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Does board gender diversity affect firm performance? Empirical evidence from Standard & Poor's 500 Information Technology Sector

Liliana Nicoleta Simionescu, Ştefan Cristian Gherghina*, Hiba Tawil and Ziad Sheikha

*Correspondence:
stefan.gherghina@fin.ase.ro
Department of Finance,
Bucharest University
of Economic Studies,
6 Romana Square,
010374 Bucharest, Romania

Abstract

The essence of this study is to investigate the influence of the board gender diversity on firms' accounting and market-based performance using a sample of Standard & Poor's 500 companies belonging to the information technology sector over 12 years. Using the pooled ordinary least squares (OLS) method, the outcomes provide evidence for a positive influence of women on corporate boards on both measures of company performance, except for the percentage of female executives in the case of return on assets (ROA). After estimating the fixed effects and random-effects through panel data, the econometric outcomes show no statistically significant association among board gender diversity and ROA but a positive influence of the number and percentage of women on board on price-to-earnings ratio.

Keywords: Gender diversity, Firm performance, Pooled OLS, Fixed-effects, Random-effects

Introduction

During the last decade, there was a noticeable trend of increasing the representation of women on boards in several countries worldwide, argued by the fact that corporations with female executives make better decisions for shareholders (Huang and Kisgen 2013). Although European countries were the leading parties in promoting women's rights in the workplace, other countries followed the trend through mandatory laws or recommendations (Wang 2020). As companies' boards are becoming more balanced in gender (Kumar and Zattoni 2016), Jourová (2016) expected a 40% share target of women on boards of directors among listed companies in 2020. Moreover, Ben Slama et al. (2019) confirmed that the uppermost level of accounting performance is achieved when the quota of 40% of women on board is fulfilled. Reguera-Alvarado et al. (2017) reinforced the need for regulatory interventions to avoid the social and labor criticisms that females have usually encountered and which downgrades them to microscale jobs. From an ethical viewpoint, Martínez and Rambaud (2019) argued that if the occurrence of females rises, the objective is reached autonomously of the company's return. However, the economic perspective claims that women must be promoted according to their education

and professional knowledge, or else the corporation might register a decline in its profitability. Hence, this phenomenon gained substantial attention in recent studies as women show various ethical and social behaviors than men (Mahmood et al. 2018). Intensifying gender diversity in the boardroom can enhance the power of boards to perform their control and strategic roles (Kang et al. 2010). For instance, the presence of females on boards could enhance corporate governance mechanisms, such as transparency and accountability, because of their contribution to mitigating fraud (Capezio and Mavisakalyan 2016). Loukil et al. (2020) proved that women executives raise transparency and disclosure and reduce asymmetric information, particularly in family corporations. Further, Mobbs et al. (2021) claimed that informed women executives could reduce anomalous CEO payment and the probability of a financial restatement. Thus, female directors' support alleviates agency issues and could encourage firm innovation by ensuring effective supervision (Chen et al. 2018). Conversely, Bhuiyan et al. (2020) advised that companies with corrupted women managers have greater real earnings management and larger audit fees.

The empirical evidence is mixed and sometimes contradictory (Kilic and Kuzey 2016; Martínez and Rambaud 2019). Prior studies have found that women could improve the decision-making process because of their different insights and innovative ideas that boost firm performance (Terjesen et al. 2009). Moreover, women on board increase perceptions of the board's lawfulness and reliability, thus promoting stockholder confidence in the company (Perrault, 2015). Zalata et al. (2019) argued that women directors with oversight duties lessen managerial opportunism as measured by the discretionary accrual. Further, Dadanlar and Abebe (2020) suggested that women CEO-led companies have a low probability of discrimination lawsuits. García-Sánchez et al. (2019) concluded that boards with more women directors decrease the risk of impression management policies in sustainability reporting. Furthermore, Luo et al. (2017) emphasized that larger board female representation is related to lesser levels of real activity manipulation. However, women's participation in the boardroom could reduce the effectiveness in executive tasks as a more diversified board has communication glitches, thus adding organizational and operational risks to the company and dropping firm performance (Westphal and Milton 2000).

This study would contribute to the literature as it focuses on the impact of board gender diversity on firm performance in the information technology (IT) sector of the United States (US). Prior literature that investigated high-technology companies was focused on female directors and earnings management (Gavious et al. 2012) or risk (Mukarram et al. 2018). Carmen, (2019) merely explored gender diversity in US computer industries but only at the senior management level. Therefore, the novelty of this study is depicted by providing fresh evidence on board gender diversity and firm performance for the IT sector, also considering other specific corporate governance mechanisms such as board independence and compensation. Even if European nations quickly force gender quotas, in the US, publicly traded companies are not required to fulfill a gender diversity quota, except those registered in California. Nevertheless, Terjesen et al. (2015) emphasized that some nations set out quotas for women's presence, while others established non-binding gender quotas to fulfill the "comply or explain" rule. According to 2020 Women on boards (2020), females hold 22.6% of the board seats of Russell 3000

companies, whereas Catalyst (2020) reported that 26% of S&P 500 companies' boards constitute women. Concerning US technology companies, Sullivan et al. (2020) found that female board members, on average, account for 20.6%. The examination of the IT sector is argued by the fact that this industry faces several challenges, regular transformations, and constant insecurity (Gavious et al. 2012). Additionally, the IT sector is facing male gender stereotyping (Turner, 2001) since the era wherein females were advised to abandon the job market and rest at domicile with their infants (Oost 2000). In several societies, females are usually supposed to be accountable for performing tasks like cooking, cleaning, and raising children; hence their capacity to enter the workforce is constrained (Peng and She 2020). Consequently, gender-segregated opinions in the computer sector are unfavorable to females, favor gender bias and sexism, and drive to fewer possibilities for women in the field (Gumbus and Grodzinsky 2004; Oost 2000). However, greater gender diversity on corporate boards is required in this sector as long as it fosters innovation and technology, as it is also associated with higher research and development intensity and more patents (Cheng and Groysberg 2020), but their critical mass is necessary (Chijoke-Mgbame et al. 2020; Saggese et al. 2020). Further, Vafaei et al. (2021) reinforced that women executives are aligned with enhanced innovation activity independent of the firm type. Moreover, Chen et al. (2021) emphasized that female directors are related with a stronger link among research and development and upcoming firm performance. Hence, assorted groups yield a greater fraction of premium quality solutions rather than unvaried communities (Richard and Norman 1961). Dezsö and Ross (2012) asserted that the more a company's approach is centered on innovation, the more woman representation in top leadership enhances firm performance.

The study is organized as follows. Section 2 discusses prior literature and related theories. Section 3 depicts the sample, selected variables, and the quantitative framework. Section 4 presents and discusses the results. Finally, we conclude the study.

Prior literature and theoretical background

Various findings are reflected in the theoretical literature wherein agency philosophy, upper echelons, and the resource dependence theory advise that greater board diversity enhances performance. However, role incongruity and the gender-stereotyping theory prose a negative influence of female directors on company performance (Yang et al. 2019).

Agency theory emphasizes the information asymmetry among executives and stockholders, as well as the conflict amid directors (agents) and owners (principals) (Reddy and Jadhav 2019). However, the board's responsibility is to certify managers' active supervision (Fama and Jensen 1986). Accordingly, diverse boards exhibit a reasonable number of independent directors to oversee directors properly (Aggarwal et al. 2019). Consequently, increased gender diversity may lead to an activist board (Marinova et al. 2016). Further, Ain et al. (2020) proved that boards showing a significant majority of female directors register a better inclination to lower agency costs as related to their token membership.

The resource dependence view suggests that some corporations are more powerful than others, given their interconnection and positioning in social space (Pfeffer and Salancik 2003). Hillman et al. (2000) claimed that variations of conditions drive

adjustments in corporate policy, which may be supported through an amendment in board structure. Further, Robinson and Dechant (1997) asserted that women ensure an improved knowledge of markets and customers.

Additionally, the upper echelon theory postulates that executives act according to their individual experiences, values, personalities, and other related human factors (Hambrick and Mason 1984). Usually, females are supposed to be welcoming, gentle, respectful, and interpersonally experienced, but men are thought to be resilient, influential, forceful, and goal-centered (Diana and Eugene 1999). However, female directors are required to embrace organizational patterns that are not masculine or feminine but are satisfactory to male collaborators, overseers, and underlings—a circumstance not encountered by their masculine colleagues (Ragins 1998). To secure board positions, Solimene et al. (2017) noticed an increase in the share of women executives with specialized diplomas. However, Heilman (2001) argued that being experienced does not certify that a female will go forward to the matching corporate rank as a correspondingly performing male. Dezsö and Ross (2012) reinforced that females should be far more effective than males to surmount impediments to their progress, suggesting that tenured women executives are of a greater typical class than their male peers. Therefore, women do not benefit from equitable attention concerning their aptitudes and capabilities on account of the beliefs that they are inexperienced to accomplish ordinarily males' jobs (Heilman 2012). Nevertheless, Unite et al. (2019) claimed that women directors have personal skill levels similar to those of males and that the nomination of female managers does not influence firm performance.

Theories corresponding to social groups, like social identification and social categorization, assess the way people attempt to encircle themselves with humans having comparable qualities that support them to strengthen intra-group interaction (Martín-Ugedo et al. 2019). Conjectures from social psychology advise that varied executives may not impact board rulings attributable to the board's interior group dynamics (Akram et al. 2020; Carter et al. 2010). According to the similarity-attraction viewpoint, interlocking male executives would prefer males over females for board assignments because men have more confidence and optimism than women (Markoczy et al. 2020). Oldford et al. (2021) found that for a large sample of US companies, female board affiliation is negatively related to firm performance in social groups that are not pro-diverse. Nielsen and Huse (2010) asserted that a female is self-assured in her fundamental beliefs and is expected to speak up when concerns raised in the board are contrary to her principles. As such, Milliken and Martins (1996) emphasized the cognitive and emblematic gains of diversity and the negative influence on turnover and performance. Further, the member familiarity and information distribution view as formulated by Gruenfeld et al. (1996) suggest that parties with close representatives may be more successful at systematizing data and incorporating additional standpoints than collectivities whose participants are not acquainted.

Numerous studies explored the impact of boardroom gender diversity on firm-specific outcomes (Nadeem et al. 2019). In this vein, Table 1 summarizes the outcomes of the most recent studies on the impact of women directors on firm performance. Owing to its consequences, researchers have tried to analyze it from various points. Therefore, board diversity was defined based on particular attributes. For instance, there was

Table 1 Review of earlier studies regarding boardroom gender diversity and firm performance

Author(s)	Period	Database	Econometric techniques	Quantitative results
Mastella et al. (2021)	2010–2018	150 Brazilian listed enterprises	OLS, quantile and panel data regressions	Positive link among board gender diversity and firm performance
Saleh et al. (2021)	2010–2017	48 firms listed on Palestine Stock Exchange	Fixed-effects regressions ad one-step system generalized method of moments	Positive impact, but statistically insignificant, of board gender diversity on company performance
Soare et al. (2021)	2010–2017	4080 Belgian companies	Difference-in-difference	Rise in diversity adversely influence some company performance variables
Sun and Zou (2021)	2002–2018	Listed corporations in China	Propensity score matching technique	Companies lead by women CEOs register superior performance than corporations lead by male CEOs
Ahmad et al. (2020)	2011–2013	Top 200 Malaysian quoted firms	Multiple regression analysis	The share of female directors on board is negatively associated with return on assets
Arioglu (2020)	2009–2017	Corporations quoted at the Borsa Istanbul	System-GMM and 2SLS-IV regressions	Women directors positively influence firm financial performance
Đặng et al. (2020)	2004–2015	369 firms listed on the Standard&Poor's 500	Pooled OLS, fixed-effects, system GMM, control function	The presence of women on corporate boards positively influence return on assets
Ozdemir (2020)	2007–2016	36 US tourism firms	Fixed-effects regressions	Board diversity positively influence Tobin's Q
Shahzad et al. (2020)	2008–2018	5879 US corporations	Regression analysis by incorporating the Sobel intermediary factor test method	Board gender diversity positively influence company performance
Song et al. (2020)	1993–2018	Publicly traded US lodging companies	Panel regression models	Gender diversity positively influence firm performance
Brahma et al. (2020)	2005–2016	FTSE100 constituent companies	Fixed-effects and system GMM	Positive influence of board gender diversity on return on assets, as well as Tobin's Q
González et al. (2020)	1996–2006	523 Colombian family companies	Fixed and random-effects regressions	Outside female directors positively influence industry-adjusted ROA, but family women directors exert a contrary effect
Xing et al. (2020)	2000–2014	2325 firms listed on the Shanghai and Shenzhen Stock Exchanges	OLS, fixed-effects, 2SLS, Probit	Female top managers positively influence ROA in more gender-diverse boards
Niikura and Seko (2020)	2015	All firms listed in Tokyo Stock Exchange	Two-stage least squares method	The share of women on board and female inside and outside board members positively influence return on equity

Table 1 (continued)

Author(s)	Period	Database	Econometric techniques	Quantitative results
Garanina and Muravyev (2020)	1998–2014	All companies listed on the RTS and/or MICEX, as well as MOEX	Fixed and random- effects, 2SLS, dynamic panel data models, quantile regressions	Gender-diverse boards register superior market values and improved profitability
Sarkar and Selarka (2020)	2005–2014	1348 firms listed on National Stock Exchange (NSE)	Panel data models, instrumental variable technique, difference in difference analysis	The existence of a woman director on board determines better firm performance
Fernández-Temprano and Tejerina-Gaite (2020)	2005–2015	87 non-financial Spanish companies	Fixed and random-effects regressions	Lack of statistically significant association between gender diversity and performance
Chijoke-Mgbame et al. (2020)	2008–2016	77 companies listed on Nigerian Stock Exchange	Fixed-effects and dynamic GMM	The presence of women on boards positively influences company performance
Ararat and Yurtoglu (2020)	2011–2018	Whole firm listed on the Borsa Istanbul	Pooled OLS, fixed and random-effects regressions	No association between female representation and firm performance
Belaounia et al. (2020)	2007–2016	1986 public companies from 24 nations	Firm and year fixed-effects regressions	Companies with higher representation of women on board register superior overall performance
Pucheta-Martínez and Gallego-Álvarez (2020)	2004–2015	10,314 firm-year observations from 34 states	Pooled OLS regressions	Board gender diversity positively influence Tobin's Q
Akram et al. (2020)	2010–2016	375 non-financial companies listed on Pakistan Stock Exchange	Fixed and random-effects regressions	Gender diversity negatively influence firm performance

Source: Authors' selection based on the earlier studies

noticed demographic board diversity that covers age, gender, nationality, and education (Ararat et al. 2015) or structural board diversity that embraces the size of the board and the directors' independence (Srivastava 2015). Additionally, board diversity may improve a firm's value as it allows persons with different experiences, backgrounds, ages, and gender to participate in the decision-making process (Carter et al. 2003). Terjesen et al. (2016) explored 3,876 public companies in 47 states and provided evidence that more female directors drive better market and accounting firm performance.

Women on boards exert a significant impact on firm performance (Adams and Ferreira 2009) because they can improve managerial duties through their preparation of meetings, different viewpoints, and leadership skills compared to men (Huse and Solberg 2006). Wang Jr et al. (2018) claimed that women CEOs own more human capital than men CEOs. Therefore, as many countries, such as Norway, Denmark, Spain, France, or Belgium, have understood the status of women in the boardroom of companies, gender quotas have been required for the number of females as board members (Adams and Funk 2012). However, women are still a minority on boards and other top management positions as almost 20% of the world's largest corporations have no women directors (Desvaux et al. 2010).

The benefits that ensue from the participation of females on board are varied. First, women on board can affect corporate governance and thus enhance firm performance (Alabede 2016). This fact was supported by Adams and Ferreira (2009), who reported that women have a crucial impact on corporate governance as they are more dedicated to attending meetings and that men are also more likely to improve their presence when there are women directors. As such, Dah et al. (2020) confirmed that women CEOs are less likely to be substituted when the company is performing badly as related to men CEOs. Second, board gender diversity exerts an essential role in improving firm reputation because engaging women on the board of directors signals that the corporation does not encounter discrimination issues, mirroring a good image to the community (Kaur and Singh 2017). Third, Arguden (2012) argued that women know what consumers need better, meaning they can develop successful products and services. Resultantly, women in Europe and the US motivate between 70 and 80% of consumers' purchase decisions, respectively. Fourth, companies that have women on board and top management are disposed to be successful because their employees are recruited according to their qualifications instead of their demographic features. Furthermore, women employees will work hard, registering higher productivity to reach the top, because they perceive women in top positions as role models (Lückerath-Rovers 2013). Finally, women show new ideas and innovative insights, which boost the policymaking process. Nevertheless, their contribution may add value to problem-solving through their communication and easiness of gaining information from different sources (Sánchez 2017). The behavioral theory of the corporation suggests that the rigor of policymaking operations can impact innovation in companies; however, homogeneous communities may hinder innovation (Torchia et al. 2018). Therefore, varied parties have a larger array of opinions and unique views.

The presence of female directors may also be influenced by cultural features. Institutional theory (Meyer and Rowan 1977) contended that companies operating in a strongly institutionalized setting register a higher likelihood to subsist. As such, Li and Harrison

(2008) proved that regulations enclosed in a society's culture influence board structure. Further, Carrasco et al. (2015) reinforced that specific characteristics of the culture of a nation influence female presence on boards. Regarded as a component of societal culture (masculinity-femininity), Hofstede et al. (2010) exposed that men are oriented on profits, appreciation, progress, and tasks, while women are focused on having proper teamwork with superiors, collaboration, living space, and labor security. Moreover, Parboteeah et al. (2008) evidenced that uncertainty avoidance constrains female managers' profession, while gender egalitarianism supports it.

Gender theory emphasizes that women prioritize ethical issues in an assignment, even if its completion is expected to be successful (Eccles 1994). Kaplan et al. (2009) argue that women's reporting commitment for an unknown reporting line is greater than males' reporting plans. Moreover, women directors enhance the board's operation and productivity alongside company performance (Gavious et al. 2012). Accordingly, the more women and independent directors on the board, meaning diversified boards, the more directors undertake their monitoring, controlling, and auditing tasks effectively, thus boosting firm performance (Woschkowiak 2018). Female directors provide new opinions along with qualified backgrounds dissimilar from those of the "old boys' club" (Bennouri et al. 2018). Thus, a setting of disagreements regarding sexual intimidation is related to a context of acceptance for disparities toward nationality, education, or faith, with workers' development, involvement, and authorization being promoted using tutoring, coaching courses, and impartial recompense for the entire personnel (Bell et al. 2002).

Conversely, the trend of increasing women on board may have some drawbacks for corporations. Hence, having women on the board of directors would exert a negative impact on firm performance, as explained by the increased time needed to make decisions in more diversified boards (Smith et al. 2006). Additionally, board diversity imposes additional costs on the firm, and any increase in the firm performance might not be sufficient to offset those costs (Marinova et al. 2016). Further, Cox and Blake (1991) claimed that turnover and non-attendance are frequently greater among females.

According to the cross-disciplinary set of theories, the association between board gender diversity and firm performance may either be positive or negative founded on the approached philosophy. Therefore, in line with Carter et al. (2010), the main hypotheses of our study are framed in a null shape, as follows:

Hypothesis 1. The number of women on board does not influence firm performance.

Hypothesis 2. The percentage of women on board does not influence firm performance.

Hypothesis 3. The percentage of female executives does not influence firm performance.

Data and research design

Sample and measurement of variables

Our sample comprises all IT companies covered by Standard & Poor's 500 Index. Therefore, 71 companies have been studied during the period 2009–2020. We collected data starting from 2009, arguing that Lee et al. (2015) pretended that there is an increase in the growth rate of new female chairs since this year. The entire quantitative data were extracted from primary sources, namely the Bloomberg database.

Table 2 reveals the variables employed in the empirical analysis. Concerning dependent variables, this study employs both an accounting-based indicator (ROA) and a market valuation indicator (PER) to measure firm performance as in Aggarwal et al. (2019); Niikura and Seko (2020); Terjesen et al. (2016); Unite et al. (2019) and Yang et al. (2019). Accounting-based indicators such as ROA show backward-looking predictions as they provide a view of a company's performance in prior years (Kou et al. 2021) and, hence, unbiased estimates. Conversely, stock market-based measures like PER reveal investors' forward-looking projections, being idiosyncratic (Chauhan and Dey 2017). Further, ROA may be altered by accounting standards and manipulated by the board, but PER is not easily handled (Chijoke-Mgbame et al. 2020). The explanatory measures capture board gender diversity along with other specific corporate governance variables and several firm-level control variables.

Econometric approach

To assess the impact of corporate board gender diversity on firm performance, our base regression models are depicted below, similar to Brahma et al. (2020); Chijoke-Mgbame et al. (2020); Garanina and Muravyev (2020); González et al. (2020); Liu et al. (2014); Mastella et al. (2021) and Nadeem et al. (2019):

$$ROA_{it} = \alpha + \beta\, Board\_gender_{it} + \lambda\, Corporate\_governance_{it} + \Omega\, Firm\_controls_{it} + \varepsilon_{it} \quad (1)$$

$$PER_{it} = \alpha + \beta\, Board\_gender_{it} + \lambda\, Corporate\_governance_{it} + \Omega\, Firm\_controls_{it} + \varepsilon_{it} \quad (2)$$

where β is the coefficient of board gender diversity variables, λ is the vector of other specific corporate governance variables, Ω is the vector of firm-level control variables, and ε depicts the error term for firm i at time t. First, in line with Bennouri et al. (2018) and Pucheta-Martínez and Gallego-Álvarez (2020), a basic OLS estimation of the influence of female directorship on firm performance is employed. However, there may emerge biased estimates because of the endogeneity issue. Second, to check the robustness of pooled OLS outcomes, as in Ararat and Yurtoglu (2020), we estimate the panel data fixed-effects (FE) and random-effects (RE). To control if unobservable heterogeneity is correlated with the independent variables, we employ the Hausman test to select the appropriate method among fixed and random-effects, similar to Akram et al. (2020); Chauhan and Dey (2017); Garanina and Muravyev (2020); González et al. (2020); Martínez and Rambaud (2019) and Zalata et al. (2019). Moreover, under Yang et al. (2019), we incorporate several substitute control variables to distinguish how the influence of board diversity changes over with their inclusion.

Empirical findings and discussion

Descriptive analysis and correlations

The summary statistics are presented in Table 3. The mean ROA is 8.99%, while the mean PER is 35.23. However, there is a large variation in firm performance as the disparity between the minimum and maximum values is large. The average number of women on board is 1.73, whereas the related share is 16.53%. Similarly, the percentage of female executives is merely 12.36%. Figure 1 reveals the mean values of gender diversity

Table 2 Variable description

Variable name	Abbreviation	Definition	Prior Studies
Dependent variables			
Return on Assets	ROA	Net income divided by average total assets	Ahmadi et al. (2018), Đặng et al. (2020), Frijns et al. (2016), Jiang et al. (2020), Liu et al. (2014), Ye et al. (2019)
Price to Earnings Per Share	PER	Stock price divided by earnings per share	Fu et al. (2016), Letting' et al. (2012)
Independent variables			
Board gender diversity variables			
Number of Women on Board	NOWOMBRD	Number of women on board	Byoun et al. (2016), Liu et al. (2014), Maj and Bębenek (2017), Ye et al. (2019)
Percentage of Women on Board	PERWOMBRD	Number of women on board divided by board seats	Ahmadi et al. (2018), Conyon and He (2017), Haque and Jones (2020), Low et al. (2015)
Percentage of Female Executives	PERFEMEXE	Number of women executives divided by total executives	Liu et al. (2014), Low et al. (2015)
Other specific corporate governance variables			
Size of the Board	SIZEBRD	Number of directors	Aggarwal et al. (2019), Frijns et al. (2016), Haque and Jones (2020), Rockey and Zakir (2020)
Number of Board Meetings	BRDMEET	Number of board meetings	Aggarwal et al. (2019)
Board Duration	BRDDUR	Number of years since board appointment	Byoun et al. (2016), Haque and Jones (2020)
Age of the Youngest Directors	AGEYNGDIR	Age of the youngest directors	Eulerich et al. (2014), Song et al. (2020)
Age of the Oldest Directors	AGEOLDDIR	Age of the oldest directors	Eulerich et al. (2014), Song et al. (2020)
Number of Independent Directors	INDEPDIR	Number of independent directors	Chen et al. (2017), Jiang et al. (2020), Naciti (2019)
Total Board Compensation Paid	BRDCOMP	Board members total compensation	Conyon and He (2004)
Total Executive Compensation Paid	EXECOMP	Executives' total compensation	Badertscher et al. (2013), Conyon and He (2004)
Firm-level control variables			
Variables towards firm size			
Firm size	TA	Total assets	Badertscher et al. (2013), Byoun et al. (2016)
Employees	EMP	Number of employees	Naciti (2019)
Variables regarding cash-flow			
Free Cash Flow	FCF	Cash available to be distributed to owners	Ogbeide and Akanji (2017)
Cash Flow from Operating Activities	CFFO	Cash inflows and outflows from main operations	Ogbeide and Akanji (2017)
Cash Flow from Financing Activities	CFFF	Cash to raise capital or repay investors	Ogbeide and Akanji (2017)
Variables regarding corporate liquidity			
Cash Ratio	CR	Cash and cash equivalent divided by current liabilities	Delen et al. (2013)
Current Ratio	CURR	Current assets divided by current liabilities	Delen et al. (2013)
Quick Ratio	QR	Current assets minus inventory divided by current liabilities	Delen et al. (2013)

Table 2 (continued)

Variable name	Abbreviation	Definition	Prior Studies
Variables concerning dividend policy			
Dividend Yield	DY	Annual dividend divided by current stock price	Chen et al. (2017)
Dividends Per Share	DPS	Total dividends paid divided by number of outstanding shares	Chen et al. (2017)
Dividend Payout Ratio	DPR	Dividend per share divided by earnings per share	Chen et al. (2017)
Variables regarding firm leverage			
Total Debt to Total Assets	TDTA	Total debt to total assets	Park and Jang (2013), Wang (2010)
Total Debt to Capital	TDC	Total debt to capital	Conyon and He (2017)
Total Debt to Equity	TDE	Total debt to equity	Maj and Bębenek (2017)
Variables concerning business efficiency			
Operating Margin	OM	Operating income divided by net income	Delen et al. (2013)
Variables towards corporate taxation			
Effective Tax Rate	ETR	Paid taxes divided by taxable income	Badertscher et al. (2013)
Variables regarding corporate innovation			
Research and Development	R&D	Research and development expenditures	Fu et al. (2016), Wang (2010)

Source: Authors' work

measures over the selected period. In line with 2020 Women on boards (2020), we notice an increase in the presence of women on US corporate boards, argued by the fact that major corporations are experiencing excessive pressure from stockholders. Conversely, in smaller enterprises, CEOs and nominating committees count on individuals they meet in their friendship groups.

Table 4 reveals the mean values of ROA and PER depending on the number of women on board, consistent with Ahmadi et al. (2018). We observe that the mean ROA is higher in companies with at least one woman on board than in firms with no female director, but after the threshold of four females, the performance decreases. The facts are consistent with those of Kristie (2011), who claimed that "one is a token, two is a presence, and three is a voice." Furthermore, Garanina and Muravyev (2020) documented that three women on board are necessary to achieve a positive effect. Regarding PER, the situation is opposite as long as the highest mean value is registered when no woman director is registered.

Table 5 reports the Pearson correlations among the included variables. We notice high correlations between firm-level control variables, but different models will be estimated for each of these measures to avoid the multicollinearity issue.

Regression results

Table 6 reports baseline estimates of the relation between board gender diversity and ROA via pooled OLS. We checked for multicollinearity using the variance inflation factor statistic (VIF), but all related values were lower than the cut-off value of ten recommended by Wooldridge (2012). The number and percentage of women on board

Table 3 Descriptive statistics

Variables	Obs	Mean	Std. Dev	Min	Max
ROA	747	9.00	8.12	−47.23	35.92
PER	766	35.23	88.39	3.78	1,880.06
NOWOMBRD	659	1.74	1.22	0.00	7.00
PERWOMBRD	695	16.54	10.20	0.00	50.00
PERFEMEXE	660	12.36	11.86	0.00	50.00
SIZEBRD	695	9.90	2.22	3.00	19.00
BRDMEET	689	7.76	3.37	2.00	34.00
BRDDUR	683	1.50	0.94	1.00	5.00
AGEYNGDIR	654	49.04	5.33	31.00	63.00
AGEOLDDIR	654	72.43	4.92	59.00	89.00
INDEPDIR	690	8.06	2.05	2.00	16.00
BRDCOMP	681	2.72	1.48	0.06	14.12
EXECOMP	692	33.98	39.64	0.47	436.61
TA	756	23,447.70	44,475.20	51.37	375,319.00
EMP	695	40,888.60	76,820.80	375.00	492,000.00
FCF	770	2,864.05	7,080.56	−2,649.00	70,019.00
CFFO	770	3,641.61	8,666.13	−637.00	81,266.00
CFFF	770	-1,663.90	6,568.26	−102,977.00	14,324.00
CR	752	1.36	1.33	0.00	9.84
CURR	752	2.39	1.68	0.62	11.85
QR	752	1.85	1.45	0.03	10.76
DY	426	2.30	2.69	0.04	32.91
DPS	806	0.81	1.44	0.00	18.50
DPR	745	44.57	230.54	0.00	5,425.46
TDTA	752	20.65	16.76	0.00	96.91
TDC	748	34.52	41.34	0.00	585.91
TDE	720	76.11	174.66	0.00	2,762.64
OM	762	18.61	15.39	−105.20	66.15
ETR	642	29.26	58.60	0.00	1,366.33
R&D	256	1,865.72	3,193.30	0.00	16,876.00

Source: Authors' computations. Notes: For the definition of variables, please see Table 2

positively influence ROA, consistent with Đặng et al. (2020); thus, the null Hypothesis 1 and Hypothesis 2 are rejected. In line with Martínez and Rambaud (2019), the positive impact may depict a competitive gain as women offer wider knowledge, skills, viewpoints, and experiences. However, the adverse influences emphasize an increased likelihood of struggles in the decision-making process. Likewise, consistent with Ahmadi et al. (2018), gender diversity can enhance board supervision, provide legitimacy to the board, augment the teamwork and coaching of managers, and strengthen stakeholder connection. Moreover, the findings support those of Pucheta-Martínez and Gallego-Álvarez (2020), who argued that women's conduct harmonizes all stockholders' interests and prevents disputes, improving corporate performance.

Nevertheless, the percentage of female executives exerted a negative influence, consistent with the identification and social categorization theories. Further, null Hypothesis 3 is rejected. Contrary to Brahma et al. (2020), a female executive does not own sufficient managerial power, adequate information, and time to impact policymaking, thus

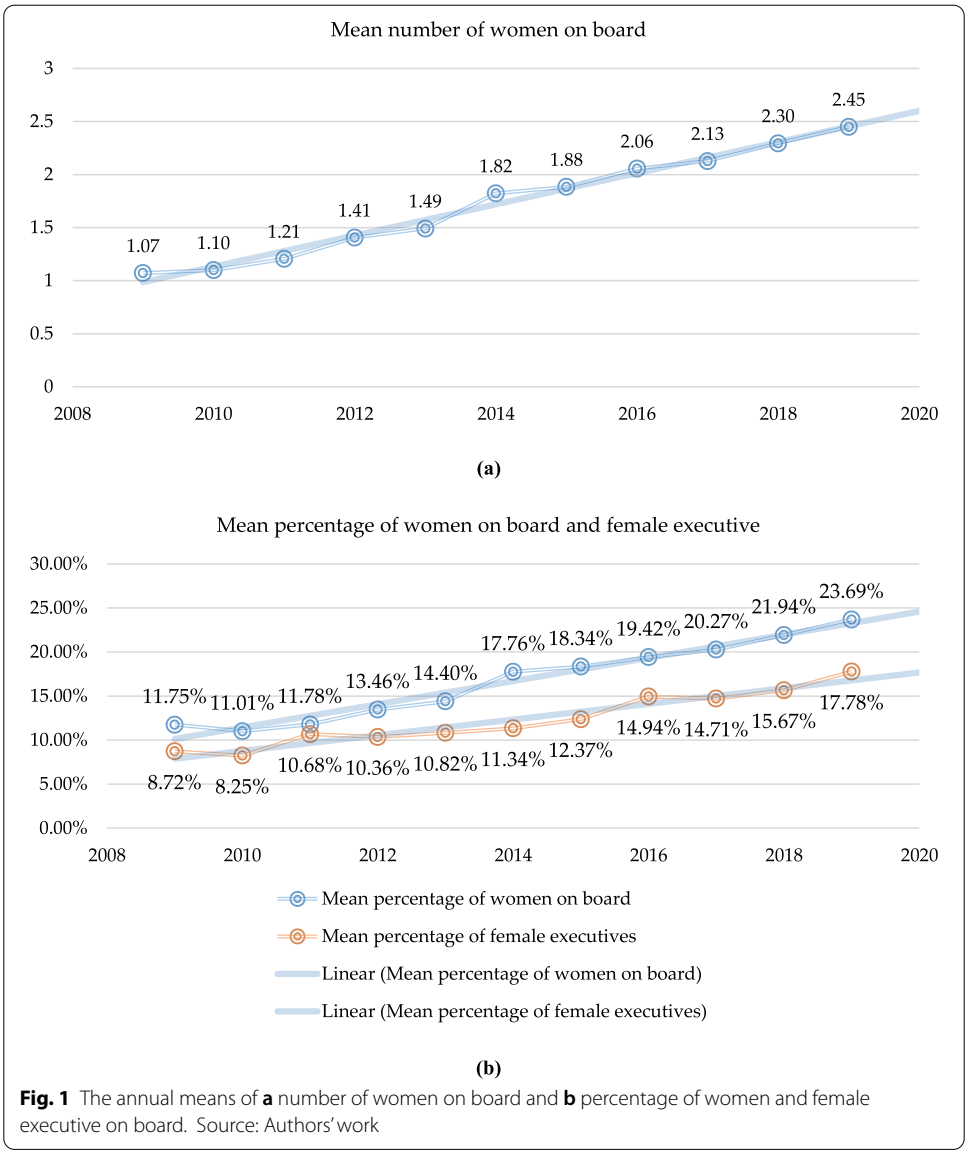

Fig. 1 The annual means of **a** number of women on board and **b** percentage of women and female executive on board. Source: Authors' work

Table 4 Comparison among companies that have no women on board and those that have at least one woman on board

Number of women directors	Mean performance	
	ROA (%)	PER
0	7.74385	44.46645
1	8.737377	34.78452
2	9.839072	24.60696
3	9.207485	33.27893
4	12.00326	19.83047
5	8.258044	20.03975
7	4.226931	25.34961

Source: Authors' computations. Notes: For the definition of variables, please see Table 2

Table 5 Pearson correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) ROA	1.00														
(2) PER	0.25	1.00													
(3) NOWOMBRD	0.14	0.08	1.00												
(4) PERWOMBRD	0.25	0.22	0.86	1.00											
(5) PERFEMEXE	0.07	−0.12	0.56	0.31	1.00										
(6) SIZEBRD	−0.20	−0.26	0.49	−0.00	0.53	1.00									
(7) BRDMEET	−0.33	−0.10	−0.01	−0.09	0.01	0.16	1.00								
(8) BRDDUR	−0.30	−0.05	−0.43	−0.44	−0.22	−0.15	0.10	1.00							
(9) AGEYNGDIR	−0.01	−0.35	0.02	−0.09	0.06	0.24	−0.03	−0.11	1.00						
(10) AGEOLDDIR	−0.11	−0.00	0.02	−0.20	0.21	0.37	−0.19	−0.20	0.20	1.00					
(11) INDEPDIR	−0.16	−0.30	0.56	0.16	0.50	0.86	0.24	−0.28	0.30	0.09	1.00				
(12) BRDCOMP	−0.13	−0.13	0.14	−0.13	0.25	0.52	−0.09	0.30	0.11	0.27	0.34	1.00			
(13) EXECOMP	0.06	−0.19	0.07	−0.04	0.30	0.23	−0.15	−0.01	0.24	0.48	0.03	0.27	1.00		
(14) TA	0.17	−0.34	0.27	0.20	0.54	0.16	−0.19	−0.15	0.43	0.05	0.26	0.06	0.43	1.00	
(15) EMP	−0.05	−0.43	0.36	0.05	0.42	0.66	0.31	−0.11	0.58	0.11	0.72	0.31	0.18	0.42	1.00
(16) FCF	0.30	−0.31	0.12	0.15	0.38	−0.06	−0.24	−0.15	0.42	−0.00	0.08	−0.06	0.41	0.94	0.30
(17) CFFO	0.28	−0.30	0.14	0.16	0.39	−0.04	−0.23	−0.14	0.41	−0.01	0.10	−0.06	0.39	0.95	0.32
(18) CFFF	−0.13	0.15	−0.14	−0.17	−0.41	0.03	0.24	0.09	−0.42	0.00	−0.10	0.04	−0.17	−0.67	−0.24
(19) CR	0.09	0.00	0.18	0.01	0.39	0.31	−0.06	−0.17	−0.04	0.42	0.08	0.23	0.42	0.21	−0.12
(20) CURR	0.02	−0.10	0.15	−0.06	0.37	0.38	−0.01	−0.12	0.01	0.38	0.15	0.27	0.42	0.20	−0.04
(21) QR	−0.01	−0.11	0.19	−0.04	0.39	0.40	0.04	−0.14	0.01	0.39	0.18	0.25	0.40	0.19	−0.03
(22) DY	0.08	0.12	0.08	−0.01	0.12	0.12	0.29	−0.10	0.22	−0.04	0.24	−0.04	−0.25	0.06	0.20
(23) DPS	0.07	−0.10	0.39	0.23	0.33	0.37	0.13	−0.15	0.52	−0.08	0.58	0.16	−0.11	0.34	0.73
(24) DPR	0.04	0.09	0.09	0.08	0.14	0.02	−0.03	−0.03	−0.03	−0.04	0.08	−0.03	−0.01	−0.00	−0.04
(25) TDTA	−0.43	−0.20	0.02	−0.28	0.38	0.52	0.01	0.15	0.27	0.40	0.37	0.37	0.27	0.30	0.33
(26) TDC	−0.34	−0.21	0.12	−0.18	0.37	0.56	0.16	0.01	0.38	0.31	0.56	0.30	0.11	0.27	0.58
(27) TDE	−0.27	−0.20	0.17	−0.10	0.33	0.53	0.23	−0.04	0.34	0.23	0.55	0.24	0.03	0.18	0.58

Table 5 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(28) OM	0.51	−0.03	0.17	0.18	0.31	0.01	−0.37	−0.22	0.08	0.33	−0.20	0.06	0.50	0.35	−0.04
(29) ETR	−0.31	0.06	−0.07	−0.03	−0.15	−0.09	−0.04	0.07	−0.07	0.01	−0.08	−0.09	0.03	−0.16	−0.16
(30) R&D	0.16	−0.33	0.36	0.21	0.71	0.31	−0.07	−0.19	0.31	0.07	0.37	0.09	0.34	0.90	0.44
	(16)	**(17)**	**(18)**	**(19)**	**(20)**	**(21)**	**(22)**	**(23)**	**(24)**	**(25)**	**(26)**	**(27)**	**(28)**	**(29)**	**(30)**
(16) FCF	1.00														
(17) CFFO	1.00	1.00													
(18) CFFF	−0.70	−0.69	1.00												
(19) CR	0.09	0.08	0.04	1.00											
(20) CURR	0.07	0.06	0.07	0.97	1.00										
(21) QR	0.05	0.04	0.08	0.97	0.99	1.00									
(22) DY	−0.01	−0.00	0.01	0.17	0.19	0.22	1.00								
(23) DPS	0.26	0.29	−0.30	−0.34	−0.31	−0.29	0.47	1.00							
(24) DPR	−0.03	−0.04	−0.14	0.09	0.07	0.08	0.20	0.01	1.00						
(25) TDTA	0.13	0.14	−0.20	0.21	0.24	0.26	0.15	0.21	0.02	1.00					
(26) TDC	0.12	0.14	−0.25	−0.02	−0.01	0.03	0.27	0.54	0.02	0.86	1.00				
(27) TDE	0.05	0.07	−0.20	−0.15	−0.14	−0.10	0.23	0.60	−0.02	0.69	0.92	1.00			
(28) OM	0.39	0.37	−0.15	0.46	0.42	0.40	−0.17	−0.20	−0.01	−0.05	−0.22	−0.20	1.00		
(29) ETR	−0.17	−0.16	0.04	−0.04	−0.04	−0.04	−0.01	−0.11	0.55	−0.01	−0.05	−0.13	−0.07	1.00	
(30) R&D	0.81	0.81	−0.63	0.38	0.37	0.38	0.09	0.27	0.02	0.28	0.25	0.16	0.41	−0.19	1.00

Source: Authors' computations. Notes: For the definition of variables, please see Table 2

Table 6 The outcomes of pooled OLS regarding the impact of board gender diversity on ROA

Variables	1	2	3	4	5	6	7	8	9	10
NOWOMBRD	0.35	−0.10	−0.39	0.72	0.60	0.73	0.74			
	(0.3720)	(0.6916)	(0.6887)	(0.3659)**	(0.3748)	(0.3795)*	(0.3696)**			
	(0.4036)	(0.7323)	(0.7482)	(0.3802)*	(0.3676)*	(0.3828)*	(0.3709)**			
PERWOMBRD								0.01	−0.02	−0.04
								(0.0350)	(0.0661)	(0.0662)
								(0.0374)	(0.0690)	(0.0729)
PERFEMEXE										
SIZEBRD	−0.53	0.09	−0.12	−0.48		−0.68				
	(0.2288)**	(0.5300)	(0.5058)	(0.2567)*		(0.2593)**				
	(0.2596)**	(0.4986)	(0.4466)	(0.2430)*		(0.2516)***				
INDEPDIR					−0.50		−0.28	−0.34	0.68	0.68
					(0.2471)**		(0.2287)	(0.2029)*	(0.4098)	(0.4180)
					(0.2887)*		(0.2421)	(0.2436)	(0.4187)	(0.4035)*
AGEYNGDIR	−0.20	−0.34	−0.38	−0.24	−0.20	−0.21	−0.10	−0.21		
	(0.0591)***	(0.1374)**	(0.1430)***	(0.0624)***	(0.0658)***	(0.0655)***	(0.0585)*	(0.0594)***		
	(0.0642)***	(0.1398)**	(0.1406)***	(0.0632)***	(0.0692)***	(0.0682)***	(0.0734)	(0.0628)***		
AGEOLDDIR				−0.05	−0.05	−0.04	−0.09		−0.22	−0.23
				(0.0690)	(0.0719)	(0.0715)	(0.0693)		(0.1569)	(0.1582)
				(0.0542)	(0.0592)	(0.0575)	(0.0567)*		(0.1421)	(0.1463)
BRDDUR	−2.13	−2.55	−2.78	−1.70	−1.65	−1.62	−1.44	−2.15	−2.86	−3.00
	(0.3833)***	(1.671194)	(1.6653)*	(0.4071)***	(0.4334)***	(0.4244)***	(0.4204)***	(0.3958)***	(1.9153)	(1.9247)
	(0.3467)***	(1.17031)**	(1.1785)**	(0.4027)***	(0.4668)***	(0.4277)***	(0.4225)***	(0.3847)***	(1.6066)*	(1.6163)*
BRDMEET	0.07	−0.72	−0.78	−0.04	−0.08	−0.09	−0.06	0.08	−0.46	−0.47
	(0.1134)	(0.3090)**	(0.3037)**	(0.1184)	(0.1231)	(0.1219)	(0.1214)	(0.1146)	(0.2621)*	(0.2652)*
	(0.1045)	(0.3186)**	(0.3192)**	(0.1167)	(0.1240)	(0.1234)	(0.1211)	(0.1063)	(0.2530)*	(0.2485)*
EXECOMP	0.003			−0.0003	0.007	0.009	0.009	0.001		
	(0.0056)			(0.0057)	(0.0054)	(0.0053)*	(0.0053)*	(0.0056)		

Table 6 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	(0.0087)			(0.0066)	(0.0085)	(0.0075)	(0.0082)	(0.0091)		
BRDCOMP		0.003	−0.0008	0.02	−0.15	−0.04	−0.10		0.24	0.23
		(0.3532)	(0.3533)	(0.2159)	(0.2156)	(0.2233)	(0.2128)		(0.3399)	(0.3425)
		(0.2666)	(0.2664)	(0.1598)	(0.1712)	(0.1691)	(0.1768)		(0.2739)	(0.2774)
CFFO	0.0001	0.0001		0.0001				0.0001	0.00009	
	(0.0000)**	(0.0000)**		(0.0000)***				(0.0000)***	(0.0000)*	
	(0.0000)***	(0.0000)**		(0.0000)***				(0.0000)***	(0.0000)**	
CFFF			−0.0001		−0.00005	−0.00004				−0.00006
			(0.0000)**		(0.0000)	(0.0000)				(0.0000)
			(0.0000)**		(0.0000)*	(0.0000)*				(0.0000)**
FCF										
TDE	−0.03							−0.03		
	(0.0068)***							(0.0066)***		
	(0.0090)***							(0.0089)***		
TDC		−0.15	−0.17						−0.14	−0.16
		(0.0288)***	(0.0290)***						(0.0299)***	(0.0309)***
		(0.0327)***	(0.0350)***						(0.0363)***	(0.0389)***
TDTA				−0.11	−0.12	−0.11	−0.10			
				(0.0212)***	(0.0220)***	(0.0220)***	(0.0218)***			
				(0.0198)***	(0.0212)***	(0.0204)***	(0.0210)***			
CR	0.54							0.43		
	(0.4177)							(0.4107)		
	(0.5838)							(0.5620)		
CURR		−0.95	−0.87						−1.41	−1.71
		(0.9639)	(0.9729)						(0.8153)*	(0.7705)**
		(0.9830)	(1.0250)						(0.7850)*	(0.7718)**
QR				0.16	−0.61	−0.35	−0.94			

Table 6 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
				(0.4960)	(0.4830)	(0.5014)	(0.3756)**			
				(0.7770)	(0.7556)	(0.7590)	(0.5069)*			
DPS	2.58							2.62		
	(0.3952)***							(0.3956)***		
	(0.6104)***							(0.6090)***		
DY		1.84	1.91						1.63	1.70
		(0.3300)***	(0.3325)***						(0.3233)***	(0.3242)***
		(0.4698)***	(0.4457)***						(0.4719)***	(0.4631)***
DPR				0.002	0.002	0.001	0.002			
				(0.0007)***	(0.0007)***	(0.0007)**	(0.0007)**			
				(0.0007)***	(0.0007)***	(0.0007)***	(0.0008)**			
EMP		0.00001	0.00002	0.00001	0.00001	0.00001				
		(0.0000)**	(0.0000)**	(0.0000)***	(0.0000)***	(0.0000)***				
		(0.0000)**	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***				
TA										
OM	0.36	0.30	0.32	0.38	0.39	0.38	0.37	0.36	0.36	0.38
	(0.0362)***	(0.0723)***	(0.0738)***	(0.0327)***	(0.0339)***	(0.0341)***	(0.0338)***	(0.0371)***	(0.0774)***	(0.0803)***
	(0.0355)***	(0.0664)***	(0.0678)***	(0.0319)***	(0.0307)***	(0.0321)***	(0.0309)***	(0.0346)***	(0.0676)***	(0.0696)***
ETR	−0.02	−0.09	−0.09	−0.11	−0.11	−0.11	−0.10	−0.02	−0.08	−0.08
	(0.011)**	(0.0255)***	(0.0259)***	(0.0213)***	(0.0225)***	(0.0221)***	(0.0225)***	(0.0110)**	(0.0254)***	(0.0258)***
	(0.0161)*	(0.0339)***	(0.0315)***	(0.0179)***	(0.0198)***	(0.0189)***	(0.0211)***	(0.0162)*	(0.0334)**	(0.0330)**
R&D	−0.0005	−0.0005	−0.0003	−0.0006	−0.0001	−0.0001	0.00008	−0.0006	−0.0003	−0.0001
	(0.0001)***	(0.0002)*	(0.0002)	(0.0002)***	(0.0001)	(0.0001)	(0.0001)	(0.0001)***	(0.0002)	(0.0002)
	(0.0002)***	(0.0002)*	(0.0002)	(0.0002)***	(0.0001)	(0.0001)	(0.0001)	(0.0002)***	(0.0002)	(0.0001)
_cons	19.75	33.77	38.73	27.86	27.81	29.11	23.45	18.17	27.09	28.89
	(3.6139)***	(9.6238)***	(9.6454)***	(5.3350)***	(5.5547)***	(5.5682)***	(5.3992)***	(3.5587)***	(12.5326)**	(12.5175)**

Table 6 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	(3.8662)***	(8.7564)***	(8.7270)***	(5.2876)***	(5.5026)***	(5.5394)***	(5.2919)***	(3.7200)***	(12.1702)**	(12.1583)**
F statistics	22.81***	7.88***	7.89***	20.85***	18.26***	18.72***	19.58***	22.31***	22.21***	7.77***
R-Sq	0.6302	0.6051	0.6054	0.6732	0.6434	0.6489	0.6158	0.625	0.6036	0.5706
Mean VIF	2.43	3.6	3.11	2.45	1.87	1.94	1.48	2.23	2.89	2.46
# Obs	188	87	87	179	179	179	186	188	188	90
Variables	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
NOWOMBRD											
PERWOMBRD	0.06	0.05	0.06	0.09							
	(0.0339)*	(0.0353)	(0.0352)*	(0.0192)***							
	(0.0360)*	(0.0363)	(0.0362)*	(0.0182)***							
PERFEMEXE					−0.04	−0.03	−0.01	−0.03			
					(0.0191)**	(0.0230)*	(0.0217)	(0.0165)**			
					(0.0201)**	(0.0241)	(0.0237)	(0.0166)**			
SIZEBRD											
INDEPDIR	−0.08		−0.15		0.23	0.59		0.29		−0.07	−0.10
	(0.2066)		(0.2143)		(0.1228)*	(0.1594)***		(0.1182)**		(0.2123)	(0.2111)
	(0.2324)		(0.2405)		(0.1325)*	(0.1626)***		(0.1288)**		(0.2493)	(0.2469)
AGEYNGDIR	−0.14	−0.19	−0.11	−0.06	−0.04	−0.12	−0.19	−0.05	−0.20	−0.11	−0.10
	(0.0577)**	(0.0659)***	(0.0601)*	(0.0375)*	(0.0429)	(0.0575)**	(0.0585)***	(0.0385)	(0.0660)***	(0.0606)*	(0.0590)*
	(0.0694)**	(0.0723)***	(0.0737)	(0.0380)*	(0.0434)	(0.0601)**	(0.0608)***	(0.0377)	(0.0744)***	(0.0750)	(0.0743)
AGEOLDDIR	−0.09	−0.07	−0.09	−0.08				−0.08	−0.06	−0.08	−0.08
	(0.0668)	(0.0709)	(0.0693)	(0.0411)**				(0.0423)**	(0.0706)	(0.0697856)	(0.0696)
	(0.0525)*	(0.0571)	(0.0555)*	(0.0345)**				(0.0368)**	(0.0561)	(0.054362)	(0.0547)
BRDDUR	−1.61	−1.39	−1.44	−1.17	−1.20	−0.64	−0.92	−0.88	−1.55	−1.61	−1.54
	(0.4150)***	(0.4285)***	(0.4306)***	(0.2152)***	(0.2550)***	(0.4436)	(0.4550)**	(0.2302)***	(0.4166)***	(0.4253)***	(0.4209)***
	(0.4325)***	(0.4035)***	(0.4414)***	(0.1756)***	(0.2341)***	(0.4190)	(0.4396)**	(0.2135)***	(0.3742)***	(0.4233)***	(0.4204)***

Table 6 (continued)

Variables	11	12	13	14	15	16	17	18	19	20	21
BRDMEET	0.01	−0.11	−0.05	−0.33	−0.31	−0.49	−0.40	−0.34	−0.09	−0.03	−0.05
	(0.1190)	(0.1238)	(0.1224)	(0.0639)***	(0.0715)***	(0.0909)***	(0.0920)***	(0.0645)***	(0.1238)	(0.1233)	(0.1224)
	(0.1227)	(0.1198)	(0.1230)	(0.0647)***	(0.0678)***	(0.0878)***	(0.0911)***	(0.0621)***	(0.1217)	(0.1241)	(0.1242)
EXECOMP	0.001	0.009	0.01	−0.003	0.001			−0.003	0.008	0.009	0.00
	(0.0057)	(0.0053)*	(0.0054)*	(0.0050)	(0.0057)			(0.0052)	(0.0053)	(0.0054)*	(0.0053)
	(0.0069)	(0.0076)	(0.0082)	(0.0090)	(0.0108)			(0.0075)	(0.0073)	(0.0079)	(0.0078)
BRDCOMP	0.07	−0.22	−0.06	−0.14		−0.18	−0.18	−0.04	−0.20	−0.07	−0.08
	(0.2093)	(0.2111)	(0.2129)	(0.1422)		(0.1898)	(0.1866)	(0.1529)	(0.2115)	(0.2146)	(0.2144)
	(0.1715)	(0.1894)	(0.1794)	(0.1376)		(0.1478)	(0.1574)	(0.1360)	(0.1911)	(0.1828)	(0.1809)
CFFO	0.0001							0.0001			
	(0.0000)***							(0.0000)***			
	(0.0000)***							(0.0000)***			
CFFF		−0.00004	−0.00002				−0.0001		−0.0001	−0.00004	
		(0.0000)	(0.0000)				(0.0000)**		(0.0000)	(0.0000)	
		(0.0000)*	(0.0000)				(0.0000)***		(0.0000)**	(0.0000)*	
FCF				0.00006							
				(0.0000)**							
				(0.0000)***							
TDE					−0.004						
					(0.0021)*						
					(0.0026)						
TDC						−0.04	−0.03				
						(0.0098)***	(0.0100)***				
						(0.0110)***	(0.0111)***				
TDTA	−0.09	−0.12	−0.10	−0.06				−0.07	−0.13	−0.11	−0.11
	(0.0211)***	(0.0220)***	(0.0219)***	(0.0112)***				(0.0114)***	(0.0217)***	(0.0216)***	(0.0216)***
	(0.0198)***	(0.0207)***	(0.0208)***	(0.0115)***				(0.0117)***	(0.0204)***	(0.0212)***	(0.0212)***

Table 6 (continued)

Variables	11	12	13	14	15	16	17	18	19	20	21
CR					0.50						
					(0.1624)***						
					(0.1651)***						
CURR						0.35	0.46				
						(0.1627)**	(0.1632)***				
						(0.1692)**	(0.1780)***				
QR	−0.32	−0.74	−0.78	0.71				0.53	−0.77	−0.74	−0.85
	(0.3910)	(0.4756)	(0.3895)**	(0.1385)***				(0.1392)***	(0.4766)	(0.3922)*	(0.3762)**
	(0.5202)	(0.6781)	(0.5075)	(0.1561)***				(0.1429)***	(0.6820)	(0.5058)	(0.5011)*
DPS					0.32						
					(0.1629)**						
					(0.2229)						
DY						0.14	0.12				
						(0.0932)	(0.0910)				
						(0.1615)	(0.1509)				
DPR	0.002	0.001	0.001	0.001				0.001	0.001	0.001	0.002
	(0.0007)***	(0.0007)**	(0.0007)**	(0.0007)				(0.0007)**	(0.0007)**	(0.0008)**	(0.0007)**
	(0.0008)***	(0.0007)**	(0.0008)**	(0.0005)**				(0.0005)***	(0.0007)***	(0.0008)**	(0.0008)**
EMP		0.00001		0.00001			0.00001		0.00001		
		(0.0000)**		(0.0000)***			(0.0000)***		(0.0000)**		
		(0.0000)***		(0.0000)***			(0.0000)***		(0.0000)***		
TA					0.00001	0.00001	−0.00001				
					(0.0000)	(0.0000)**	(0.0000)				
					(0.0000)	(0.0000)**	(0.0000)				
OM	0.36	0.40	0.37	0.28	0.27	0.24	0.28	0.26	0.41	0.39	0.38
	(0.0330)***	(0.0329)***	(0.0344)***	(0.0168)***	(0.0190)***	(0.0247)***	(0.0275)***	(0.0163)***	(0.0317)***	(0.0331)***	(0.0330)***
	(0.0310)***	(0.0343)***	(0.0319)***	(0.0200)***	(0.0225)***	(0.0267)***	(0.0310)***	(0.0193)***	(0.0313)***	(0.0301)***	(0.0300)***

Table 6 (continued)

Variables	11	12	13	14	15	16	17	18	19	20	21
ETR	−0.10	−0.10	−0.10	−0.09	−0.006	−0.008	−0.009	−0.10	−0.10	−0.10	−0.10
	(0.0217)***	(0.0224)***	(0.0225)***	(0.0150)***	(0.0041)*	(0.0035)**	(0.0035)**	(0.0153)***	(0.0224)***	(0.0227)***	(0.0227)***
	(0.01)***	(0.0196)***	(0.0212)***	(0.0143)***	(0.0054)	(0.0031)***	(0.0028)***	(0.0147)***	(0.0195)***	(0.0213)***	(0.0209)***
R&D	−0.0004	−0.0001	0.00001						−0.0001	0.00003	0.00
	(0.0001)**	(0.0001)	(0.0001)						(0.0001)	(0.0001)	(0.0001)
	(0.0001)***	(0.0001)	(0.0001)						(0.0001)	(0.0001)	(0.0000)
_cons	22.32	24.67	22.62	18.52	8.77	12.47	18.51	18.24	24.80	22.54	21.93
	(5.1632)***	(5.4185)***	(5.3811)***	(3.3909)***	(2.4709)***	(3.2567)***	(3.1437)***	(3.4687)***	(5.4351)***	(5.4261)***	(5.3937)***
	(4.9336)***	(5.4235)***	(5.0672)***	(3.2113)***	(2.4010)***	(3.3496)***	(3.3155)***	(3.3418)***	(5.5496)***	(5.1910)***	(5.1703)***
F statistics	20.49***	19.04***	18.32***	43.8***	30.95***	20.42***	20.89***	37.99***	20.12***	19.03***	20.41***
R-Sq	0.6439	0.6366	0.6178	0.5693	0.4277	0.4375	0.4785	0.5184	0.6321	0.609	0.6067
Mean VIF	2.06	1.73	1.62	1.3	1.39	1.24	1.46	1.31	1.73	1.61	1.42
# Obs	186	179	186	479	510	328	310	509	179	186	186

Source: Authors' computations. Notes: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. The first and second numbers between the brackets are the standard error and robust standard error, respectively. For the definition of variables, please see Table 2

yielding a negative influence on firm performance. According to Akram et al. (2020), women executives may have close connections with the stockholders, which limits their capacity to operate autonomously.

Table 7 shows the outcomes of pooled OLS concerning the influence of board gender diversity on PER. The VIF of less than ten for all independent variables reveals that multicollinearity is not a concern. Contrary to Bennouri et al. (2018) and Martín-Ugedo et al. (2019), as the coefficients of board gender diversity variables are statistically significant and positive, market-based performance is enhanced by investors' judgment of the supervision effectiveness of the board. As such, all three null hypotheses are rejected. In line with Carmen et al. (2019), gender diversity supports a competitive edge, also contributing to greater supervision (Chijoke-Mgbame et al. 2020), which enhances performance. Concerning the theory, the outcomes are consistent with the agency conjecture and resource dependence hypotheses. Therefore, investors remark gender diversity as a method to amend the oversight efficiency of the board.

Robustness checks

To further confirm our findings, we perform robustness examinations employing panel data FE and RE. Table 8 reports the estimates concerning the impact of board gender diversity on ROA using FE and RE regression models. The econometric outcome reveals the lack of statistical significance for all board gender diversity measures. Therefore, the three hypotheses cannot be rejected. Hence, the findings are in line with the theories from social psychology. Consistent with Ararat and Yurtoglu (2020), Carter et al. (2010) and Marinova et al. (2016), there is no variance in ROA of companies with and without women on corporate boards. Further, Ionascu et al. (2018) indicated that women on the board of directors have no contribution in driving the company's performance as measured by ROA. According to Chauhan and Dey (2017), the outcomes endorse the tokenism assumption and advocate that women directors are viewed merely as a token to fulfill conventional requirements. From a cultural perspective, as the US show a high masculinity setting (Hofstede et al. 2010), the existence of female directors does not exert a substantial impact on company performance (Martín-Ugedo et al. 2019).

In line with Wang (2014), the presence of independent directors is not statistically significant, and this explains why outsiders usually fail in their monitoring role. Moreover, leverage ratios show a negative relationship between the share of debt and firm performance, meaning the higher the firm dependency on financing through debt, the worse its performance. This result is confirmed by Evgeny (2015), who explained that highly levered firms do not implement particular projects even if it shows a positive net present value. This is because such corporations have to pay their debt obligations, thus disregarding good opportunities that may enhance their performance. However, other studies, such as those of Ibhagui and Olokoyo (2018), have an opposite explanation depending on the firm size. If small-sized firms have debt, then it enhances their

Table 7 The outcomes of pooled OLS regarding the impact of board gender diversity on PER

Variables	1	2	3	4	5	6	7	8	9	10
NOWOMBRD	5.98	3.74	3.70	4.47	2.14	4.55	1.96			
	(3.4668)*	(1.5628)**	(1.5492)**	(3.3853)	(3.3791)	(3.3916)	(3.2331)			
	(3.3701)*	(1.4002)***	(1.3405)***	(2.5207)*	(2.7229)	(2.5749)*	(2.5191)			
PERWOMBRD								0.52	0.42	0.45
								(0.3239)	(0.1498)***	(0.1510)***
								(0.31345)*	(0.1691)**	(0.1684)***
PERFEMEXE										
SIZEBRD	−0.68	−0.51	−0.18	−6.29		−5.78				
	(2.1464)	(1.1977)	(1.1377)	(2.3751)***		(2.3174)**				
	(2.2296)	(1.0463)	(1.0474)	(2.9122)**		(2.7425)**				
INDEPDIR					−1.90		−2.44	1.33	−2.16	−1.80
					(2.2280)		(2.0007)	(1.8867)	(0.9284)**	(0.9537)*
					(2.5105)		(2.0554)	(2.4917)	(0.9069)**	(0.9926)*
AGEYNGDIR	−0.67	−0.14	−0.29	−0.83	−0.70	−0.81	−1.09	−0.69		
	(0.5521)	(0.3105)	(0.3216)	(0.5779)	(0.5940)***	(0.5859)	(0.5119)**	(0.5502)		
	(0.3699)*	(0.2749)	(0.2768)	(0.3818)**	(0.3678)*	(0.3830)**	(0.3925)***	(0.3686)*		
AGEOLDDIR				3.54	3.38	3.55	3.42		0.21	0.20
				(0.6384)***	(0.6482)	(0.6397)***	(0.6069)***		(0.3555)	(0.3608)
				(1.0921)***	(1.0736)***	(1.0945)***	(1.0215)***		(0.4030)	(0.3983)
BRDDUR	15.95	−0.39	−0.19	12.54	13.33	12.67	13.34	16.86	−0.78	−0.23
	(3.5715)***	(3.7764)	(3.7456)	(3.7662)***	(3.9074)***	(3.7928)***	(3.6782)***	(3.6596)***	(4.3385)	(4.3906)
	(6.3001)**	(2.6077)	(2.5612)	(5.5575)**	(6.1555)**	(5.6994)**	(5.4790)**	(6.6157)**	(2.9509)	(3.1207)
BRDMEET	−3.06	−0.17	−0.03	−2.52	−2.43	−2.42	−2.51	−3.16	−0.58	−0.35
	(1.0736)***	(0.6983)	(0.6832)	(1.0953)**	(1.1101)**	(1.0900)**	(1.0622)**	(1.0774)***	(0.5937)	(0.6051)
	(1.0381)***	(0.5770)	(0.5368)	(0.9508)***	(0.9854)**	(0.9578)**	(0.9052)***	(1.0757)***	(0.5825)	(0.5792)
EXECOMP	0.06			−0.01	−0.04	−0.04	−0.05	0.07		
	(0.0528)			(0.0528)	(0.0487)	(0.0473)	(0.0470)	(0.0519)		

Table 7 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	(0.0488)			(0.0301)	(0.0276)*	(0.0246)*	(0.0259)*	(0.0520)		
BRDCOMP		0.26	0.16	3.03	1.89	3.26	1.70		0.31	0.29
		(0.7983)	(0.7946)	(1.9979)	(1.9441)	(1.9956)	(1.8619)		(0.7701)	(0.7813)
		(0.6629)	(0.6693)	(3.1501)	(2.7675)	(3.2403)	(2.5145)		(0.5821)	(0.6004)
CFFO	−0.0002	−0.0001		−0.0005				−0.0002	−0.0001	
	(0.0004)	(0.0001)		(0.0004)				(0.0003)	(0.0001)	
	(0.0002)	(0.0000)		(0.0002)*				(0.0002)	(0.0000)**	
CFFF			−0.0001		0.0003	0.0003				−0.00002
			(0.0001)		(0.0003)	(0.0003)				(0.0001)
			(0.0000)		(0.0002)	(0.0002)*				(0.0000)
FCF										
TDE	−0.07							−0.08	0.01	
	(0.0635)							(0.0619)	(0.0678)	
	(0.0517)							(0.0508)	(0.0581)	
TDC		0.03	0.03							0.01
		(0.0652)	(0.0654)							(0.0705)
		(0.0600)	(0.0647)							(0.0639)
TDTA				−0.25	−0.28	−0.21	−0.32			
				(0.1962)	(0.1987)	(0.1969)	(0.1908)*			
				(0.1708)	(0.1763)	(0.1705)	(0.1768)*			
CR	−1.75							−1.79		
	(3.9378)							(3.8330)		
	(6.1160)							(5.9022)		
CURR		−1.89	−1.05						−0.60	0.76
		(2.1783)	(2.1883)						(1.8468)	(1.7577)
		(2.2593)	(2.4952)						(1.7394)	(1.7345)
QR				−5.90	−8.42	−5.24	−5.54			

Table 7 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
				(4.5880)	(4.3543)*	(4.4808)	(3.2855)*			
				(6.2949)	(6.8278)	(6.2875)	(4.0850)			
DPS	−3.36							−3.41		
	(3.7425)							(3.7171)		
	(4.3179)							(4.4687)		
DY		1.21	1.32						1.29	1.19
		(0.7458)	(0.7479)*						(0.7325)*	(0.7396)
		(1.4399)	(1.4626)						(1.3521)	(1.3549)
DPR				−0.0009	0.001	0.001	0.0008			
				(0.0068)	(0.0071)	(0.0069)	(0.0068)			
				(0.0036)	(0.0038)	(0.0036)	(0.0036)			
EMP		−0.00004	−0.00004	−0.00001	−0.0001	−0.00002				
		(0.0000)*	(0.0000)*	(0.0000)	(0.0000)	(0.0000)				
		(0.0000)**	(0.0000)*	(0.0000)	(0.0000)	(0.0000)				
TA										
OM	−2.31	0.07	0.10	−1.52	−1.35	−1.54	−1.31	−2.29	−0.11	−0.11
	(0.3426)***	(0.1634)	(0.1661)	(0.3031)***	(0.3058)***	(0.3047)***	(0.2959)***	(0.3476)***	(0.1753)	(0.1832)
	(0.6598)***	(0.1671)	(0.1661)	(0.4339)***	(0.4157)***	(0.4430)***	(0.3969)***	(0.6572)***	(0.2240)	(0.2338)
ETR	0.07	−0.09	−0.10	0.10	0.12	0.11	0.08	0.08	−0.07	−0.07
	(0.1143)	(0.0577)	(0.0584)*	(0.1977)	(0.2029)	(0.1981)	(0.1975)	(0.1140)	(0.0576)	(0.0590)
	(0.0796)	(0.1009)	(0.1049)	(0.1842)	(0.1826)	(0.1865)	(0.1811)	(0.0823)	(0.1022)	(0.1046)
R&D	0.001	−0.0003	−0.0009	0.003	0.002	0.002	0.0008	0.001	0.00005	−0.0008
	(0.0017)	(0.0006)	(0.0004)*	(0.0019)	(0.0014)	(0.0014)	(0.0009)	(0.0017)	(0.0006)	(0.0004)*
	(0.0015)	(0.0005)	(0.0006)	(0.0018)*	(0.0014)	(0.0014)	(0.0007)	(0.0016)	(0.0005)	(0.0005)
_cons	114.04	32.97	34.66	-89.75	-122.57	-98.28	-104.22	98.10	23.73	16.56
	(33.7247)***	(21.7472)	(21.6944)	(49.3484)*	(50.0761)**	(49.7598)*	(47.2286)**	(32.9288)***	(28.3881)	(28.5540)

Table 7 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	(27.9184)***	(21.0156)	(21.9717)	(54.2176)*	(62.5617)*	(57.3167)*	(53.2063)*	(27.3981)***	(25.6836)	(26.3553)
F statistics	6.16***	2.92***	3.00***	6.22***	5.65***	6.18***	6.79***	6.19***	2.68***	2.44***
R-Sq	0.3163	0.3622	0.3686	0.3806	0.358	0.379	0.3571	0.3176	0.3141	0.2946
Mean VIF	2.45	3.6	3.11	2.45	1.87	1.94	1.48	2.26	2.89	2.46
# Obs	187	87	87	179	179	179	186	187	90	90

Variables	11	12	13	14	15	16	17	18	19
NOWOMBRD									
PERWOMBRD	0.36	0.31	0.38	−0.16					
	(0.3069)	(0.3154)	(0.3074)	(0.2435)					
	(0.2427)	(0.2529)	(0.2481)	(0.2429)					
PERFEMEXE					0.45	0.20			
					(0.2162)**	(0.1954)			
					(0.2464)*	(0.2102)			
SIZEBRD									
INDEPDIR	−2.45		−2.51		−1.32	−2.91		−2.08	−1.95
	(1.8709)		(1.8705)		(1.3914)	(1.3986)**		(1.8409)	(1.8276)
	(2.0052)		(2.0344)		(0.8613)	(0.9472)***		(1.9756)	(1.9180)
AGEYNGDIR	−1.04	−0.65	−1.00	0.07	0.42	0.02	−0.67	−1.02	−1.10
	(0.5224)**	(0.5884)	(0.5247)*	(0.4777)	(0.4870)	(0.4584)	(0.5876)	(0.5253)*	(0.5109)**
	(0.3909)***	(0.3785)*	(0.3828)**	(0.3227)	(0.4214)	(0.3415)	(0.3655)*	(0.3727)***	(0.3876)***
AGEOLDDIR	3.40	3.28	3.43	0.95		1.04	3.35	3.48	3.45
	(0.6050)***	(0.6338)***	(0.6052)***	(0.5197)*		(0.5005)**	(0.6290)***	(0.6049)***	(0.6030)***
	(1.0116)***	(1.0328)***	(1.0195)***	(0.5008)*		(0.4659)**	(1.049)***	(1.0406)***	(1.0283)***
BRDDUR	14.20	14.68	14.37	3.32	1.12	1.27	13.75	13.43	13.07
	(3.7567)***	(3.8263)***	(3.7589)***	(2.7229)	(2.8845)	(2.7331)	(3.7076)***	(3.6872)***	(3.6434)***
	(5.7250)**	(6.3871)**	(5.8267)**	(2.6244)	(2.3616)	(2.6004)	(6.2714)**	(5.6588)**	(5.4939)**

Table 7 (continued)

Variables	11	12	13	14	15	16	17	18	19
BRDMEET	−2.64	−2.55	−2.65	−1.94	−1.46	−1.57	−2.47	−2.58	−2.49
	(1.0780)**	(1.1056)**	(1.0688)**	(0.8072)**	(0.8074)*	(0.7616)**	(1.1023)**	(1.0691)**	(1.0598)**
	(0.9420)***	(1.0393)**	(0.9460)***	(0.6015)***	(0.5811)**	(0.5965)***	(1.007)**	(0.9174)***	(0.8917)***
EXECOMP	−0.03	−0.03	−0.04	0.00	0.03	−0.00	−0.04	−0.05	−0.05
	(0.0517)	(0.0478)	(0.0472)	(0.0637)	(0.0643)	(0.0619)	(0.0472)	(0.0468)	(0.0467)
	(0.0291)	(0.0234)	(0.0261)*	(0.0471)	(0.0495)	(0.0472)	(0.0240)*	(0.0271)**	(0.0268)**
BRDCOMP	1.60	1.58	1.74	2.94		2.68	1.67	1.70	1.76
	(1.8951)	(1.8850)	(1.8586)	(1.7955)		(1.8048)	(1.8823)	(1.8612)	(1.8563)
	(2.4888)	(2.6425)	(2.4811)	(1.8879)		(1.8035)	(2.6991)	(2.5213)	(2.5368)
CFFO						−0.0002			
						(0.0002)			
						(0.0002)			
CFFF		0.0003	0.0003				0.0003	0.0002	
		(0.0003)	(0.0003)				(0.0003)	(0.0003)	
		(0.0002)	(0.0001)				(0.0002)	(0.0001)	
FCF				−0.0001					
				(0.0003)					
				(0.0002)					
TDE					−0.06				
					(0.0247)**				
					(0.0273)**				
TDC									
TDTA	−0.31	−0.28	−0.29	−0.17		−0.13	−0.32	−0.33	−0.34
	(0.1914)	(0.1968)	(0.1911)	(0.1422)		(0.1362)	(0.1935)*	(0.1879)*	(0.1873)*
	(0.1762)*	(0.1767)	(0.1744)*	(0.1611)		(0.1456)	(0.1797)*	(0.1806)*	(0.1808)*
CR					−1.60				

Table 7 (continued)

Variables	11	12	13	14	15	16	17	18	19
					(1.8270)				
					(1.2211)				
CURR									
QR	−6.17	−8.85	−6.18	−2.32		−2.14	−9.04	−5.95	−5.30
	(3.5400)*	(4.2463)**	(3.4004)*	(1.7493)		(1.6444)	(4.2413)**	(3.4007)*	(3.2564)
	(4.3891)	(6.6768)	(4.4440)	(1.0308)**		(0.8666)**	(6.6387)	(4.4140)	(4.0908)
DPS					−1.50				
					(1.8325)				
					(1.4770)				
DY									
DPR	0.0004	0.0005	0.001	−0.004		−0.005	0.0009	0.001	0.0009
	(0.0068)	(0.0070)	(0.0069)	(0.0092)		(0.0091)	(0.0070)	(0.0069)	(0.0068)
	(0.0037)	(0.0039)	(0.0036)	(0.0034)		(0.0038)	(0.0039)	(0.0036)	(0.0036)
EMP		−0.0001		−0.0001			−0.0001		
		(0.0000)		(0.0000)**			(0.0000)		
		(0.0000)*		(0.0000)***			(0.0000)*		
TA					−0.0001				
					(0.0000)				
					(0.0000)**				
OM	−1.36	−1.32	−1.39	−0.86	−0.97	−0.70	−1.24	−1.28	−1.26
	(0.2995)***	(0.2939)***	(0.3008)***	(0.2127)***	(0.2159)***	(0.1928)***	(0.2823)***	(0.2873)***	(0.2860)***
	(0.4100)***	(0.4033)***	(0.4196)***	(0.2525)***	(0.2849)***	(0.2352)***	(0.3913)***	(0.40068)***	(0.3936)***
ETR	0.08	0.14	0.08	0.35	0.12	0.34	0.15	0.10	0.09
	(0.1971)	(0.2003)	(0.1970)	(0.1895)*	(0.0478)***	(0.1814)*	(0.2001)	(0.1969)	(0.1965)

Table 7 (continued)

Variables	11	12	13	14	15	16	17	18	19
	(0.1810)	(0.1945)	(0.1816)	(0.2052)*	(0.0595)**	(0.2003)*	(0.1923)	(0.1795)	(0.1785)
R&D	0.001	0.002	0.001				0.002	0.001	0.0009
	(0.0016)	(0.0014)	(0.0012)				(0.0014)	(0.0012)	(0.0009)
	(0.0012)	(0.0014)	(0.0010)				(0.0014)	(0.0010)	(0.0007)
_cons	-107.40	-134.49	-111.29	-16.94	51.35	−7.37	-133.70	-111.75	-108.22
	(46.7375)**	(48.3777)***	(46.9686)**	(43.0349)	(28.0742)*	(41.1471)	(48.3661)***	(47.0405)**	(46.6802)**
	(53.4346)**	(62.1733)**	(55.0738)**	(35.2621)	(19.6373)***	(31.0901)	(61.8780)**	(55.2773)**	(53.5548)**
F statistics	6.43***	6.07***	6.47***	3.06***	3.44***	2.79***	6.44***	6.80***	7.31***
R-Sq	0.362	0.3584	0.3633	0.0846	0.0773	0.0734	0.3546	0.3575	0.3558
Mean VIF	2.06	1.73	1.62	1.3	1.4	1.31	1.73	1.61	1.42
# Obs	186	179	186	478	506	507	179	186	186

Source: Authors' computations. Notes: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. The first and second numbers between the brackets are the standard error and robust standard error, respectively. For the definition of variables, please see Table 2

Table 8 The outcomes of panel data fixed-effects and random-effects regression regarding the impact of board gender diversity on ROA

Variables	1	2	3	4	5	6	7	8	9	10
	FE	FE	FE	RE	FE	FE	RE	FE	FE	FE
NOWOMBRD	−0.05	−0.30	−0.25	0.04	0.11	0.01	0.02			
	(−0.14)	(−0.37)	(−0.31)	(0.12)	(0.26)	(0.03)	(0.07)			
PERWOMBRD								−0.0002	−0.05	−0.04
								(−0.01)	(−0.65)	(−0.61)
PERFEMEXE										
SIZEBRD	0.27	0.86	0.80	0.12		0.50*				
	(−1.06)	(1.45)	(1.36)	(0.47)		(1.7)				
INDEPDIR					0.18		0.08	0.09	0.46	0.46
					(0.61)		(0.33)	(0.37)	(0.9)	(0.91)
AGEYNGDIR	−0.09	−0.09	−0.13	−0.11*	−0.10	−0.09	−0.08	−0.09		
	(−1.33)	(−0.6)	(−0.83)	(−1.67)	(−1.26)	(−1.15)	(−1.23)	(−1.39)		
AGEOLDDIR				−0.06	−0.03	−0.05	−0.05		−0.16	−0.17
				(−0.82)	(−0.35)	(−0.61)	(−0.78)		(−0.85)	(−0.92)
BRDDUR	−0.11	0.76	0.68	−0.94*	−0.42	−0.16	−0.83*	−0.27	−0.0009	−0.009
	(−0.22)	(0.44)	(0.4)	(−1.95)	(−0.73)	(−0.29)	(−1.75)	(−0.53)	(0)	(−0.01)
BRDMEET	0.10	−0.28	−0.31	0.06	0.09	0.10	0.07	0.09	−0.31	−0.32
	(−0.94)	(−0.79)	(−0.86)	(0.57)	(0.79)	(0.89)	(0.73)	(0.89)	(−0.93)	(−0.96)
EXECOMP	0.006			0.008	0.009	0.008	0.01**	0.007		
	(−1.26)			(1.59)	(1.61)	(1.48)	(2.05)	(1.31)		
BRDCOMP		−0.27	−0.24	−0.13	−0.10	−0.15	−0.13		−0.26	−0.25
		(−0.81)	(−0.73)	(−0.65)	(−0.47)	(−0.72)	(−0.68)		(−0.78)	(−0.75)
CFFO	−0.00007	−0.00007		0.00005				−0.00006	−0.00001	
	(−1.17)	(−0.47)		(1.02)				(−1.08)	(−0.06)	
CFFF			−0.00004		−0.00003	−0.00003				−0.00003
			(−0.98)		(−0.92)	(−0.86)				(−0.62)
FCF										

Table 8 (continued)

Variables	1 FE	2 FE	3 FE	4 RE	5 FE	6 FE	7 RE	8 FE	9 FE	10 FE
TDE	−0.02***							−0.02***		
	(−4.68)							(−4.55)		
TDC		−0.22***	−0.22***						−0.20***	−0.20***
		(−5.27)	(−5.07)						(−4.67)	(−4.46)
TDTA				−0.13***	−0.13***	−0.14***	−0.13***			
				(−5.08)	(−4.25)	(−4.49)	(−4.91)			
CR	−1.21**							−1.15**		
	(−2.55)							(−2.44)		
CURR		−1.42	−0.95						−0.97	−0.70
		(−1.18)	(−0.74)						(−0.83)	(−0.57)
QR				−0.05	0.13	−0.01	−0.31			
				(−0.11)	(0.22)	(−0.02)	(−0.76)			
DPS	1.71***							1.65***		
	(−3.52)							(3.37)		
DY		1.48***	1.54***						1.26***	1.27***
		(3.59)	(3.72)						(3.25)	(3.3)
DPR				0.002***	0.001***	0.001***	0.001***			
				(3.32)	(2.91)	(3.02)	(3.24)			
EMP		0.00006	0.00006	0.00001	0.00002	0.00002				
		(1.48)	(1.59)	(1.22)	(0.97)	(0.86)				
TA										
OM	0.54***	0.47***	0.45***	0.41***	0.41***	0.44***	0.41***	0.52***	0.42***	0.41***
	(−9.46)	(3.44)	(3.29)	(9.53)	(7.33)	(7.63)	(9.33)	(9.34)	(3.35)	(3.29)
ETR	−0.01	−0.07***	−0.07***	−0.12***	−0.12***	−0.12***	−0.12***	−0.01	−0.06**	−0.06**
	(−1.62)	(−2.71)	(−2.85)	(−6.94)	(−6.91)	(−6.88)	(−7.08)	(−1.61)	(−2.3)	(−2.36)
R&D	−0.0003	0.0001	−0.0003	−0.0004	−0.0006*	−0.0006	−0.0001	−0.0003	0.0003	0.00006

Table 8 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	FE	FE	FE	RE	FE	FE	RE	FE	FE	FE
	(−1.31)	(0.25)	(−0.62)	(−1.6)	(−1.67)	(−1.62)	(−0.99)	(−1.32)	(0.63)	(0.14)
_cons	3.18	3.87	6.172917	16.54***	11.91	9.51	15.49**	5.64	21.64	22.84
	(−0.65)	(0.34)	(0.54)	(2.68)	(1.51)	(1.24)	(2.46)	(1.23)	(1.29)	(1.36)
F statistics	11.68***	4.63***	4.74***		10.69***	11.04***		11.53***	4.77***	4.83***
Wald chi2				205.47***			199.94***			
R-Sq	0.4998	0.5192	0.5251	0.5412	0.5499	0.5578	0.5334	0.4965	0.4923	0.4953
Hausman test										
Prob > chi2	0	0	0	0.1926	0.0155	0	0.8961	0.0401	0	0
# Obs	188	87	87	179	179	179	186	188	90	90

Variables	11	12	13	14	15	16	17	18	19	20	21
	RE	FE	RE	FE	FE	FE	RE	FE	FE	RE	RE
NOWOMBRD											
PERWOMBRD	0.005	0.01	0.007	0.01							
	(0.16)	(0.37)	(0.23)	(0.5)							
PERFEMEXE					−0.01	−0.01	−0.01	−0.02			
					(−0.98)	(−0.52)	(−0.52)	(−1.47)			
SIZEBRD											
INDEPDIR	0.03		0.01		0.28**	0.52***		0.26*		0.02	0.09
	(0.13)		(0.05)		(2.03)	(2.63)		(1.94)		(0.09)	(0.4)
AGEYNGDIR	−0.09	−0.10	−0.08	−0.04	−0.03	0.06	−0.05	−0.03	−0.10	−0.09	−0.08
	(−1.37)	(−1.28)	(−1.35)	(−1.15)	(−0.86)	(1.04)	(-1)	(−0.93)	(−1.3)	(−1.38)	(−1.24)
AGEOLDDIR	−0.06	−0.03	−0.07	−0.02				−0.01	−0.03	−0.07	−0.05
	(−0.87)	(−0.36)	(−0.97)	(−0.42)				(−0.3)	(−0.38)	(-1)	(−0.78)
BRDDUR	−1.02**	−0.61	−1.08**	−0.33	0.07	0.09	−0.23	−0.24	−0.64	−1.11**	−0.83*
	(−2.2)	(−1.18)	(−2.35)	(−1.21)	(0.25)	(0.21)	(−0.51)	(−0.92)	(−1.26)	(−2.43)	(−1.76)

Table 8 (continued)

Variables	11 RE	12 FE	13 RE	14 FE	15 FE	16 FE	17 RE	18 FE	19 FE	20 RE	21 RE
BRDMEET	0.06	0.09	0.05	−0.02	0.02	−0.0004	−0.16*	−0.01	0.09	0.05	0.07
	(0.62)	(0.78)	(0.53)	(−0.42)	(0.38)	(0)	(−1.81)	(−0.28)	(0.8)	(0.53)	(0.73)
EXECOMP	0.01*	0.01*	0.01**	0.009**	0.001			0.007*	0.01*	0.01**	0.01**
	(1.91)	(1.72)	(2.17)	(2.11)	(0.32)			(1.77)	(1.72)	(2.17)	(2.06)
BRDCOMP	−0.09	−0.06	−0.12	0.008		−0.19	−0.08	−0.16	−0.05	−0.12	−0.13
	(−0.47)	(−0.29)	(−0.63)	(0.06)		(−1.07)	(−0.47)	(−1.25)	(−0.26)	(−0.63)	(−0.68)
CFFO	0.00005							−0.00004			
	(1)							(−1.2)			
CFFF		−0.00003	−0.00001				−0.00004		−0.00003	−0.00001	
		(−0.91)	(−0.19)				(−1.36)		(−0.88)	(−0.19)	
FCF				−0.00001							
				(−0.42)							
TDE					−0.003*						
					(−1.66)						
TDC						−0.04***	−0.03***				
						(−3.71)	(−2.97)				
TDTA	−0.12***	−0.13***	−0.12***	−0.10***				−0.09***	−0.13***	−0.12***	−0.13***
	(−4.9)	(−4.21)	(−4.97)	(−6.87)				(−7.2)	(−4.21)	(-5)	(−4.93)
CR					0.26						
					(1.54)						
CURR						0.49***	0.43**				
						(2.63)	(2.45)				
QR	−0.25	0.15	−0.36	0.30**				0.20	0.12	−0.37	−0.31
	(−0.61)	(0.25)	(−0.89)	(1.97)				(1.4)	(0.2)	(−0.92)	(−0.77)
DPS					−0.02						
					(−0.19)						

Table 8 (continued)

Variables	11	12	13	14	15	16	17	18	19	20	21
	RE	FE	RE	FE	FE	FE	RE	FE	FE	RE	RE
DY						−0.02	0.04				
						(−0.38)	(0.58)				
DPR	0.001***	0.001***	0.001***	0.001***				0.001***	0.001***	0.001***	0.001***
	(3.23)	(2.98)	(3.05)	(3.25)				(3.39)	(3)	(3.05)	(3.25)
EMP		0.00002		−0.00001			0.00001*		0.00		
		(0.93)		(−1.15)			(1.77)		(0.92)		
TA					−0.00003***	−0.00004***	−0.00002***				
					(−4.89)	(−4.29)	(−2.81)				
OM	0.40***	0.40***	0.40***	0.49***	0.54***	0.47***	0.38***	0.51***	0.41***	0.40***	0.41***
	(9.48)	(7.37)	(9.79)	(20.35)	(21.53)	(13.03)	(11.67)	(22.52)	(7.46)	(10.05)	(9.46)
ETR	−0.12***	−0.13***	−0.12***	−0.11***	−0.004	−0.008***	−0.008***	−0.12***	−0.12***	−0.12***	−0.12***
	(−6.9)	(−6.93)	(−6.73)	(-10.19)	(−1.32)	(−3.01)	(−3.12)	(-10.99)	(−6.95)	(−6.7)	(−7.1)
R&D	−0.0003	−0.0006	−0.0001						−0.0006	−0.0001	−0.0001
	(−1.27)	(−1.64)	(−0.62)						(−1.6)	(−0.57)	(−1.01)
_cons	16.88***	13.68*	17.71***	7.56*	−1.65	−4.96	7.58**	5.05	14.09*	17.96***	15.47**
	(2.78)	(1.85)	(2.95)	(1.95)	(−0.64)	(−1.27)	(2.21)	(1.34)	(1.94)	(3.01)	(2.48)
F statistics		11.4***		46.29***	52.76***	27.39***		55.8***	12.27***		
Wald chi2	203.94***		204.01***				257.27***			205.79***	201.12***
R-Sq	0.5267	0.548	0.526	0.6201	0.5955	0.5499	0.4976	0.6466	0.5475	0.5255	0.5334
Hausman test											
Prob > chi2	0.9983	0	0.9784	0	0	0.0033	0.1035	0	0	0.5711	0.9064
# Obs	186	179	186	479	510	328	310	509	179	186	186

Source: Authors' computations. Notes: *, **, and *** represent significance at 10%, 5%, and 1%, respectively. FE indicates fixed-effects within the regression, RE indicates random-effects Generalized Least Squares (GLS) regression. The number between the brackets is the t-statistic for FE and z-statistic for RE. For the definition of variables, please see Table 2

performance less than large-sized firms. Owing to the several benefits large firms have over small ones, they can yield higher returns than their smaller counterparts—offsetting their costs of debt. Thus, they have economies of scale as an advantage, and they could reduce the costs of debt through negotiations and thereby take more favorable debt deals. Nevertheless, in line with Farrukh et al. (2017), dividend policy measures are statistically significant in most models and show a positive impact on firm performance. Hence, the higher the dividend payments, the better the company's performance because of the company's good image from the shareholders' perspective.

Table 9 presents the fixed-effects and random-effects regressions' results when PER is employed as the dependent variable. The outcome reveals that the presence of women on the board enhances their performance, in line with Kang et al. (2010), who noticed that investors generally react positively to the nomination of female directors. In line with Mastella et al. (2021), the results endorse the perception that the presence of women boosts company performance by enhancing the managerial process, variety of opinions, skills, and innovations. The null Hypothesis 1 and Hypothesis 2 are rejected, but null Hypothesis 3 cannot be rejected. As the corporations belonging to the S&P 500 Information Technology segment are centered on innovation, the findings reinforce those of Dezsö and Ross (2012), who remarked that a superior female presence in senior staff enhances company performance. Additionally, consistent with Ararat and Yurtoglu (2020), the appointment of women directors smooths the creation of higher quality financial statements, diminishes the frequency of infringement of financial market guidelines, and reduces bad news hoarding. Nonetheless, the number of board meetings showed a significant negative impact on firm performance. The outcome is opposed to that of Al-Daoud et al. (2016), who revealed that if board meetings are frequent, numerous matters could be discussed and judged based on various opinions, thus improving the decision-making process that boosts the overall firm performance. Concerning the theory, the findings prove the assumption that a gender-responsive board will drive superior performance, as contended by the information and decision-making approach presumption (Gruenfeld et al., 1996), contrary to Yang et al. (2019).

Concluding remarks

This study investigated the effect of board gender diversity on firm performance for S&P 500 companies belonging to the IT sector, considering several other specific corporate governance variables and firm-level control measures. We found evidence for a positive effect of women on corporate boards on both measures of company performance—ROA and PER—apart from the percentage of female executives in the case of ROA when estimated through pooled OLS. However, the outcomes of panel data fixed-effects and random-effects revealed the lack of connection between board gender diversity and ROA but a positive impact of the number and percentage of women on board on PER.

Our results provide several managerial insights and policy suggestions. Consistent with Đặng et al. (2020), the findings advise that companies should consider a larger share of women on board as long as their presence may positively influence firm performance. Further, increased diversity may enhance productivity, creativity, and innovation. Similarly, governments and market regulators should impose gender quotas for women on

Table 9 The outcomes of panel data fixed-effects and random-effects regression regarding the impact of board gender diversity on PER

Variables	1 RE	2 FE	3 FE	4 RE	5 RE	6 RE	7 RE	8 RE	9 FE	10 FE
NOWOMBRD	9.07***	4.10***	4.23***	7.39***	6.31**	7.55***	7.80**			
	(3.04)	(2.98)	(3.08)	(2.78)	(2.22)	(2.82)	(2.53)			
PERWOMBRD								0.91***	0.28**	0.29**
								(3.25)	(2.11)	(2.17)
PERFEMEXE										
SIZEBRD	−1.08	0.20	0.22	−2.52		−2.40				
	(−0.54)	(0.21)	(0.23)	(−1.26)		(−1.21)				
INDEPDIR					0.32		−0.72	1.05	1.19	−1.28
					(0.16)		(−0.32)	(0.53)	(1.38)	(1.49)
AGEYNGDIR	0.62	0.12	0.10	0.19	0.22	0.17	0.13	0.63		
	(1.17)	(0.49)	(0.41)	(0.37)	(0.42)	(0.33)	(0.23)	(1.2)		
AGEOLDDIR				1.20**	1.04*	1.16**	1.33**		0.01	0.01
				(2.04)	(1.79)	(1.98)	(2.12)		(0.04)	(0.04)
BRDDUR	1.50	−2.62	−2.49	4.88	7.09*	5.07	5.04	2.47	−2.16	−1.96
	(0.37)	(−0.89)	(−0.86)	(1.28)	(1.86)	(1.33)	(1.23)	(0.61)	(−0.71)	(−0.65)
BRDMEET	−3.10***	−0.62	−0.66	−2.92***	−2.86***	−2.90***	−3.15***	−3.20***	−0.42	−0.44
	(−3.53)	(−1.02)	(−1.08)	(−3.64)	(−3.55)	(−3.61)	(−3.5)	(−3.66)	(−0.74)	(−0.79)
EXECOMP	0.05			0.04	0.04	0.05	0.04	0.05		
	(1.19)			(1.16)	(1.19)	(1.35)	(0.99)	(1.26)		
BRDCOMP		0.09	0.10	1.91	1.34	1.79	2.40		0.02	0.007
		(0.18)	(0.19)	(1.29)	(0.92)	(1.23)	(1.49)		(0.04)	(0.01)
CFFO	0.0002	0.00008		0.0003				0.0002	0.0001	
	(0.48)	(0.32)		(0.71)				(0.41)	(0.66)	
CFFF			−0.00002		−0.0001	−0.0001				−0.00001
			(−0.34)		(−0.61)	(−0.66)				(−0.16)
FCF										

Table 9 (continued)

Variables	1 RE	2 FE	3 FE	4 RE	5 RE	6 RE	7 RE	8 RE	9 FE	10 FE
TDE	0.01							0.01		
	(0.25)							(0.34)		
TDC		−0.20***	−0.20***						−0.18**	−0.18**
		(−2.88)	(−2.82)						(−2.46)	(−2.4)
TDTA				0.11	0.07	0.11	−0.10			
				(0.54)	(0.34)	(0.56)	(−0.45)			
CR	−2.85							−2.62		
	(−0.77)							(−0.72)		
CURR		−1.50	−1.28						−0.81	−0.72
		(−0.74)	(−0.6)						(−0.42)	(−0.35)
QR				−4.00	−4.99	−4.09	−3.99			
				(−0.98)	(−1.24)	(-1)	(−1.16)			
DPS	−3.43							−3.87		
	(−0.9)							(−1.03)		
DY		−1.13	−1.10						−1.25*	−1.27*
		(−1.64)	(−1.58)						(−1.93)	(−1.96)
DPR				−0.001	−0.001	−0.001	−0.0003			
				(−0.29)	(−0.41)	(−0.43)	(−0.08)			
EMP		0.00006	0.00007	0.00004	0.00005	0.00006				
		(0.96)	(1.09)	(0.35)	(0.44)	(0.54)				
TA										
OM	−2.95***	−0.85***	−0.85***	−2.73***	−2.56***	−2.71***	−2.42***	−2.91***	−0.80***	−0.78***
	(−6.77)	(−3.67)	(−3.68)	(−7.27)	(−6.97)	(−7.27)	(−6.18)	(−6.77)	(−3.75)	(−3.67)
ETR	0.07	0.02	0.02	0.09	0.10	0.09	0.05	0.07	0.02	0.02
	(0.96)	(0.61)	(0.55)	(0.76)	(0.8)	(0.72)	(0.4)	(0.99)	(0.57)	(0.58)
R&D	−0.002	0.00007	0.00001	−0.003	−0.003	−0.003	−0.001	−0.002	0.0004	0.0007

Table 9 (continued)

Variables	1	2	3	4	5	6	7	8	9	10
	RE	FE	FE	RE	RE	RE	RE	RE	FE	FE
	(−1.04)	(0.09)	(0.01)	(−1.52)	(−1.42)	(−1.48)	(−1.01)	(−1.03)	(0.57)	(0.89)
_cons	92.06**	36.10*	36.51*	27.55	9.44	29.45	−1.66	70.94*	35.25	35.22
	(2.32)	(1.89)	(1.9)	(0.54)	(0.18)	(0.58)	(−0.03)	(1.91)	(1.25)	(1.24)
F statistics		4.02***	4.02***						4.15***	4.09***
Wald chi2	66.17***			81***	78.85***	80.87***	71.35***	69.41***		
R-Sq	0.2903	0.4839	0.484	0.3375	0.3326	0.3386	0.2957	0.3009	0.4574	0.4539
Hausman test										
Prob > chi2	0.997	0	0	0.9773	0.9714	0.9347	0.933	0.9975	0	0
# Obs	187	87	87	179	179	179	186	187	90	90

Variables	11	12	13	14	15	16	17	18	19
	RE	RE	RE	FE	FE	FE	RE	RE	RE
NOWOMBRD									
PERWOMBRD	0.90***	0.84***	0.91***	0.27					
	(3.31)	(3.44)	(3.31)	(0.74)					
PERFEMEXE					0.37	0.29			
					(1.16)	(0.98)			
SIZEBRD									
INDEPDIR	−0.02		0.10		2.97	3.47		1.88	1.86
	(−0.01)		(0.05)		(1.3)	(1.47)		(0.9)	(0.89)
AGEYNGDIR	0.13	0.22	0.11	0.002	0.36	0.27	0.09	0.04	0.03
	(0.23)	(0.43)	(0.21)	(0)	(0.55)	(0.42)	(0.18)	(0.07)	(0.06)
AGEOLDDIR	1.44**	1.20**	1.42**	1.66*		1.08	1.14*	1.35**	1.40**
	(2.31)	(2.08)	(2.27)	(1.9)		(1.3)	(1.92)	(2.11)	(2.19)
BRDDUR	4.84	6.68*	4.95	−4.81	−5.14	−4.33	5.04	4.77	5.01
	(1.2)	(1.96)	(1.22)	(-1)	(−1.09)	(−0.94)	(1.44)	(1.15)	(1.21)

Table 9 (continued)

Variables	11 RE	12 RE	13 RE	14 FE	15 FE	16 FE	17 RE	18 RE	19 RE
BRDMEET	−3.30***	−2.98***	−3.28***	−2.51**	−1.96*	−2.32**	−2.84***	−3.15***	−3.15***
	(−3.72)	(−3.76)	(−3.7)	(−2.35)	(−1.89)	(−2.29)	(−3.44)	(−3.44)	(−3.44)
EXECOMP	0.04	0.05	0.05	0.03	0.05	0.04	0.04	0.04	0.04
	(1.06)	(1.37)	(1.21)	(0.46)	(0.74)	(0.58)	(1.22)	(0.97)	(0.93)
BRDCOMP	2.65*	1.53	2.52	−2.29		−1.57	2.04	2.65	2.62
	(1.64)	(1.11)	(1.59)	(−0.94)		(−0.68)	(1.42)	(1.62)	(1.6)
CFFO	0.0002					−0.0002			
	(0.6)					(−0.47)			
CFFF		−0.0001	−0.0001				−0.0001	−0.0001	
		(−0.66)	(−0.43)				(−0.24)	(−0.19)	
FCF				−0.0003					
				(−0.4)					
TDE					0.01				
					(0.56)				
TDC									
TDTA	−0.09	0.08	−0.09	0.03		0.04	0.09	−0.12	−0.13
	(−0.41)	(0.43)	(−0.42)	(0.14)		(0.19)	(0.46)	(−0.51)	(−0.55)
CR					0.98				
					(0.35)				
CURR									
QR	−2.87	−3.81	−3.02	2.69		1.78	−5.82	−3.80	−3.90
	(−0.83)	(−0.96)	(−0.88)	(0.98)		(0.7)	(−1.42)	(−1.07)	(−1.11)
DPS					−0.02				
					(−0.01)				
DY									
DPR	−0.0001	−0.0016	−0.0007	−0.004		−0.004	−0.001	−0.0004	−0.0002

Table 9 (continued)

Variables	11	12	13	14	15	16	17	18	19
	RE	RE	RE	FE	FE	FE	RE	RE	RE
	(−0.04)	(−0.38)	(−0.15)	(−0.48)		(−0.56)	(−0.26)	(−0.09)	(−0.06)
EMP		0.0001		0.0001			0.00002		
		(0.47)		(1.17)			(0.17)		
TA					−0.0001				
					(−0.67)				
OM	−2.55***	−2.66***	−2.53***	−2.23***	−2.20***	−2.18***	−2.53***	−2.29***	−2.27***
	(−6.44)	(−7.59)	(−6.44)	(−5.18)	(−5.32)	(−5.53)	(−7.04)	(−5.78)	(−5.78)
ETR	0.03	0.08	0.03	0.32	−0.04	0.25	0.11	0.06	0.07
	(0.27)	(0.65)	(0.24)	(1.61)	(−0.84)	(1.34)	(0.9)	(0.47)	(0.49)
R&D	−0.002	−0.003	−0.002				−0.001	−0.0007	−0.0004
	(−1.17)	(−1.58)	(−1.1)				(−0.66)	(−0.37)	(−0.33)
_cons	-15.54	−1.53	-14.07	-32.10	55.51	-26.68	21.22	-10.48	-13.98
	(−0.29)	(−0.03)	(−0.26)	(−0.47)	(1.32)	(−0.41)	(0.43)	(−0.19)	(−0.25)
F statistics				2.8***	3.09***	3.3***			
Wald chi2	77.58***	86.64***	77.32***				70.12***	62.69***	63.04***
R-Sq	0.3202	0.3542	0.3161	0.0673	0.0802	0.0981	0.2996	0.2662	0.2652
Hausman test Prob > chi2	0.9808	0.8539	0.9781	0.0316	0	0.001	0.5933	0.8861	0.785
# Obs	186	179	186	478	506	507	179	186	186

Source: Authors' computations. *, **, and *** represent significance at 10%, 5%, and 1%, respectively. FE indicates fixed-effects within the regression, RE indicates random-effects Generalized Least Squares (GLS) regression. The number between the brackets is the t-statistic for FE and z-statistic for RE. Notes: For the definition of variables, please see Table 2

board like in European nations. Gender diversity should be enlarged, compulsory laws being a crucial aspect in this vein (Reguera-Alvarado et al. 2017).

This study provides a source of reference to the academicians and scholars for future research. The study is oriented toward the largest companies, while other company types may provide different outcomes because of their specific features regarding capital structure or ownership. Upcoming research should cover the ownership form as the related kind might change the statistical relationships identified in this study. Moreover, female attributes such as age or education level should be covered. Additionally, other measures of board diversity, like the Blau index or the Shannon index, may be used.

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Authors' contributions
L.N.S. carried out conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing—original draft, writing—review & editing. S.C.G. carried out conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing—original draft, writing—review & editing. H.T. carried out conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing—original draft, writing—review & editing. Z.S. carried out conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing—original draft, writing—review & editing. All authors read and approved the final manuscript.

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Declarations

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