 1983), in which the main problem arises because of the misalignment of interests between the agent (managers) and the owner (shareholders), the board is seen as the main governing body equipped to solve this issue. In this context, the effectiveness of long-tenured boards compared to short-tenured boards on firm performance is an important subject of discussion. The main point is whether long tenure could result in less effectiveness on behalf of the board. Looking at international literature, different opinions emerge. Some scholars point out that long-tenured directors are actually more useful at reducing the misalignment of interests because, having known the firm for a long time, they act by reducing the information gap between managers and shareholders (Kim, Mauldin, & Patro, 2014). From this point of view, experience and firm-specific knowledge would likely bring benefits to firm performance in terms of more effective corporate governance and monitoring. Similarly, Bonini, Deng, Ferrari, John, and Ross (2017), investigating the relationship between long-tenured directors and firm performance on a sample of S&P 1,500 firms, find that long-tenured directors acquire a wealth of skills and knowledge and show a positive effect on firm performance.

On the contrary, other studies find that less tenured directors are more effective because, being new in the company, they are more motivated and bring in a different and innovative perspective compared to the established one. Jia (2017), studying the link between directors' tenure and innovation, points out that boards with extended tenure may have difficulties in refreshing themselves and keeping up with technological developments. Long-tenure may therefore result in an attachment to established policies, thus hindering broader views and more innovative strategies.

Focusing on the context of earnings management, Ghazalat, Islam, Noor, and Abu Haija (2017) also find that longer tenure of independent directors and multiple directorships may have negative effects on corporate governance within emerging economies.

This dichotomy between the views that long-tenured boards could lead to entrenchment, while, at the same time, their longer experience and firm-specific knowledge may represent an asset that has been discussed in previous studies (Pozen & Hamacher, 2015). One strand of research has focused its attention on a curvilinear relationship between board tenure length and the effectiveness of corporate governance. For example, a study conducted by Huang and Hilary (2018) finds that long-tenured boards do contribute to enhancing firm performance due to the directors' more profound knowledge of the firm's business history. However, this is true only up to a certain threshold, after which extended tenure results in reduced effectiveness of the board. Similarly, Clements, Jessup, Neill, and Wertheim (2018) also show that long-term tenure may bring benefits in terms of firm performance for a certain number of years after which effectiveness decreases due to entrenchment, resulting in decreased firm performance.

Ciavarella (2017) investigates the relationship between board diversity and firm performance under several features, among which is tenure diversity, within a sample of European countries. The findings show that the firm performance increases when directors have a longer tenure. In this scenario, the effectiveness of tenure diversity and the role it may have on firm performance represent an increasingly relevant and worthwhile topic of investigation. Thus, the first issue we address focuses on the impact of a heterogeneous board, in terms of the tenure diversity of its members, on firm performance. In fact, most of the studies investigate tenure length, but very little research has been conducted on the relationship between board tenure diversity and firm performance. For example, Clegg and Cooper (2009) show that diversity in tenure may increase the chance of more engaging debates among board members and that tenure-diverse boards seem to increase openness to change and innovation leading to better firm performance. Positive effects of tenure heterogeneity are also found by Li and Wahid (2018), who investigate whether heterogeneity on boards can contribute to superior firm performance. Their findings highlight that board diversity, in terms of director tenure and rank, results in increased CEO performance-turnover sensitivity. These findings also highlight that tenure diversity on boards leads to fewer instances of overcompensation. The study also points out that director heterogeneity improves board effectiveness in firms that have embraced diversity at their onset and not in those where diversity has been imposed by regulatory acts. Considering the findings coming from the still little extant literature on board tenure diversity, we support the idea that tenure diversity could play a role in balancing out the negative and positive effects of long tenure on boards and, consequently, increasing firm performance. Aligned with the idea that while long-tenure directorship in some cases results in entrenchment, it may also enhance firm

performance due to longer experience and firm-specific knowledge of its directors, we believe that the mix of long and short-tenured directors could exploit all the benefits and overcome the disadvantages posed by the two options.

These considerations lead to the following hypothesis:

H1: Tenure diversity in boardrooms increases firm performance.

Education diversity refers to the level of education the various directors sitting on the same board have. Thus, in other words, it refers to the degree of studies they have achieved. Specifically, four different levels are generally taken into account: high school diploma, bachelor's degree, master's degree, and PhD. This trait is considered relevant because there is a common agreement on the fact that the level of education affects the way a person thinks, acts, and interacts with others. In fact, literature has supported the idea that knowledge and understanding derive from education and experience and various studies have underlined that higher educational levels on boards increase the board's ability to process information and embrace innovation, thus leading to increased board effectiveness. Hitt and Tyler (1991) find that types of education affect the type of strategic decision models adopted by firms. Their study points out that strategic-decision models are found to vary by industry and by executive characteristics like age, educational degree type, amount and type of work experience, and level (CEO and below). Darmadi (2013) studies firms listed on the Indonesia Stock Exchange to examine the influence of educational qualifications of both the CEOs and board members on financial performance. His findings reveal that a higher level of education among board members and CEOs has a positive impact on firm performance. Similarly, Wincent, Anokhin, and Örtqvist (2010) find that educational level diversity among board members and diverse knowledge play a role in raising discussions on innovative issues among the directors and may result in increased firm innovation. Nevertheless, numerous studies also underline that being a director does not require any specific level of instruction (Rose, 2007) and that the educational levels of board members have little or no effect on firm performance (Bruton, Ahlstrom, & Li, 2010). Other studies have shown that educational diversity can result in decreased firm performance because of the gap in terms of education existing among the directors belonging to the same board, which generates conflicts and hinders agreement on discussion (EmadEldeen, Elbayoumi, Basuony, & Mohamed, 2021).

Thus, it is important to understand if having diversity in terms of educational levels leads to better performance on behalf of the board and, consequently, to enhanced firm performance. It goes without saying that boards in which members have different educational levels and experiences can rely on a varied set of competencies and may be more able to address complex issues within the boardroom. In fact, some scholars have shown that diversity in levels of education and cognitive skills among directors may lead to more effective corporate strategy formulation. Indeed, multidisciplinary and cross-functional teams are prone to resolve problems quickly due to their broader perspectives

(Ruigrok, Peck, Tacheva, Greve, & Hu, 2006; Mishra & Jhunjhunwala, 2013). Bernile, Bhagwat, and Yonker (2017), examining differences in levels of education together with gender, age, and ethnicity to determine whether board diversity has an effect on volatility, show that volatility is markedly lower in firms with greater board heterogeneity. The authors relate these findings to the tendency of heterogeneous boards to adopt less risky financial policies. Another characteristic linked to heterogeneous boards is greater openness to innovation. However, the authors also point out that greater diversity on boards could lead to conflicts among board members having different opinions, which could, in turn, frustrate and slow down decision-making in the boardroom. The same issue is investigated by Giannetti and Zhao (2016), who study board diversity in terms of educational level, ethnicity, age, and gender, and find that heterogeneity could slow down decision-making due to the conflicting views of board directors, thus resulting in increased volatility.

Mahadeo, Soobaroyen, and Hanuman (2012) conduct a study on a sample of Mauritian firms to examine the effects of heterogeneous boards in terms of educational level and background, independence, and other diversity attributes. The authors focus on the relationship between the combined effect of various elements of board heterogeneity and financial performance. Concerning educational background heterogeneity, their findings show that diversity in educational levels and backgrounds is linked to lower performance. The authors, however, also point out that, in the long-term, educational diversity may reveal positive effects in situations requiring innovation and change.

Studies on the benefits of educationally diverse boards and their effectiveness on firm performance take into account both the firm performance measures and the specificity of the firm being studied. In fact, in highly specialized firms, board diversity, particularly in terms of education, may not result in the same benefits seen in other firms (Oehmichen, Heyden, Georgakakis, & Volberda, 2017; Bernile et al., 2017).

Given the findings and the considerations emerging from existing literature, we agree with the idea that educational level diversity can actually bring a benefit to the firm in terms of better performance because it enhances board members' ability to focus on different aspects of any issue. Having a mix of diversified levels of education allows the firm to have people with different types of mindsets working together. A board that is homogeneous in terms of the level of education implies the same type of studies for all the directors, thus their mindsets will be pretty aligned. This fact could lead to a reduced openness in terms of way of thinking and approaches to solve problems and propose solutions. We posit that having a mix of educational levels among the board members generate richer and broader discussions, perspectives, and way of thinking, enriching the way the decision-making process is carried out. Thus, we formulate the following hypothesis:

H2: Educational diversity in boardrooms increases firm performance.

3. RESEARCH METHODOLOGY

3.1. Sample and data

The sample of data used for testing the hypotheses of the research is composed of 187 listed firms, belonging to the European area. A 9-year time span from 2010 to 2018 is covered in the analysis.

To select the firms of the sample, the Orbis, Bureau van Dijk's database was used. Firms are selected based on the geographical area first (EU28 filter has been used), and then the size is considered (setting a minimum number of 50 employees). After that, the sample is reduced by selecting only firms that use the IAS/IFRS accounting principles, presenting a market capitalization greater than 10 million euros, and, finally, as the last filter, only the corporation's legal form is considered. Firms operating in the financial industry are not included due to the different accounting policies, markets, business strategies, and regulations compared to other industries.

Financial data are gathered from Orbis and Datastream. Non-financial data, related to the board members' characteristics, are gathered from the annual reports of the single firms. Year of birth, gender, level of education, and tenure within the firm as a director is collected for each member of the board.

3.2. Variables

Dependent variables

To measure the performance of the firm, we use two dependent variables, applying two different models for each hypothesis: *Tobin's Q* and return on assets (*ROA*).

Aligned with previous literature (Carter, Simkins, & Simpson, 2003; Carter, D'Souza, Simkins, & Simpson, 2010; Ahern & Dittmar, 2012; Magnanelli, Nasta, & Raoli, 2020; Magnanelli & Pirolo, 2021), we use *Tobin's Q* in the regression, calculated as the ratio between the market value of the firm and its book value, because it measures performance with a market perspective. This variable, in fact, reflects the market's expectations concerning future outcomes.

Supported by another strand of literature that measures performance with accounting indicators (Boadi & Osarfo, 2019; Al-Matari, Al-Swidi, & Fadzil, 2014; Rampling, 2011), we also run our regressions using the firm's *ROA* as the dependent variable.

Independent variables

Tenure diversity and educational diversity refer to specific features of the directors belonging to the board of a firm. These characteristics can be either categorical or quantitative. Depending on this, the index was constructed to test the board diversity changes: the (relative) entropy was applied for categorical variables, and the standard deviation was applied for quantitative variables. More specifically, the first independent variable is the tenure diversity index which is based on the time, measured in months, spent being a board member in the firm. This index captures the variability in the number of months the directors spend in the company. The index is created considering the tenure of the various directors starting from the moment in which they began serving on the board of the firm. Thus, it is based on a quantitative variable.

The educational level diversity index, instead, is constructed taking into account the various educational levels that directors hold, creating four categories: high school diploma, bachelor's degree, master's degree, and PhD. To each category, a number from 1 to 4 has been assigned. Thus, it is based on a categorical variable. This index captures the level of heterogeneity in terms of the level of education among board members.

Control variables

Following recommendations in the existing literature (Campbell & Mínguez-Vera, 2008), we include some control variables to monitor for firm-specific characteristics that may affect firm performance. Specifically, we control for: 1) the firm size, measured by the logarithm of total assets; 2) the number of board meetings per year; 3) the financial leverage, given by the ratio between total debts over common equity; 4) the listing year, and 5) the industry.

A summary of the variables, the measures, and the calculations can be found in Table 1.

Table 1. Variables definitions

	<i>Variables</i>	<i>Label</i>	<i>Definition</i>
Dependent variables	Tobin's Q	<i>Tobin's Q</i>	Tobin's Q = Market capitalization/Total assets
	Return on assets	<i>ROA</i>	ROA = EBIT/Total assets
Independent variables	Education level	<i>Edu.Level</i>	Directors' educational level: high school diploma, bachelor's degree, master's degree, and Ph.D
	Tenure	<i>Tenure</i>	Time (months) spent on the firm's board
Control variables	Firm size	<i>log(tot_assets)</i>	Natural logarithm of the current total assets
	Board meetings	<i>No. of board meetings</i>	Number of board meetings per year
	Listing	<i>Listing</i>	Firm's listing year
	Financial leverage	<i>lt_debt/comm_equity</i>	Total debt/Total equity
	Industry	<i>Industry</i>	According to Global Industry Classification Standard (GICS) taxonomy

3.3. Methodology

To test the two presented hypotheses, aligned with previous literature (Goldstein, 2003), a multilevel random-effects model is performed for each hypothesis (models "a"). This model allows testing complex correlation structures in the analysis of longitudinal hierarchical data (Rabe-Hesketh, Skrondal, & Pickles, 2004; Skrondal & Rabe-Hesketh,

2004). The firm-specific random effect captures the dependence of observations belonging to the same firm, while the industry-specific random effect captures the clustering effect of firms operating in the same industry.

In order to solve the time dependence issue among variables, an autoregressive model is then considered (models "b"), including the lagged performance in the linear predictor. This method

becomes relevant when the impact of a decision or an action takes a while to produce its effects. Thus, the implemented statistical model runs a lagged relationship between diversity index variables and firm performance. However, this method may lead to endogeneity bias pointed out by Alfö and Aitkin (2000), and Wooldridge (2005). To solve this issue, an approximated approach is considered by including the value of the performance at the baseline as a further independent variable. The model presents the following form:

$$y_{itj} = \beta_0 + \sum_{p=1}^P \beta_p x_{it} + b_i + u_j + \epsilon_{itj} \quad (1)$$

where, y_{itj} is the dependent variable for firm i clustered in industry j at time t ; x_{it} is the vector

representing independent and control variables; b_i and u_j are, respectively, the firm- and industry-specific random effects, and ϵ_{itj} is a zero-mean error term.

4. RESULTS

Table 2 presents the descriptive statistics for each variable and each year covered by the study. It is interesting to notice that the number of board meetings is around 8 for the all the sample during the whole time span. As far as educational level diversity and the tenure diversity are concerned, we can see that their values change over time, indicating that there have been changes in the board composition of the firms belonging to the sample.

Table 2. Descriptive statistics (Part 1)

Variables	Obs.	Mean	Std. Dev.	Min	Max
2010					
No. of board meetings	186	7,55	3,06	1	16
Listing	150	1996	14,67	1947	2 009
ROA	187	7,79	21,58	-150	79,49
lt_debt/comm_equity	185	1,04	4,03	0	14,43
Tobin's Q	185	62,50	356,99	0	3,40
log(tot_assets)	186	12,38	2,15	8	18,45
Edu.Level	186	0,83	0,46	0	1,85
Tenure	175	0,72	0,50	0	2,58
2011					
No. of board meetings	186	8,06	5,45	1	66
Listing	150	1996	14,67	1947	2 010
ROA	187	4,01	19,96	-135	35,87
lt_debt/comm_equity	185	0,94	3,64	0	19,00
Tobin's Q	186	60,95	359,17	0	3,60
log(tot_assets)	185	12,46	2,10	8	18,46
Edu.Level	187	0,33	0,46	0	1,85
Tenure	180	0,22	0,50	0	2,58
2012					
No. of board meetings	186	7,99	4,97	1	58
Listing	150	1996	14,67	1947	2 011
ROA	185	3,71	15,37	-153	26,25
lt_debt/comm_equity	185	0,61	1,89	0	12,55
Tobin's Q	187	64,59	442,75	0	4,90
log(tot_assets)	185	12,57	2,08	8	18,50
Edu.Level	187	0,25	0,46	0	1,85
Tenure	180	0,14	0,50	0	2,58
2013					
No. of board meetings	186	7,82	4,68	1	55
Listing	150	1996	14,67	1947	2 012
ROA	184	3,80	13,98	-98	27,75
lt_debt/comm_equity	185	0,45	2,54	0	11,75
Tobin's Q	187	78,37	559,86	0	6,70
log(tot_assets)	185	12,58	2,06	8	18,48
Edu.Level	184	1,23	0,46	0	1,85
Tenure	179	1,12	0,50	0	2,58
2014					
No. of board meetings	186	7,89	4,50	1	54
Listing	150	1996	14,67	1947	2 013
ROA	187	4,83	11,02	-69	28,02
lt_debt/comm_equity	186	0,74	3,68	0	48,70
Tobin's Q	185	129,42	800,86	0	9,60
log(tot_assets)	185	12,70	2,02	9	18,52
Edu.Level	186	1,32	0,46	0	1,85
Tenure	179	1,21	0,50	0	2,58

Table 2. Descriptive statistics (Part 2)

Variables	Obs.	Mean	Std. Dev.	Min	Max
2015					
No. of board meetings	187	7,84	4,20	1	44
Listing	150	1996	14,67	1947	2 014
ROA	187	4,93	10,27	-51	28,89
lt_debt/comm_equity	187	0,57	1,38	0	12,04
Tobin's Q	187	152,34	863,58	0	8,80
log(tot_assets)	186	12,83	2,03	9	18,61
Edu.Level	186	0,83	0,46	0	1,85
Tenure	181	0,72	0,50	0	2,58
2016					
No. of board meetings	187	7,91	4,30	1	49
Listing	150	1996	14,67	1947	2 015
ROA	186	4,80	11,50	-58	44,70
lt_debt/comm_equity	186	0,49	1,11	0	11,54
Tobin's Q	187	209,83	1065,77	0	9,30
log(tot_assets)	187	12,84	2,01	8	18,65
Edu.Level	186	0,78	0,46	0	1,85
Tenure	181	0,67	0,50	0	2,58
2017					
No. of board meetings	186	7,88	3,79	1	39
Listing	150	1996	14,67	1947	2 016
ROA	187	4,98	10,83	-64	38,98
lt_debt/comm_equity	183	0,53	1,31	0	12,46
Tobin's Q	186	235,44	1123,94	0	8,40
log(tot_assets)	187	12,89	1,99	8	18,71
Edu.Level	187	0,83	0,46	0	1,85
Tenure	181	0,72	0,50	0	2,58
2018					
No. of board meetings	187	7,93	3,75	1	31
Listing	150	1996	14,67	1947	2 017
ROA	187	5,42	11,45	-32	77,34
lt_debt/comm_equity	183	0,51	1,26	0	14,08
Tobin's Q	183	182,87	1070,76	0	9,30
log(tot_assets)	187	12,96	1,95	8	18,75
Edu.Level	187	1,07	0,46	0	1,85
Tenure	181	0,96	0,50	0	2,58

Regressions summarized in Table 3 aim at testing the relation between tenure and education diversity among board members and firm financial performance expressed by *Tobin's Q*.

As shown in Model 1a, the coefficient on the independent variable *Tenure* is positive and statistically significant, supporting *H1* that tenure-diverse boards positively influence a firm's *Tobin's Q*, thus leading to higher financial performance.

To further analyze the effects of tenure diversity, another regression is run including the previous year's performance (Model 1b) among the control variables. The positive and highly significant coefficient of *lag.Tobin* supports the idea that a firm's current performance strongly depends on the financial results achieved in the previous year. This second regression also confirms the positive effect of tenure diversity on firm performance as assumed by *H1*.

To test the effects of board education heterogeneity on performance, a regression analysis is carried out on the relation between educational diversity, measured in terms of the level of education (*Edu.Level*), and firms' *Tobin's Q*.

As for testing *H1*, also for *H2*, two models were applied. In Model 2a the regression is run testing the performance with *Tobin's Q*, while in Model 2b, the performance of the previous year, measured with the variable *lag.Tobin*, has been included in the regression to check if a firm's current performance depends also on the performance of the previous year.

The results provide no evidence of any significant impact of education diversity on firm financial performance.

Further results are obtained by analyzing the impact of both education diversity and tenure diversity on firm performance at the same time. As reported in Models 3a and 3b, there is no evidence that education diversity has any significant impact on firm performance while the positive effect of tenure-diverse boards is once again confirmed. The two independent variables, therefore, do not seem to influence each other when analyzed together.

As far as the control variables are concerned, in Models 1b and 3b, the findings show a negative influence of firm size, expressed as the natural logarithm of its assets, on firm profitability. These findings are in line with the idea that profitability declines in firms that become too large since they start suffering from diseconomies of scale (Magnanelli, Raoli, & Sacchi, 2016; LaFrance, Lee, Green, Kvaternik, Robinson, & Alarcon, 2006; Cannatelli, 2013). Moreover, the results indicate that the number of board meetings held per year has a significantly negative effect on firm performance in all Models 1, 2, and 3. Regarding the length of time a firm is listed on the market and the effects this may have on its performance, the findings show a positive and statistically significant coefficient of the control variable (*Listing*) that represents the firm's year of listing in Models 1b, 2b, and 3b. This is in line with the concept that firms that have been listed on the market for a longer period of time receive trust from the financial market and this has a positive influence on their financial performance.

Table 3. Dependent variable: Tobin's Q

Variables	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b
(Intercept)	0.341876	-0.291947	0.369918	-0.263865	0.338076	-0.291853
Edu.Level			0.010931	-0.013053	0.015240	-0.006409
Tenure	0.269711***	0.113832.			0.268919***	0.114350.
log(tot_assets)	-0.045274.	-0.037186*	-0.036660	-0.033640.	-0.046093.	-0.036814*
No. of board meetings	-0.020471**	-0.019274**	-0.020822**	-0.019519**	-0.020344**	-0.019265**
Listing	0.002622	0.005981*	0.004256	0.006303*	0.002661	0.005988*
lt_debt/comm_equity	-0.006557	-0.008391	-0.005051	-0.008196	-0.006569	-0.008388
lag.Tobin		0.343403***		0.346027***		0.343416***
base.Tobin		0.158701***		0.164925***		0.159537***

Note: ., *, **, *** indicate significance at the 10%, 5%, 1%, and 0,1% levels, respectively.

As previously mentioned, in this study the ROA is also used as a measure of a firm's performance to test the hypotheses in order to further analyze the impact of tenure and education diversity on performance (Table 4), using an accounting variable of firm performance. It is interesting to note that evidence of a positive and significant effect of tenure-diverse boards on firm performance is further confirmed (Models 4a and 4b).

Instead, the results provide no evidence of a link between educational diversity and firm performance expressed as ROA (Models 5a and 5b).

As regards the control variables, Table 5 suggests that the current year ROA is a function of the previous year's ROA (*lag.roa*). The results are in line with those of the previous regression analysis using Tobin's Q as a dependent variable. In fact, a negative relationship is found between the number of board meetings and the firm performance in all Models 4, 5, and 6. The length of time a firm is listed on the market is confirmed again as having

a positive impact on performance when tested together with the previous year's ROA.

In Models 6a and 6b, where the education diversity and the tenure diversity are included at the same time in the regression, there is no evidence that education diversity has a significant impact on firm performance, while the positive effect of tenure-diverse boards is confirmed. Thus, also, in this case, ROA is used as the dependent variable, when analyzed together, the two diversity dimensions do not seem to influence each other.

In observing the results shown in Table 4, there is clear evidence to support *H1*, concerning the significant and positive relationship between tenure diversity on corporate boards and firm performance. There is no evidence, however, to confirm *H2* regarding a positive effect of educational level diversity on boards, given the non-significant impact, it appears to have on both proxies of firm performance.

Table 4. Dependent variable: ROA

Variables	Model 4a	Model 4b	Model 5a	Model 5b	Model 6a	Model 6b
(Intercept)	-2.41917	3.00879	-1.37698	4.11747*	-2.43446	3.022805
Edu.Level			0.42318	-0.73589	0.67658	-0.271666
Tenure	2.35742*	1.36751*			2.38591*	1.329428*
log(tot_assets)	0.58889.	-0.02764	0.57911.	0.00788	0.53753.	-0.006487
No. of board meetings	-0.40295***	-0.31848***	-0.40080**	-0.32554***	-0.39845**	-0.320825***
Listing	0.05292	0.03676.	0.07082	0.04563*	0.05434	0.036530.
lt_debt/comm_equity	-0.06782	-0.04783	-0.04397	-0.05166	-0.06837	-0.047063
lag.roa		0.50076***		0.49300***		0.499441***
base.roa		0.14269***		0.14420***		0.144110***

Note: ., *, **, *** indicate significance at the 10%, 5%, 1%, and 0,1% levels, respectively.

5. DISCUSSION

Globalization has led to dramatic changes in the corporate world and the way business is conducted. This has resulted in enhanced interconnectedness among firms of various sizes and increased competition, in fact, the majority of firms finds themselves competing both with domestic or local players as well as global ones. In this new scenario, firms have had to rethink and reshape most of the common practices they were used to, in order to better respond to the enhanced competitiveness and to become more global. This changing landscape has also affected corporate boards, as they have to face the continuously changing dynamics of globalized markets. Moreover, due to the globalization occurring in the job market for directors, firms can choose to hire directors coming from all over the world, having different characteristics, from both a personal and a professional point of view. With shareholders

increasing their role and influence, the choice of directors is particularly relevant because it has become an ethical issue that stakeholders pay attention to.

Academics in the past decades have shed light on the need to identify the optimal features that a board should have in order to work more effectively. Among the studies, a branch of research has concentrated the attention on the effects that diversity attributes may have within the boardroom and whether such characteristics actually have an impact on the financial performance of the company. In this branch of research, the focus has mostly been on gender diversity, also due to recommendations and regulations that have enforced gender quotas on boards in several countries worldwide. However, in recent years, other diversity attributes characterizing board composition have also sparked a heightened interest.

The purpose of this paper is to investigate two diversity attributes that may significantly affect board performance: tenure diversity and education diversity.

As concerns tenure diversity, many past studies primarily look into the dichotomy between long-tenured boards versus short-tenured boards with conflicting results. The present study instead focuses on tenure diversity and the role it plays on board on firm performance. The authors hypothesize that tenure diversity could have a balancing effect on the negative and positive aspects associated with long-tenured boards and therefore a positive effect on firm performance. The *H2* focuses on the role of the educational diversity among board members, assuming that it increases board effectiveness leading to a better performance thanks to the diversified mindsets there would be in the boardrooms.

This study is innovative in terms of the research methodology because, besides the firm fixed-effect methodology that has not been extensively used in previous research, the proposed statistical models test a lagged relationship between diversity measures and financial performance which appears to be quite scarce in previous studies.

The findings reveal a positive relationship between tenure diversity among board members and firm financial performance, confirming the *H1* with both the performance variables, market-based and accounting-based. Thus, the higher the tenure diversity in a boardroom, the higher the performance of the firm will be most likely because the tenure diversity among board members increases board effectiveness, leading as a consequence to better firm performance. However, the analysis of the impact of the educational diversity in corporate boards does not lead to any significant result, thus the *H2* is not confirmed.

6. CONCLUSION

The outcomes of the present work add some insights to the extant literature about board composition and firm performance. However, given the constant change in the dynamics of the environments in which firms operate, it will be necessary in the future to continue to investigate the effects that director heterogeneity may have on board effectiveness. Boards represent the focal point of corporate governance and if we consider that board homogeneity may hinder a firm's potential in terms of global reach then investigating the effects of board diversity on firm performance is undoubtedly a crucial area of research that may contribute to the board selection processes.

However, the present work still presents some limitations. The selected sample is limited because it focuses only on large listed firms. Further empirical studies might enhance the sample dimensions, including more firms or eventually more regions. Additionally, more diversity dimensions could be tested simultaneously, in order to further enhance the spectrum of analysis of diversity on corporate boards.

The contributions of this study from a research perspective are threefold: 1) it enriches the existing literature on diversity, investigating some of the diversity traits less studied until now despite their significance and impact on firm performance; 2) it provides empirical evidence on how these two specific diversity aspects affect firm performance using an innovative and precise technique for measuring diversity, by implementing enriched statistical variables and model; 3) it helps practitioners during the board selection process, highlighting relevant characteristics that the board should have in terms of composition to ultimately be more effective.

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APPENDIX

Table A.1. Descriptive statistics — Country data

2010-2018			
Country	Frequency	Percentage	Cumulative percentage
AT	5	2,67%	2,67%
DE	17	9,09%	11,76%
DK	13	6,95%	18,72%
EE	2	1,07%	19,79%
FR	13	6,95%	26,74%
GB	109	58,29%	85,03%
GR	2	1,07%	86,10%
HR	3	1,60%	87,70%
IE	2	1,07%	88,77%
IRL	4	2,14%	90,91%
IT	4	2,14%	93,05%
LT	2	1,07%	94,12%
LU	1	0,53%	94,65%
NV	1	0,53%	95,19%
PL	1	0,53%	95,72%
SE	8	4,28%	100,00%
Total	187	100,00%	

Table A.2. Descriptive statistics — Industry data

2010-2018			
Utilities	Frequency	Percentage	Cumulative percentage
Automobiles & Components	6	3,21%	3,21%
Capital goods	32	17,11%	20,32%
Commercial & Professional services	18	9,63%	29,95%
Consumer durables & Apparel	13	6,95%	36,90%
Consumer services	12	6,42%	43,32%
Energy	1	0,53%	43,85%
Food & Staples retailing	2	1,07%	44,92%
Food, beverage & Tobacco	15	8,02%	52,94%
Health care equipment & Services	5	2,67%	55,61%
Household & Personal products	6	3,21%	58,82%
Materials	19	10,16%	68,98%
Media & Entertainment	8	4,28%	73,26%
Pharmaceuticals, biotechnology & Life	7	3,74%	77,01%
Real estate	6	3,21%	80,21%
Retailing	15	8,02%	88,24%
Software & Services	7	3,74%	91,98%
Technology hardware & Equipment	5	2,67%	94,65%
Telecommunication services	2	1,07%	95,72%
Transportation	4	2,14%	97,86%
Utilities	4	2,14%	100%
Total	187	100%	