



# The dynamic relation between board gender diversity and firm performance: the moderating role of shareholder activism

Fujiao Xie<sup>1</sup> · Ying Guo<sup>2</sup> · Shirley J. Daniel<sup>3</sup> · Yuanyang Liu<sup>4</sup>

Accepted: 22 August 2023 / Published online: 28 September 2023

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## Abstract

California became the first state in the US to require gender diversity on publicly corporate boards. To provide timely evidence on the heated debate, we investigate the impact of board gender diversity on financial performance and how shareholder activism affects the dynamic relationship in the United States. We find that the relation between board gender diversity and firm performance presents an inverted U-shaped nonlinear form. Firm performance increases as the board is more gender-diverse, but performance decreases after the board diversity level reaches a turning point. Furthermore, shareholder activism through proxy proposals enhances the positive effect of diversity and alleviates the negative effect of diversity on firm performance, and the positive effect diminishes after board gender ratios reach an optimal level. Our study captures the dynamic impacts of shareholder activism and board gender diversity on firm performance and provides insights for regulators to make proper decisions in increasing board diversity.

**Keywords** Corporate governance · Gender diversity · Firm performance · Shareholder activism · Proxy proposals · Nonlinear relationship

**JEL Classification** M14 · G34

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✉ Fujiao Xie  
fujiao.xie@brooklyn.cuny.edu

Ying Guo  
ying.guo@csueastbay.edu

Shirley J. Daniel  
sdaniel@hawaii.edu

Yuanyang Liu  
yliu191@utk.edu

<sup>1</sup> Murray Koppelman School of Business, Brooklyn College, City University of New York, 2900 Bedford Avenue, New York, NY 11210, USA

<sup>2</sup> College of Business and Economics, California State University, East Bay, Hayward, CA 94542, USA

<sup>3</sup> Shidler College of Business, University of Hawaii at Manoa, Honolulu, HI 96822, USA

<sup>4</sup> Haslam College of Business, The University of Tennessee, Knoxville, TN 37996, USA

## 1 Introduction

As the number of female professionals has significantly increased in the workforce, the underrepresentation of women in corporate boards has been brought to the attention of regulators, activist investors, and the general public. In the US, women have been facing a "glass ceiling" that limits their upward mobility in top management, which is deeply embedded in the culture (Morrison and Von Glinow 1990). The proportion of women on corporate boards in the U.S. has hovered around twenty percent, which is much lower than its European counterparts. There have been pressures to increase the number of women on corporate boards of directors globally. In Europe, one of the primary means of increasing gender diversity on boards has been the imposition of legislative quotas (The European Commission 2012, 2020). Although European legislated quotas in board gender diversity have raised concerns, the number of women on boards in Europe has been successfully increased over a relatively short time frame, and the proportion of women on boards in the European Union (EU) ranges mostly from 20 to 45 percent (Deloitte 2019). Unlike European countries, there is no mandated board gender quota in the U.S. across all states and U.S. women's representation in public boardrooms remains at a relatively low level. Therefore, a heated debate on how to effectively enhance female board representation on boards in the U.S. is ongoing.

Motivated by the regulatory debate on increasing board gender diversity in the U.S., our study examines how the U.S.' unique institutional and regulatory environment affects board gender diversity and firm performance. Unlike European countries, the boardrooms of U.S. public companies are dominated by males, on average about 80% male board members in the board. Additionally, imposing any legal quotas for gender diversity on public boards across all states has encountered resistance in the U.S. In 2018, California passed SB 826 and became the first state in the U.S. to require a board gender diversity quota for public companies headquartered in California (California Legislative Information, SB826 2018). California's SB826 gender diversity legislation mandated that at least one female director be included in corporate boards by the end of 2019 and at least two (three) female directors for companies with five (six and above) board members by the end of 2021. However, California's board diversity law (SB 826) faced significant resistance and legal challenges in courts (Posner 2020; The New York Times 2022). Following California, a few states, such as Colorado, Illinois, Maryland, and New York, passed legislation to encourage companies to enhance the number of women directors in public boardrooms. On August 6, 2021, the Securities Exchange Commission (SEC) passed NASDAQ's Rule 5605(f) on board diversity to mandate companies to publicly disclose board diversity statistics annually and explain why they do not have at least two diverse directors (SEC, 2021). Although there are a few U.S. regulatory changes in improving women's representation in boardrooms, the debate continues on the economic benefits of promoting board gender diversity and how to increase gender diversity in the U.S. across all states.

Extant studies provide inconclusive evidence on the impact of board gender diversity on firm performance. A positive, negative, and no relationship has been reported in the literature (Baker et al. 2020; Chen et al. 2023). Given the unclear impacts of board gender diversity and inconclusive findings in the literature, more research on the mechanism of board gender diversity on corporate governance practice is needed. To provide evidence to the current regulatory debate, this study empirically examines the economic benefits of board gender diversity and how shareholder activism influences board gender diversity and firm performance in the unique U.S. institutional environment. To our knowledge, this is

the first paper that has incorporated the effectiveness of shareholder activism in promoting gender diversity when investigating the curvilinear relation between board gender diversity and firm performance. Our study sheds light on the dynamic link between board gender diversity and firm performance in the U.S. legal environment and the direct and indirect roles of shareholder activism on board gender diversity and firm value. Our findings may contribute to policy discussions as U.S. regulators and institutional investors make decisions relating to enhancing women's representation in public company boardrooms.

In the absence of effective regulatory requirements across all states, shareholder activism plays an essential role in promoting board gender diversity in the U.S., and the number of shareholder proposals for greater board gender diversity has been continuously increasing over the last few years. Activist investors use the shareholder proxy process to put forth proposals to encourage board gender diversity. For example, large institutional investors, including Black Rock, Vanguard, and the CalPRS and CalSTRS pension funds, have called for greater board diversity, requesting more active dialogue and engagement with company and board leadership (CalPRS news 2017). Given the unique legislative and institutional environment in the U.S., it is crucial to understand how the involvement of shareholder activism influences board gender diversity and firm performance in the U.S. setting.

Using a sample of US public companies from 1999 to 2017, we first empirically examine the dynamic association between board gender diversity and firm performance. Our findings suggest a nonlinear relation between board gender diversity and firm performance in an inverted U-shape form. Firm performance improves when female representation in boardrooms increases to a balanced level; after reaching the balanced level, increasing female board representation decreases firm performance.

Next, we examine both the direct and indirect roles of shareholder activism on the nonlinear relation between gender diversity and firm performance. Our main findings support that shareholder proposals in increasing board gender diversity have both direct and moderating indirect impacts on board gender diversity and firm performance. Specifically, shareholder proposals for greater gender diversity increase female board representation for a less gender-diverse board and lead to better financial performance. However, when the level of gender diversity is above its balanced level, shareholder proposals in increasing gender diversity may accentuate the negative impact of board gender diversity on the firm's financial performance, which results in reduced firm value. Taken together, our findings suggest that firm performance and board gender diversity are affected both directly and indirectly by the U.S. institutional environments, such as the involvement of shareholder activism. The results are also robust in the two-stages Heckman model.

The study not only advances our understanding of gender diversity on U.S. public boards but also provides insights for policymakers, practitioners, and academics related to regulatory debates and addresses the divergent views of board gender diversity. The U.S. regulators currently have been focused on gender diversity issues in boardrooms and made a few regulatory changes, including California's Senate Bill 826 in 2018 and SEC's NASDAQ's Rule 5605(f) in 2021. These regulatory changes were, ultimately, to enhance female representation in the boardroom thereby improving board governance practice. Our findings suggest a benefit in balanced gender diversity in boardrooms, demonstrated by a nonlinear relation between board gender diversity and firm performance, which partly supports regulators' view in increasing board gender diversity. The nonlinear relationship found in the study implies that regulators may need to use caution when mandating a specific number and percentage of female representation in public boardrooms.

In addition, the study adds to the growing body of literature on whether and how the shareholder proxy process in the U.S., which differs from its European counterparts, affects

board gender diversity and firm performance. Our paper finds the direct and moderating impact of shareholder activism on the dynamic relation between board gender diversity and firm performance in the U.S. More specifically, shareholder proposals generally increase gender diversity and lead to better firm performance when the board lacks gender diversity, while shareholder proposals' moderating effect on board gender diversity and firm performance is significantly negative when corporate board gender diversity exceeds its balanced level. Our findings help to explain the mixed evidence on the relationship between board gender diversity and firm performance in the literature and provide evidence for regulators when considering shareholder activism as an alternative approach to increasing board gender diversity. To sum up, the findings of our study should be of interest to regulators, board committees, investors, and accounting researchers interested in board diversity, shareholder activism, and firm performance.

The rest of the article is organized as follows. The next section reviews the prior literature and develops the theoretical framework and hypotheses on the impact of board gender diversity in the workplace, management team, and board members. The research design, variable definitions, and regression models are detailed in Sect. 3, followed by the sample and discussion of the analysis and results. In the conclusion, we summarize our research findings and contributions.

## 2 Literature review and hypothesis development

### 2.1 Gender diversity and firm performance

The research evidence on the impact of board gender diversity on a firm's financial performance is mixed (Baker, et al. 2020; Phan and Yu 2022; Trinh et al. 2023). On the one hand, board diversity could improve firm performance (Bear et al. 2010; Bonn 2004; Bonn et al. 2004; Campbell and Minguez-Vera 2008; Carter et al. 2003; Erhardt et al. 2003; Mahadeo et al. 2012; Nguyen and Faff 2006; Srinidhi et al. 2011). A diverse demographic composition within a workgroup may improve governance and monitoring and thus firm performance (Pfeffer 1983, 1997; Frink et al. 2003). In addition, consistent with the resource dependence theory that firm performance depends on how successfully the firm obtains critical resources from the external stakeholders, diversified boards could build stronger ties with their external shareholders and help the firm obtain more external resources, resulting in a better financial performance (Pfeffer and Salancik 1978; Hillman et al. 2007; Hillman et al. 2009; Campbell and Minguez-Vera 2008; Miller and Del Carmen Triana 2009). Furthermore, boards including both male and female directors could bring different information and perspectives, skills, approaches, and knowledge and thus improve the board's decision quality, enhancing firm performance (Ali et al. 2014; Rogelberg and Rumery 1996; Zalata et al. 2022). For example, Talke et al. (2010) demonstrate that a diverse board promotes creativity and innovation. In sum, a gender-diversified board improves the firm's image to gain more support from various groups of stakeholders and better access to resources to enhance its decision-making quality in the firm's operations and strategic movement, resulting in better firm performance.

On the other hand, a few studies find a negative impact of board gender diversity on corporate performance (Adams and Ferreira 2009; Ahern and Dittmar 2012; Böhren and Ström, 2010; Dobbin and Jung 2011; Haslam et al. 2010; He and Huang 2011; Shrader et al. 1997; Shoham et al. 2020). Social identity theory provides a possible explanation for

the adverse impact of gender diversity. Individuals in different groups show bias and perceptions toward other groups (Brewer 1979). The distinctiveness and segregation in different gender groups bring in more conflicts, distrust, lack of communication, and less cooperation in the boardroom, thus preventing the board from making the right decisions, which hurts firm performance (Schwab et al. 2016; Thams et al. 2018).

Additionally, a few studies estimate the nonlinear relation between board gender diversity and firm performance in non-US settings and provide mixed results (Ali et al. 2011, 2014; Frink et al. 2003; Joecks et al. 2013; Schwab et al. 2016). For example, Ali et al. (2014) found no curvilinear association between board gender diversity and firm performance for large organizations listed on the Australian Securities Exchange. However, Joecks et al. (2013) find that the relationship between board gender diversity and firm performance is a U-shape curvilinear when studying 151 German companies during 2000–2005. Later, Schwab et al. (2016) study gender diversity in the management team for financial service firms in Portugal from 1985 to 2000 and recognize a curvilinear relationship between managerial gender diversity and employee productivity as an indicator of firm performance. Therefore, given the inconclusive evidence, more studies on the relationship between board gender diversity and corporate performance are needed.

Given the possible co-existence of positive and negative effects of board gender diversity, we predict a curvilinear relationship between board gender diversity and firm performance. When a homogenous board becomes more gender-diverse, it improves the firm's image to attract more talented employees, gain more support and resources from various groups of stakeholders and enhance strategic decisions, which benefits corporate performance. However, the benefits of heterogeneity diminish when the board diversifies beyond a balanced level, conflicts and miscommunications between in-groups and out-groups become more intensive and such dysfunctional group processes will eventually hurt firm performance. Thus, we propose an inverted U-shape nonlinear relation between board gender diversity and firm performance in our first hypothesis.

**Hypothesis 1** The relation between firm performance and board gender diversity is positive when board gender diversity is relatively low and becomes negative when board gender diversity increases beyond a balanced level.

## 2.2 The role of shareholder activism in board gender diversity in the U.S.

Given the controversial evidence found in the literature, the impact of board diversity on firm performance may depend on other factors, such as location (country), period, socio-cultural, and the institutional and regulatory environment (Gregorič et al. 2017; Lewellyn and Muller-Kahle 2020; Rhode and Packel 2014; Thams et al. 2018). Compared to the European countries' legislated quotas, shareholder activism is more commonly employed to increase board gender diversity in the U.S. (Terjesen and Sealy 2016; Rastad and Dobson 2020). In the U.S., external shareholders can significantly influence the firm's policies by filing proposals against a firm. For example, Marquardt and Wiedman (2016) find that the female board representation of targeted firms increased significantly more in the two years following the initiation of the shareholder proposal, supporting that shareholder proposals are effective in improving board gender diversity. Similarly, Rastad and Dobson (2020) show that whether proposals are directly voted down or withdrawn before the vote, shareholder proposals can generate internal and external pressure on management to

promote board gender diversity in the US. However, the mechanism of shareholder proposals in greater board gender diversity and corporate performance in the U.S. remains unclear.

We, therefore, further examine how the U.S. institutional environment, such as shareholder activism, directly and indirectly, affects the nonlinear relationship between board gender diversity and firm performance. When females are underrepresented in corporate boards, shareholder activism via the proxy process would strengthen the positive impact of female board representation on firm performance, which is consistent with the resource dependence perspective. However, when female board representation reaches or even exceeds a balanced level, shareholder proposals for greater gender diversity could accentuate the adverse influence of board gender diversity on firm value, consistent with the social identity theory perspective. Therefore, shareholder activism in increasing board gender diversity would moderate the relationship between gender diversity and firm performance. It leads to our second hypothesis in a null format:

**Hypothesis 2** Shareholder activism in increasing board gender diversity moderates the relation between board gender diversity and firm performance.

### 3 Research design

#### 3.1 Sample selection

Our initial sample consists of all U.S. public companies between 1999 and 2017 from the Compustat, BoardEx, ISS, and Thomson Reuters Stock Ownership databases. Because our primary firm performance measure requires data for one lead year, we also collect 2018 data from Compustat. After dropping missing data for variables in our primary regression model, our final sample consists of 6,036 firm-year observations. The sample is used for both primary analysis and robustness tests in the study.

#### 3.2 Empirical models

To test our first hypothesis, we employ an ordinary least squares (OLS) model to estimate Eq. (1), controlling for industry, firm-, and year-fixed effects. All the continuous variables are winsorized at the 1% and 99% levels.

$$\begin{aligned}
 Tobin\_Q_{i,t+1} = & \beta_0 + \beta_1 PercFemale_{i,t} \\
 & + \beta_2 PercFemale_{i,t}^2 + \beta_3 AvgTimeRole_{i,t} \\
 & + \beta_4 AvgNoQuals_{i,t} + \beta_5 IndepD\_Rate_{i,t} \\
 & + \beta_6 InstOwn_{i,t} + \beta_7 NoDirectors_{i,t} + \beta_8 SIZE_{i,t} \\
 & + \beta_9 LEV_{i,t} + \beta_{10} RDIntensity_{i,t} \\
 & + \beta_{11} SaleGrowth_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

where *Tobin\_Q* = the Q ratio, computed as the sum of the market value of stock and the book value of total liabilities divided by the book value of total assets. *PercFemale* = a direct measure of gender diversity in the boardroom, defined as the percentage of female

board members.  $AvgTimeRole$  = an average time of board members served on the board in the unit of the year.  $AvgNoQuals$  = an average number of qualified board members who earn an undergraduate level or above.  $IndepD\_Rate$  = the ratio of independent directors on the board.  $NoDirectors$  = the board size, which measures the total number of board directors.  $InstOwn$  = the total institutional ownership, defined in the form of the percentage of shares outstanding.  $SIZE$  = the logarithm of total assets.  $LEV$  = long-term debt scaled by total assets.  $RDIntensity$  = Research and Development Intensity, measured as the Research and Development Expenses scaled by the total assets.  $SaleGrowth$  = a measure of percentage growth of sales during the year  $t$ , defined as sales at the yearend ( $Sale_{it}$ ) minus sales at the beginning of the year ( $Sale_{it-1}$ ) divided by the sale at the beginning of the year ( $Sale_{it-1}$ ).

Based on Hypothesis 1 accounting for the nonlinearity between board gender diversity and firm performance, we specify a quadratic model that includes both the percentage of female board members ( $PercFemale$ ) and its squared term ( $PercFemale^2$ ). We expect that the coefficient of  $PercFemale$  ( $\beta_1$ ) is positive and the coefficient of  $PercFemale^2$  ( $\beta_2$ ) is negative, indicating the curvilinear relationship between board gender diversity and firm performance. Equation (1) also includes control variables used in extant studies (Bennouri et al. 2018; Campbell and Mínguez-Vera 2007). We expect negative coefficients on Board independence ( $IndepD\_Rate$ ), firm leverage ratio ( $LEV$ ), and a positive coefficient on firm size ( $SIZE$ ) and Sale growth ( $SaleGrowth$ ). We further add the average time for directors on the board ( $AvgTimeRole$ ), and the average number of the qualified board members with an undergraduate level or above degree ( $AvgNoQuals$ ) to account for the effect of time length served on the board and qualification of board members which have impacts on the decision quality and therefore on the firm performance.

To test Hypothesis 2, we run OLS models to estimate Eq. (2), controlling for industry, firm-, and year-fixed effects. To examine the moderating effect of shareholder activism in greater board gender diversity, we include a variable for shareholders' proposals on board gender diversity ( $DivProp$ ) and its interaction term with gender diversity ( $DivProp * PercFemale$ ) in Eq. (2). In addition to the previously defined variables,  $DivProp$  is a dummy variable and equals 1 when a firm's shareholders initiate the proxy process to increase board gender diversity. The interaction term,  $DivProp_{it} * PercFemale$ , captures the possible moderating effects of shareholder activism.

$$\begin{aligned}
 Tobin\_Q_{i,t+1} = & \beta_0 + \beta_1 PercFemale_{i,t} + \beta_2 DivProp_{i,t} \\
 & + \beta_3 DivProp_{i,t} * PercFemale_{i,t} \\
 & + \beta_4 AvgTimeRole_{i,t} + \beta_5 AvgNoQuals_{i,t} \\
 & + \beta_6 IndepD\_Rate_{i,t} + \beta_7 InstOwn_{i,t} \\
 & + \beta_8 NoDirectors_{i,t} \\
 & + \beta_9 SIZE_{i,t} + \beta_{10} LEV_{i,t} \\
 & + \beta_{11} RDIntensity_{i,t} + \beta_{12} SaleGrowth_{i,t} \\
 & + \sum Industry + \sum Year + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

**Table 1** Descriptive statistics for main variables in the analysis

Variable	Mean	Median	Std. Dev	Quartile 1	Quartile 3
<i>ROA</i>	0.094	0.087	0.080	0.045	0.138
<i>ROE</i>	0.121	0.127	0.309	0.066	0.198
<i>Tobin_Q</i>	1.961	1.538	1.224	1.159	2.274
<i>DivProp</i>	0.022	0.000	0.148	0.000	0.000
<i>PercFemale</i>	0.133	0.125	0.096	0.083	0.200
<i>NoDirectors</i>	10.419	10.000	2.703	9.000	12.000
<i>AvgTimeRole</i>	6.211	5.916	2.523	4.500	7.434
<i>AvgNoQuals</i>	2.047	2.071	0.458	1.778	2.333
<i>IndepD_Rate</i>	0.737	0.778	0.165	0.667	0.857
<i>InstOwn</i>	0.737	0.760	0.181	0.628	0.865
<i>SIZE</i>	8.658	8.586	1.804	7.388	9.854
<i>LEV</i>	0.200	0.186	0.156	0.069	0.297
<i>RDIntensity</i>	0.023	0.000	0.041	0.000	0.027
<i>SaleGrowth</i>	0.078	0.060	0.196	-0.012	0.144
N	6036				

## 4 Results and discussion

### 4.1 Descriptive statistics

Table 1 provides descriptive statistics for the sample. Firms in our sample, on average, have ten board members, and 13% of them are female; board members usually serve on the board for six years. The mean (median) value of the firm performance measure, *Tobin\_Q*, is 1.961 (1.538), similar to that reported in the literature (e.g., Campbell and Minguez-Vera 2008). The mean (median) of the gender diversity measure, *PercFemale*, is 0.133 (0.125), with a standard deviation of 0.096. Comparing the standard deviation of *PercFemale* relative to its mean value suggests that our sample has a broad range of variation in gender diversity, indicating a powerful setting for testing the hypothesized nonlinear relation.

Table 2 shows Pearson correlations among the main variables. Firm performance (*Tobin\_Q*) is significantly correlated with *AvgTimeRole*, *InstOwn*, *NoDirectors*, *SIZE*, *LEV*, *RDIntensity*, and *SaleGrowth*. In addition, board gender diversity (*PercFemale*) has positively correlated to *ROA* and *ROE*, two accounting-based firm performance measures, suggesting that firm performance is improved when board gender diversity increases. We also compute the variance inflation factor (VIF) for the variables and find that all VIF values are less than 5, which determines that multicollinearity is not a concern in our study.

### 4.2 Main findings

Table 3 reports the results of Eq. (1) evaluating the nonlinear relation between board gender diversity and firm performance. Model 1–5 in Table 3 presents the incremental effects of variables of interest. The results across all models in Table 3 consistently show that the coefficient of board gender diversity (*PercFemale*) is significantly positive, and the coefficient on *PercFemale*<sup>2</sup> is significantly and negatively associated with firm performance (*Tobin's Q*) at  $p < 0.05$  level, indicating the nonlinear relation between board gender



**Table 2** Pearson Correlation between variables in the analysis

Variables	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) <i>ROA</i>	<b>0.357</b>	<b>0.550</b>	<b>0.033</b>	<b>0.074</b>	<b>-0.057</b>	0.000	-0.029	<b>0.034</b>	<b>0.122</b>	<b>-0.100</b>	<b>-0.037</b>	-0.017	<b>0.234</b>
(2) <i>ROE</i>	1	<b>0.154</b>	0.004	<b>0.080</b>	<b>0.086</b>	0.022	<b>0.048</b>	<b>0.071</b>	0.015	<b>0.112</b>	<b>-0.037</b>	<b>-0.043</b>	0.107
(3) <i>Tobin_Q</i>		1	<b>0.051</b>	-0.012	<b>-0.197</b>	<b>-0.046</b>	0.004	<b>-0.064</b>	<b>0.049</b>	<b>-0.228</b>	<b>-0.128</b>	<b>0.382</b>	<b>0.224</b>
(4) <i>DivProp</i>			1	<b>-0.107</b>	<b>-0.084</b>	<b>0.033</b>	<b>-0.072</b>	-0.010	<b>0.045</b>	-0.020	<b>-0.042</b>	0.001	0.013
(5) <i>Perc.Female</i>				1	<b>0.267</b>	<b>-0.090</b>	<b>0.212</b>	<b>0.275</b>	<b>0.054</b>	<b>0.352</b>	<b>0.103</b>	<b>-0.122</b>	<b>-0.132</b>
(6) <i>NoDirectors</i>					1	0.026	<b>0.218</b>	<b>0.139</b>	<b>-0.205</b>	<b>0.622</b>	<b>0.072</b>	<b>-0.231</b>	<b>-0.074</b>
(7) <i>AvgTimeRole</i>						1	<b>-0.183</b>	<b>-0.055</b>	<b>-0.105</b>	<b>-0.009</b>	<b>-0.061</b>	<b>-0.090</b>	<b>-0.049</b>
(8) <i>AvgNoQuals</i>							1	<b>0.250</b>	<b>0.037</b>	<b>0.331</b>	<b>0.111</b>	<b>0.168</b>	<b>-0.053</b>
(9) <i>IndepD_Rate</i>								1	<b>0.200</b>	<b>0.284</b>	0.030	-0.022	<b>-0.085</b>
(10) <i>InstOwn</i>									1	<b>-0.092</b>	<b>0.104</b>	0.029	<b>0.045</b>
(11) <i>SIZE</i>										1	<b>0.121</b>	<b>-0.224</b>	<b>-0.084</b>
(12) <i>LEV</i>											1	<b>-0.199</b>	<b>-0.057</b>
(13) <i>RDIntensity</i>												1	<b>0.075</b>
(14) <i>SaleGrowth</i>													1

All correlation coefficients in bold are significant at a *p*-value of 1% or beyond

**Table 3** OLS Regression results for testing hypothesis 1

Dependent Variable = Tobin_Q <sub>t,t+1</sub>					
	1	2	3	4	5
	Coeff	Coeff	Coeff	Coeff	Coeff
<i>Intercept</i>	2.015*** (<.0001)	2.123*** (<.0001)	2.082*** (<.0001)	1.929*** (<.0001)	2.523*** (<.0001)
<i>Perc_Female</i>	<b>0.864**</b> <b>(0.031)</b>	<b>1.319***</b> <b>(0.001)</b>	<b>1.499***</b> <b>(&lt;.0001)</b>	<b>1.495***</b> <b>(&lt;.0001)</b>	<b>2.457***</b> <b>(&lt;.0001)</b>
<i>Perc_Female</i> <sup>2</sup>	<b>-2.023*</b> <b>(0.090)</b>	<b>-2.472**</b> <b>(0.028)</b>	<b>-3.032***</b> <b>(0.008)</b>	<b>-2.359**</b> <b>(0.045)</b>	<b>-3.016**</b> <b>(0.014)</b>
<i>NoBoardMembers</i>	-0.046*** (<.0001)		-0.017*** (0.004)	-0.017*** (0.004)	-0.021*** (<.0001)
<i>AvgTimeRole</i>	0.004 (0.465)		0.007 (0.132)	0.013** (0.01)	0.002 (0.685)
<i>AvgNoQuals</i>	0.03 (0.391)		-0.005 (0.89)	-0.008 (0.819)	-0.018 (0.578)
<i>IndepD_Rate</i>	0.111 (0.236)		0.193** (0.033)	0.004 (0.961)	-0.013 (0.877)
<i>InstOwn</i>	-0.168** (0.05)		-0.159* (0.059)	-0.161* (0.051)	0.047 (0.536)
<i>SIZE</i>		-0.059*** (<.0001)	-0.048*** (<.0001)	-0.037** (0.001)	-0.099*** (<.0001)
<i>LEV</i>		-0.404*** (<.0001)	-0.361*** (0.004)	-0.28** (0.026)	-0.149 (0.157)
<i>RDIntensity</i>		6.195*** (<.0001)	6.156*** (<.0001)	6.228*** (<.0001)	8.206*** (<.0001)
<i>SaleGrowth</i>		0.811*** (<.0001)	0.823*** (<.0001)	0.808*** (<.0001)	0.829*** (<.0001)
Industry fixed effects	Yes	Yes	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes	No	No
Firm clustering	No	No	No	Yes	No
Year clustering	No	No	No	Yes	No
Adj. R <sup>2</sup>	0.275	0.331	0.332	0.301	0.181
N	6036	6036	6036	6036	6036

p values are presented in parentheses below corresponding coefficients. The significance level is represented as \**p*<0.1, \*\**p*<0.05, \*\*\**p*<0.01. Firm clustering approach is used to control for firm effect in the models, given the total number of individual firms in our sample is tremendous. We also compare the regression results when we choose year fixed effect over clustering approach. The results of all models are consistent

diversity and firm performance. When the board has a relatively low level of gender diversity, higher board gender diversity enhances firm performance. However, after the level of diversity of board gender composition reaches a certain level, more female board members may reduce the firm’s performance. Therefore, the results support Hypothesis 1.

To evaluate the moderating effect of shareholders’ proxy proposals on board gender diversity and firm performance in Hypothesis 2, we estimate Eq. (2) for the below-optimal and the above-optimal gender diversity subsample, respectively. Table 4 presents the

**Table 4** The results of the OLS models in examining the moderation effect of shareholder activism

	1	2	3
	Coeff	Coeff	Coeff
Panel A: The results of OLS models for the below-optimal gender diversity subsample			
Dependent Variable = Tobin_ $Q_{i,t+1}$ (Below-the-Optimal Group)			
<i>Intercept</i>	1.911*** ( $< .0001$ )	1.932*** ( $< .0001$ )	1.934*** ( $< .0001$ )
<i>Perc_Female</i>	<b>-0.157</b> ( <b>0.464</b> )	<b>0.929***</b> ( $< .0001$ )	<b>1.023***</b> ( $< .0001$ )
<i>Divprop</i>	<b>0.319**</b> ( <b>0.03</b> )	<b>0.343**</b> ( <b>0.013</b> )	<b>0.335**</b> ( <b>0.017</b> )
<i>Divprop*Perc_Female</i>	<b>1.357</b> ( <b>0.406</b> )	<b>0.174</b> ( <b>0.903</b> )	<b>0.179</b> ( <b>0.9</b> )
<i>NoBoardMembers</i>			-0.011* (0.066)
<i>AvgTimeRole</i>			0.012** (0.025)
<i>AvgNoQuals</i>			0.012 (0.747)
<i>IndepD_Rate</i>			-0.035 (0.688)
<i>InstOwn</i>			-0.111 (0.203)
<i>SIZE</i>		-0.049*** ( $< .0001$ )	-0.04*** (0.001)
<i>LEV</i>		-0.573*** ( $< .0001$ )	-0.535*** ( $< .0001$ )
<i>RDIntensity</i>		5.859*** ( $< .0001$ )	5.856*** ( $< .0001$ )
<i>SaleGrowth</i>		0.744*** ( $< .0001$ )	0.755*** ( $< .0001$ )
Industry fixed effects	No	Yes	Yes
Firm and year clustering	No	Yes	Yes
Adj. R <sup>2</sup>	0.0028	0.301	0.3016
N	5230	5230	5230
Panel B: The results of OLS models for the above-optimal gender diversity subsample			
Dependent Variable = Tobin_ $Q_{i,t+1}$ (Above-the-Optimal Group)			
<i>Intercept</i>	2.293*** ( $< .0001$ )	2.241*** ( $< .0001$ )	2.756*** ( $< .0001$ )
<i>Perc_Female</i>	<b>-0.987*</b> ( <b>0.082</b> )	<b>-1.073*</b> ( <b>0.058</b> )	<b>-1.468**</b> ( <b>0.015</b> )
<i>Divprop</i>	<b>4.808**</b> ( <b>0.017</b> )	<b>6.844***</b> ( <b>0.001</b> )	<b>5.751***</b> ( <b>0.008</b> )
<i>Divprop*Perc_Female</i>	<b>-16.833**</b> ( <b>0.025</b> )	<b>-25.744***</b> ( $< .0001$ )	<b>-22.107***</b> ( <b>0.003</b> )

**Table 4** (continued)

	1	2	3
	Coeff	Coeff	Coeff
<i>NoBoardMembers</i>			-0.057*** (0.008)
<i>AvgTimeRole</i>			0.007 (0.6)
<i>AvgNoQuals</i>			-0.077 (0.469)
<i>IndepD_Rate</i>			0.639 (0.04)
<i>InstOwn</i>			-0.631 (0.022)
<i>SIZE</i>		-0.085*** (<.0001)	-0.058* (0.054)
<i>LEV</i>		1.234*** (<.0001)	1.406** (<.0001)
<i>RDIntensity</i>		8.024*** (<.0001)	7.591*** (<.0001)
<i>SaleGrowth</i>		1.491*** (<.0001)	1.528*** (<.0001)
Industry fixed effects	No	Yes	Yes
Firm and year clustering	No	Yes	Yes
Adj. R <sup>2</sup>	0.0009	0.3738	0.3846
N	806	806	806

p values are presented in parentheses below corresponding coefficients. The significance level is represented as \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

results of the OLS regression where the dependent variable is firm performance (*Tobin's Q*), and the independent variables of interest are shareholders' proxy proposal on board diversity (*DivProp*) and its interaction with female board representation as the moderator (*DivProp\*PercFemale*). The coefficient of shareholder activism in greater board gender diversity (*DivProp*) is significant and positive for both groups on firm performance, indicating that the shareholders' involvement in board gender diversity directly increases firm performance. The results also show that the coefficient of *PercFemale* is significantly positive and the coefficient of the interaction variable *DivProp\*PercFemale* is positive and insignificant for firms with a low level of female board representation. However, for firms with a high-level diversified board, the coefficient of both *PercFemale* and *DivProp\*PercFemale* are significantly negative, indicating a negative moderation effect of shareholders' proxy proposal on firm performance. Table 4 panels A and B provide the results of our models testing Hypothesis 2 and the results are consistent. Therefore, Hypothesis 2 is supported.

Our results suggest that the positive and negative effects of gender diversity may co-exist, and the overall influence of board gender diversity on firm performance could be conditional upon the level of shareholder activism, which is partly synthesized the diverse literature on board gender diversity. The advantages of gender diversity in the board room related to business performance are in two folders. First, a gender-diverse board could

enhance a corporation's competitive advantage through the improvement of a firm image aligned with the societal gender equality movement, gaining more support from external shareholders. Second, gender diversity promotes firm creativity and innovation by including broader perspectives in the decision-making process (Kor 2006; Miller and Del Carmen Triana 2009; Dezső and Ross 2012). On the other hand, board gender diversity may have adverse effects on firm performance. When the board becomes more diverse, conflicts, miscommunication, and loss of trust among the team may be more intense due to the dysfunctional group effect, which would deteriorate the quality of board decision-making and thus reduce firm performance (Earley and Mosakowski 2000; Tajfel and Turner 1986; Williams and O'Reilly 1998; Lau and Murnighan 1998; Richard et al. 2004). The nonlinear relationship thus reflects the dynamics of co-existing positive and negative effects of board gender diversity.

Our main findings suggest that the impacts of board gender diversity on firm performance could be moderated by the U.S. institutional environment, such as shareholder activism. A few studies state that shareholder activism is an effective approach to promoting board gender diversity and female director representation generally tends to have a positive and direct impact on performance measures (Marquardt and Wiedman 2016; Hoobler et al. 2018). Consistent with the literature, we find that shareholder activism in female board representation would increase significantly corporate performance. However, our findings also show that shareholder activism has a moderating indirect influence on board gender diversity and firm performance, besides the positive direct effect. Interestingly, the moderation role of shareholder activism is positive but insignificant for the low female board representation group, while the moderating effect turns out to be significantly negative for the high female board representation group. When companies exceed their balanced level of diversity, the adverse effects of board gender diversity offset its benefits and turn out to be the dominating effect; increasing more female board representation would reduce corporate performance and such an adverse effect may even worsen when shareholders propose a greater board gender diversity in the proxy process.

Collectively, the results of the paper suggest that shareholder proposals have both direct and moderating indirect effects on the nonlinear relationship between board gender diversity and firm performance. Specifically, shareholders' proxy proposals on increasing board gender diversity generally improve firm performance. However, shareholder activism in greater board gender diversity would negatively moderate the relation between board gender diversity and firm performance, if female board representation in public boardrooms is high and exceeds the balanced level.

### 4.3 Sensitivity analysis

#### 4.3.1 Two-stage Heckman procedure

Given that gender diversity is endogenous, we perform a two-stage Heckman analysis controlling self-selection and endogeneity. Existing studies have used a firm's industry-level board gender diversity as the instrumental variable (IV) for firm-level board gender diversity. For example, Liu, et al (2014) studied board gender diversity with data from Chinese public firms between 1999 and 2011. They constructed the firm-level IV as "the percent of women directors in a focal firm's 2-digit SIC coded industry." Solal and Snellman (2019) considered the publicly traded firms in the U.S. from 1998 and 2011, and used "the average level of board diversity in the firm's industry" as an instrument for a focal firm's board

diversity. The rationale for the industry level average as IV is that a firm's board gender diversity may be correlated to its peers in its industry. This correlation, which we also show empirically next, validates the relevance assumption of a valid IV. More importantly, as noted by Liu et al (2014) and Solal and Snellman (2019), there is no theoretical reason to believe that the average level of diversity at the industry level would have a direct impact on a firm's market value. In other words, given a focal firm, its financial outcome should not be directly affected by the average board diversity from its peer industry firms. We contend that this theoretical/conceptual lack of correlation between industry average board diversity and a focal firm's financial outcome is the main reason why previous studies have applied the same IV strategy which we follow closely.

Specifically, similar to Liu et al (2014) and Solal and Snellman (2019)'s approach, we use the industrial mean of the percentage of female board members (*PercFemale\_IndMean*), as the instrumental variable (IV) in the two-stage Heckman procedure. We estimate the first stage model using Eq. (3) and then analyze the second-stage model using Eq. (4).

$$\begin{aligned}
 PercFemale_{i,t} = & \beta_0 + \beta_1 PercFemale\_IndMean_{i,t} \\
 & + \beta_2 NoDirectors_{i,t} + \beta_3 AvgTimeRole_{i,t} \\
 & + \beta_4 AvgNoQuals_{i,t} + \beta_5 IndepD\_Rate_{i,t} \\
 & + \beta_6 InstOwn_{i,t} + \beta_7 SIZE_{i,t} \\
 & + \beta_8 LEV_{i,t} + \beta_9 RDIntensity_{i,t} \\
 & + \beta_{10} SaleGrowth_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 Tobin\_Q_{i,t+1} = & \beta_0 + \beta_1 PercFemale_{i,t} \\
 & + \beta_2 PercFemale^2_{i,t} + \beta_3 NoDirectors_{i,t} \\
 & + \beta_4 AvgTimeRole_{i,t} \\
 & + \beta_5 AvgNoQuals_{i,t} + \beta_6 IndepD\_Rate_{i,t} \\
 & + \beta_7 InstOwn_{i,t} + \beta_8 SIZE_{i,t} \\
 & + \beta_9 LEV_{i,t} + \beta_{10} RDIntensity_{i,t} \\
 & + \beta_{11} SaleGrowth_{i,t} + \sum Industry + \sum Year + \varepsilon_{it}
 \end{aligned} \tag{4}$$

The results of the two-stage Heckman procedure tabulated in Table 5 indicate the non-linear relation between board gender diversity and firm performance (*Tobin's Q*). The results are consistent with our main findings.

#### 4.3.2 Alternative firm performance measurements

While Tobin's Q is the primary measurement of firm performance in the study, we re-estimate Eq. (1) using two accounting-based performance measures: return on equity (ROE) and return on asset (ROA), as alternative proxies for firm performance. The results of models in Table 6 are qualitatively similar to our main results in Table 3.

**Table 5** Two-stage Heckman analysis to verify the nonlinear relation between firm performance and board gender diversity

	1	2	3	4
	Coeff	Coeff	Coeff	Coeff
Panel A: The first stage analysis				
DV: Perc_Female				
<i>Intercept</i>	-0.156*** (<.0001)	-0.132*** (<.0001)	-0.114*** (<.0001)	-0.182*** (<.0001)
<b><i>Perc_Female_IndMean</i></b>	<b>0.895***</b> (<.0001)	<b>0.932***</b> (<.0001)	<b>0.86***</b> (<.0001)	<b>0.881***</b> (<.0001)
<i>NoBoardMembers</i>	0.005*** (<.0001)		0.002*** (<.0001)	0.002*** (<.0001)
<i>AvgTimeRole</i>	-0.002*** (<.0001)		-0.002*** (<.0001)	-0.002*** (<.0001)
<i>AvgNoQuals</i>	0.031*** (<.0001)		0.018*** (<.0001)	0.022*** (<.0001)
<i>IndepD_Rate</i>	0.084*** (<.0001)		0.041*** (<.0001)	0.069*** (<.0001)
<i>InstOwn</i>	-0.015** (0.026)		-0.001 (0.91)	-0.009 (0.171)
<i>SIZE</i>		0.017*** (<.0001)	0.007*** (<.0001)	0.012*** (<.0001)
<i>LEV</i>		0.006 (0.426)	0.01 (0.129)	0 (0.98)
<i>RDIntensity</i>		0.049 (0.126)	0.007 (0.802)	-0.007 (0.837)
<i>SaleGrowth</i>		-0.035*** (<.0001)	-0.025*** (<.0001)	-0.031*** (<.0001)
Year fixed effects	Yes	Yes	No	Yes
Industry Fixed Effects	Yes	Yes	No	Yes
Log Likelihood	-1106	-873	-1514	-746
N	6036	6036	6036	6036
Panel B: The second stage analysis				
DV: Tobin_Q <sub>i,t+1</sub>				
<i>Intercept</i>	3.017 (<.0001)	2.591*** (<.0001)	2.717*** (<.0001)	2.614*** (<.0001)
<b><i>Perc_Female</i></b>	<b>1.116**</b> (0.05)	<b>1.458***</b> (0.005)	<b>4.546***</b> (<.0001)	<b>1.705**</b> (0.002)
<b><i>Perc_Female</i><sup>2</sup></b>	<b>-2.265**</b> (0.013)	<b>-2.416***</b> (0.005)	<b>-3.798***</b> (<.0001)	<b>-2.918**</b> (0.001)
<i>NoBoardMembers</i>	-0.048*** (<.0001)		-0.029*** (<.0001)	-0.018*** (0.003)
<i>AvgTimeRole</i>	0.004 (0.416)		0.007 (0.169)	0.008 (0.107)
<i>AvgNoQuals</i>	0.024 (0.507)		-0.047 (0.151)	-0.01 (0.773)

**Table 5** (continued)

	1	2	3	4
	Coeff	Coeff	Coeff	Coeff
<i>IndepD_Rate</i>	0.093 (0.371)		-0.189** (0.037)	0.173* (0.075)
<i>InstOwn</i>	-0.171** (0.034)		-0.01 (0.894)	-0.162** (0.038)
<i>SIZE</i>		-0.062*** (<.0001)	-0.119*** (<.0001)	-0.051*** (<.0001)
<i>LEV</i>		-0.412*** (<.0001)	-0.193** (0.027)	-0.368*** (<.0001)
<i>RDIntensity</i>		6.17*** (<.0001)	8.422*** (<.0001)	6.134*** (<.0001)
<i>SaleGrowth</i>		0.816*** (<.0001)	0.911*** (<.0001)	0.829*** (<.0001)
Year fixed effects	Yes	Yes	No	Yes
Industry fixed effects	Yes	Yes	No	Yes
Appr. R2	0.286	0.341	0.171	0.343
N	6036	6036	6036	6036

The significance level is represented as \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

## 5 Conclusion

To provide evidence on the regulatory debate on promoting board gender diversity in the U.S., this study investigates how shareholder activism in greater board gender diversity affects board gender diversity and firm performance. Using a sample of U.S. public companies during the period from 1999 to 2017, we find that shareholder activism in board gender diversity has both direct and moderating indirect impacts on the nonlinear association between board gender diversity and firm performance. Specifically, we find the positive direct impact of shareholders' board gender diversity proxy proposal on firm performance. Board gender diversity could increase or decrease firm performance depending on the level of female board representation, based on the inverted U-shaped nonlinear relationship found in the study. While increasing board gender diversity would improve financial performance for companies with a low level of diversity, more board gender diversity may hurt firm performance after the firm has already reached a balanced level of diversity, and such negative association is significantly increased when shareholder proposals occur in firms with greater board gender diversity.

This study complements the existing research on board diversity in several important ways. Our findings show an inverted U-shaped nonlinear relationship between board gender diversity and firm performance for US publicly traded companies. The results partially explain why the existing literature documents inconsistent conclusions regarding board diversity's impact on firm performance. Second, our study adds more insights to the current debate on the mandated gender quota in corporate boards after the first state-wide legislative quota in the US imposed by California's SB826, effective in 2019. The nonlinear relationship between board gender diversity and performance found in the study suggests that regulators should be cautious when making decisions on the imposition of board



**Table 6** Using alternative performance measurements to robustness test the OLS model in Eq. 1

	1	2	3
	Coeff	Coeff	Coeff
Panel A: the results of OLS models using return on asset (ROA) as alternative proxies for firm performance			
Dependent Variable = ROA <sub><i>i,t+1</i></sub>			
<i>Intercept</i>	0.041*** (0.001)	0.076*** (<.0001)	0.047*** (<.0001)
<i>Perc_Female</i>	<b>0.081**</b> <b>(0.013)</b>	<b>0.132***</b> <b>(&lt;.0001)</b>	<b>0.112***</b> <b>(&lt;.0001)</b>
<i>Perc_Female</i> <sup>2</sup>	<b>-0.181*</b> <b>(0.056)</b>	<b>-0.256***</b> <b>(0.005)</b>	<b>-0.22**</b> <b>(0.018)</b>
<i>NoBoardMembers</i>	0.001** (0.011)		0.001** (0.02)
<i>AvgTimeRole</i>	0.001* (0.059)		0.001** (0.031)
<i>AvgNoQuals</i>	-0.005** (0.039)		0 (0.89)
<i>IndepD_Rate</i>	0.015** (0.026)		0.021*** (0.003)
<i>InstOwn</i>	0.02*** (0.003)		0.015** (0.021)
<i>SIZE</i>		0 (0.669)	-0.002* (0.095)
<i>LEV</i>		-0.014 (0.113)	-0.016* (0.073)
<i>RDIntensity</i>		-0.266*** (<.0001)	-0.253*** (<.0001)
<i>SaleGrowth</i>		0.071*** (<.0001)	0.072*** (<.0001)
Industry fixed effects	Yes	Yes	Yes
Firm and year clustering	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.192	0.227	0.23
N	6036	6036	6036
Panel B: the results of OLS models using return on equity (ROE) as alternative proxies for firm performance			
Dependent Variable = ROE <sub><i>i,t+1</i></sub>			
<i>Intercept</i>	-0.115** (0.006)	-0.078** (0.037)	-0.184*** (<.0001)
<i>Perc_Female</i>	<b>0.274**</b> <b>(0.041)</b>	<b>0.276**</b> <b>(0.037)</b>	<b>0.244*</b> <b>(0.071)</b>
<i>Perc_Female</i> <sup>2</sup>	<b>-0.488</b> <b>(0.256)</b>	<b>-0.491</b> <b>(0.249)</b>	<b>-0.487</b> <b>(0.256)</b>
<i>NoBoardMembers</i>	0.005*** (0.006)		0 (0.934)
<i>AvgTimeRole</i>	0.006*** (0.001)		0.006*** (<.0001)

**Table 6** (continued)

	1	2	3
	Coeff	Coeff	Coeff
<i>AvgNoQuals</i>	0.005 (0.667)		0.002 (0.884)
<i>IndepD_Rate</i>	0.152*** ( $< .0001$ )		0.138*** ( $< .0001$ )
<i>InstOwn</i>	-0.012 (0.723)		-0.035 (0.308)
<i>SIZE</i>		0.017*** ( $< .0001$ )	0.014*** ( $< .0001$ )
<i>LEV</i>		0.07 (0.223)	0.083 (0.153)
<i>RDIntensity</i>		-0.458*** (0.007)	-0.423** (0.013)
<i>SaleGrowth</i>		0.101*** ( $< .0001$ )	0.112*** ( $< .0001$ )
Industry fixed effects	Yes	Yes	Yes
Firm and year clustering	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.028	0.032	0.037
N	6036	6036	6036

The significance level is represented as \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

gender quotas in the U.S. Since the balanced level of board gender diversity for each company differs, the gender quota would not fit all companies to reach their balanced level of diversity.

The study also provides evidence on the effectiveness of shareholder activism on board gender diversity and firm performance. Our findings support that shareholder activism generally promotes board gender diversity and leads to better financial performance. However, regulators should be aware of the negative moderation effect of shareholder proposals for a highly gender-diverse board. The findings of the paper are useful to US regulators when they seek regulatory actions to promote board gender diversity.

There are several limitations of this paper that can be considered in future studies. First, the study uses U.S. data, so our findings might not be generalized to other countries with different institutional and legal environments. More international studies on board gender diversity may provide more insights. Second, additional qualitative research on shareholder proposals can help to understand how shareholder activism engages with the management in improving gender diversity.

## Appendix: Variables definition

Variables	Definition
<i>AvgNoQuals</i>	An average number of qualified board members who earn an undergraduate level or above
<i>AvgTimeRole</i>	An average time of board members served on the board in the unit of the year
<i>DivProp</i>	A dummy variable and equals one when a firm's shareholders initiate the proxy process to increase board gender diversity
<i>IndepD_Rate</i>	The ratio of independent directors on the board
<i>InstOwn</i>	The total institutional ownership, defined in the form of the percentage of shares outstanding
<i>LEV</i>	Long-term debt scaled by total assets
<i>NoDirectors</i>	The board size, which measures the total number of board directors
<i>PercFemale</i>	A direct measure of gender diversity in the boardroom, defined as the percentage of female board members
<i>PercFemale</i> <sup>2</sup>	Squared term of the percentage of female board members
<i>RDIntensity</i>	Research and Development Intensity, measured as the Research and Development Expenses scaled by the total assets
<i>ROA</i>	Return on assets, calculated as net income before depreciation divided by total assets
<i>ROE</i>	Return on equity, calculated as net income divided by shareholder's equity
<i>SaleGrowth</i>	A measure of percentage growth of sales during the year t, defined as sales at the yearend (Saleit) minus sales at the beginning of the year (Saleit-1) divided by sales at the beginning of the year (Saleit-1)
<i>SIZE</i>	The logarithm of total assets
<i>Tobin_Q</i>	The Q ratio, computed as the sum of the market value of stock and the book value of total liabilities divided by the book value of total assets

**Funding** No funding was received to assist with the preparation of this manuscript.

## Declarations

**Conflict of interest** The authors have no competing interests to declare that are relevant to the content of this article.

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