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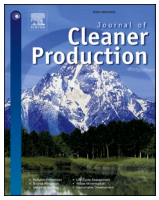

Sentry eyes? Women directors and corporate penalties

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ABSTRACT

The ethical role of women directors is the source of increasing scholarly interest. This study investigates the impact of women directors on corporate misconduct using a dataset of U.S. firms listed between 2002 and 2019. It reveals a significantly negative association between women board directors and corporate misconduct. This association is robust to alternate proxies and regression techniques accounting for potential endogeneity. This study finds that an increase in the proportion of women directors by one standard deviation decreases corporate penalties amount by approximately 1.911%. It also notes that the impact of women directors on corporate misconduct is significant when the board has at least three women and is mainly influenced by independent, rather than executive, women directors. Moreover, the relationship between women directors and corporate misconduct is driven by governance quality, external monitoring, and industry nature. Overall, the investigation indicates that the presence of women directors provides 'sentry eyes' to corporate boards and reduces corporate misconduct. These findings contribute to the continuing debate on the role of women directors and board diversity and have implications for devising effective corporate governance mechanisms.

1. Introduction

Corporate misconduct is a construct that embodies the actions of corporate managers to deceive corporate stakeholders. These actions generally violate laws and regulations (Neville et al., 2019). Corporate misconduct has resulted in the loss of human lives, marine life, biodiversity, environmental damage, billions of dollars of losses to the investors and the economy, hundreds of thousands of jobs, and stakeholders' trust. High-profile corporate scandals such as blatant financial misconduct at Lehman Brothers, Enron, Bear Stearns, and Barclays; environmental misconduct of BP involving a massive oil spill in Gulf of Mexico and emissions scandal at Volkswagen; unethical and exploitative pricing of life-saving drugs at Turing Pharmaceuticals and Valeant Pharmaceuticals; personal data privacy breach of millions of Facebook and Zoom users; poor working conditions that led to many suicides at Foxconn China and factory fires that killed 264 workers in Karachi-Pakistan and 112 workers in Dhaka-Bangladesh; false claims of technological breakthrough at Theranos are just some examples.

The devastating consequences for the people, the planet, the society, the economy, and the firm have led the policymakers to improve corporate governance mechanisms to curb corporate misconduct even though empirical evidence of its effectiveness is mixed (Velte, 2023). For example, Neville et al. (2019) while synthesizing 135 studies investigating the impact of board independence on corporate misconduct indicate that the effectiveness of board independence depends upon the type of independence. Zaman et al. (2021) document that co-opted boards increase corporate misconduct in U.S. firms and Eugster et al. (2024) indicate that optimal board size helps U.S. firms in reducing corporate misconduct. Taking a board gender diversity (BGD) perspective, the research question this study addresses is: Does the presence of women directors on corporate boards provide 'sentry eyes' to corporate boards to help reduce corporate misconduct and consequent penalties? Researchers found a link between BGD and corporate ethical behaviors due to the interplay between structural, behavioral, and cognitive aspects of the feminine and masculine elements that define corporate board dynamics (Campopiano et al., 2023). A lack of empirical evidence on the potential impact of BGD on corporate misconduct and the significance of the impact of corporate misconduct on the economy and society is the motivation behind this study.

Grounded on a comprehensive set of theories i.e., Upper-echelon theory (UET), critical mass theory (CMT), and agency theory (AT) — this study makes manifold contributions. First, using a dataset of 4671

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observations of U.S. firms listed from 2002 to 2019, this study investigates women directors' impact on corporate misconduct and observes that their presence on corporate boards helps reduce corporate misconduct. Supporting UET, these findings indicate that the presence of women directors provides 'sentry eyes' to corporate boards and reduces corporate misconduct.

Second, although the results indicate that BGD reduces corporate misconduct; however, it is still unclear when and how women directors help firms reduce corporate misconduct. This study, therefore, investigates the critical mass of women directors and observes that women directors' negative impact on corporate misconduct is significant only when there are at least three women board directors. *Third*, this study examines whether women reduce corporate misconduct irrespective of their role on the board (i.e., executive vs. independent women directors) to gain clarity on how women help firms reduce corporate misconduct. Aligned with *agency theory*, this study finds that independent women directors through their monitoring role independence reduce corporate misconduct whereas executive women directors in their role as employees do not exert any significant impact.

Fourth, investigating the channels through which women directors help firms reduce corporate misconduct, this study finds that women directors have a greater impact on corporate misconduct when working for firms with low internal governance quality, maintaining ESG-linked compensation, subject to high media scrutiny, and firms that operate in sensitive industries. These findings have substantial implications as they confirm the significance of the corporate ecosystem that makes monitoring the role of women directors more effective.

The rest of this paper is structured as follows. Section 2 constructs hypotheses grounded in relevant theories; Section 3 introduces the sample data and employed methodology; Section 4 presents our main empirical results and additional analyses; Sections 5 and 6 provide discussion and conclusion, respectively.

2. Literature and hypotheses development

Despite civil and criminal penalties imposed by the courts (ACFE, 2024), and reputational and financial penalties imposed by the market, corporate misconduct is pervasive (Liu et al., 2023) and obnoxiously costly for the stakeholders and the firm. For example, Zhao et al. (2021) observed that 17% of listed firms in China are involved in corporate fraud, which is a small portion of the bigger problem i.e., corporate misconduct, and Dyck et al. (2024) found that on the average 10% of large U.S. public corporations allegedly commit securities fraud. The cost of corporate fraud is estimated at a 5% loss in corporate revenue, a 1.7% loss in corporate value in the U.S., and $ 5 trillion lost to fraud globally (ACFE, 2024; Dyck et al., 2024).

Along with regulatory frameworks in the corporate ecosystem, researchers advocate the effectiveness of financial penalties and internal corporate governance to curb corporate misconduct (Eugster et al., 2024) wherein dynamics of corporate boards play a fundamental role (Liu et al., 2023). The corporate board epitomizes accumulated knowledge, experience, skillset, and networks found in its members to present a relatively larger pool of corporate resources not only to help improve corporate performance but also to provide 'sentry eyes' to curb corporate misconduct. For example, optimal size and diversity of the boards are negatively associated with corporate misconduct in U.S. firms (Eugster et al., 2024). Empirical evidence indicates a generally negative relationship between board independence and corporate misconduct in 20 countries (Neville et al., 2019) but positive in the U.S. (Eugster et al., 2024). The presence of co-opted directors exacerbates the incidence of corporate misconduct in U.S. firms (Zaman et al., 2021), and the presence of female board members mitigates certain types of corporate misconduct in U.S. firms (Eugster et al., 2024) as gender diversity in corporate boards not only enriches corporate resources (Post and Byron, 2015) but also improves the dynamics of corporate boards (Wahid, 2019).

Investigating the role of female board members in improving corporate financial and non-financial performance, researchers observe the positive role played by them (Terjesen et al., 2009) due to their better monitoring, positive stakeholders' orientation, and ethicality to help reduce negative corporate behaviors (Gull et al., 2023) as female board members place more emphasis on furthering the common social good. *Upper-echelon Theory* (Hambrick and Mason, 1984) proposes that top executives' perspectives are shaped to a great extent by their subjectivity; that is, the differences in their experiences and values, along with other human factors, impact their construal of strategic situations. Under UET, women on corporate boards, who are renowned for their sensitivity to the environment, would improve boards' empathy towards environmental issues (Nadeem et al., 2020). Therefore, this study hypothesizes that as 'sentry eyes' women on corporate boards help reduce negative corporate behaviors that are identified and prosecuted, and consequently firms are penalized. Accordingly, the following is the first hypothesis.

H1. The proportion of women board directors is negatively associated with corporate penalties.

Theoretical and empirical literature digs deep into the BGD and uses *critical mass theory* to argue that instead of a 'token' of one or two women on board, a critical mass of at least three women on the board is necessary to be effective (Gull et al., 2023). Using critical mass theory, a study finds no significant impact of the number of female directors on CSR in China (Yang et al., 2019), but generally, research advocates increasing the presence of women on corporate boards to improve corporate performance as well as reduce corporate misconduct (Boutchkova et al., 2021). For example, when the number of women directors in U.S. bank holding companies reaches a critical mass of three or more, bank earnings management declines (Fan et al., 2019), and appointment of a critical mass of women directors improves the corporate carbon performance of 600 firms in 17 European countries (Nuber and Velte, 2021) and 1500 firms included in Standard and Poor (Lemma et al., 2023). Accordingly, this study proposes a second hypothesis as follows.

H2. Gender-diverse boards with three or more women significantly reduce corporate penalties.

Referring to *agency theory* (Jensen and Meckling, 1976), the board's key role is managing agency conflicts between managers and shareholders via effective monitoring. Accordingly, Lefley and Janeček (2024) argue that not just the number of women on board but the composition is important for their role to be effective, for which literature commonly proposes increased board independence as a potential tool to curb corporate misconduct (Neville et al., 2019). Theoretical and empirical literature demonstrates that board independence enhances the monitoring role of the board in the USA (Duru et al., 2016), and independent boards mitigate the negative impact of corruption in UK subsidiaries (Sena et al., 2018). A meta-analysis of 135 studies from more than 20 countries shows a generally negative association of board independence with corporate misconduct (Neville et al., 2019). Consequently, grounding on the independence role of women board members, this study posits that independent women board members may help reduce corporate misconduct better as compared to executive women members and presents the third hypothesis as follows.

H3. Independent rather than executive women directors are more likely to reduce corporate penalties.

3. Data and methodology

To investigate the hypotheses of the study, a panel dataset of 4671 firm-year observations of U.S. non-financial firms listed from 2002 to 2019 is developed using BroadEx, EIKON, and Worldscope. The data for the corporate penalties is collected from the Violation Tracker database.

We keep all the firms with the available data. Following recent similar studies, we restrict our sample period from 2002 to 2019 as there are very few observations available before 2002, and corporate activities decreased significantly in the U.S. during (2020–2022) COVID-19 pandemic (Qureshi et al., 2024; Gull et al., 2024). To investigate the impact of women directors on corporate misconduct (H1-H3), the study opts for industry and year-fixed effects regression to ensure that the results do not suffer from time and industry biases (Qureshi et al., 2024). The baseline model of the study is as under:

$$CM_{it} = \beta_0 + \beta_1 WD_{it} + \beta_2 Controls_{it} + ind_j + yr_t + \varepsilon_{it} \quad (1)$$

where CM_{it} represents one of the two proxies of corporate misconduct that is detected and penalized (i.e., the natural logarithm of the amount of financial penalties and the natural logarithm of the number of financial penalties) to firm i at time t. For H1, WD_{it} represents the proportion of women directors on the board of firm i at time t. For H2, WD_{it} represents one of the three proxies of women's presence (W1, a dummy variable coded 1 when the firm has one woman director and 0 otherwise; W2, a dummy variable coded 1 when the firm has two women directors and 0 otherwise; W3, a dummy variable coded 1 when the firm has three women directors and 0 otherwise) on the board of firm i at time t. For H3, WD_{it} represents one of the two proxies of women's presence (IND_PRO, the proportion of independent women board directors, and EX_PRO, the proportion of executive women board directors) on the board of firm i at time t. $Controls_{it}$ are financial and non-financial firm-level control variables explained in Appendix 1, ind_j *and* yr_t represent industry and year-fixed effects, respectively. ε_{it} represents error term.

4. Empirical results

4.1. Summary statistics and correlations

Table 1 presents the mean, median, and standard deviation (SD) of the full sample. The mean (12.361) and median (11.633) values for corporate penalties (logged amount) indicate that almost half of the sample firms have been imposed average financial penalties. The mean value of 0.912 with an SD of 0.908 indicates high variations in the number of penalties of the sample firms. Regarding board gender diversity, we observe that, on average, women represent 22.5% of the directors and 90.2% of the sample firms have at least one-woman director. Further, about 28.9%, 35.2%, and 26.1% of the sample firms have one, two, and three women board directors, respectively. Further, the mean values of 0.217 and 0.008 for the proportion of independent and executive women directors, respectively, indicate that on average the sample firms have 21.7% of independent and 8% of executive women directors (Nadeem et al., 2020; Gull et al., 2023).

Table 2 presents industry and time trends. The study utilizes the one-digit Standard Industrial Classification (SIC) code to classify industries (Gull et al., 2022). The manufacturing industry represents the highest proportion of women directors (0.264) while the transportation, communication, and utilities industry represents the highest number of penalties (11.008). The number of penalties randomly changes while the proportion of women directors increases over the sample period.

Table 3 presents the results of pairwise correlations that do not show any highly significant correlations between the independent variables. Along with lower values of the Variance Inflation Factor (VIF), it mitigates the potential issue of multicollinearity (Qureshi et al., 2024).

4.2. Regression analysis

To empirically test our hypotheses (H1, H2, and H3), equation (1) has been estimated and the results are presented in Table 4. In Column 1, the proportion of women directors shows a highly significant negative (−1.0497***) relationship with the penalty amount validating the first hypothesis and *upper-echelon theory*. The economic impact of women directors on corporate misconduct is also significant. An increase in the proportion of women directors by one standard deviation decreases

Table 1
Summary statistics.

Variables	N	Mean	Median	SD
Penalty amount (logged)	4671	12.361	11.633	2.938
Penalty numbers (logged)	4671	0.912	0.693	0.908
Proportion of women directors (BGD)	4671	0.225	0.2	0.156
Number of women directors	4671	1.89	2	1.162
Presence of women directors	4671	0.902	1	0.298
One woman director	4671	0.289	0	0.453
Two women directors	4671	0.352	0	0.477
Three women directors	4671	0.261	0	0.439
Proportion of independent women directors	4671	0.217	0.2	0.151
Proportion of executive women directors	4671	0.008	0	0.031
Board size (logged)	4671	2.328	2.303	0.216
Board independence	4671	0.812	0.846	0.12
Board meetings (logged)	4671	2.011	1.946	0.378
CEO-CHAIR separation	4671	0.717	1	0.45
CSR committee	4671	0.432	0	0.495
R&D intensity	4671	0.013	0	0.044
Capital intensity	4671	0.096	0.039	0.19
Return on assets	4671	6.282	5.9	6.86
Tobins Q	4671	1.818	1.488	1.039
PPE to assets ratio	4671	0.323	0.263	0.259
Cash to assets ratio	4671	0.088	0.051	0.103
Leverage	4671	0.287	0.276	0.178
Firm size	4671	16.166	15.998	1.539

This table presents descriptive statistics for the variables used in this study. The sample consists of 4671 firm-year observations during the study period from 2002 to 2019. All variables are as defined in Appendix 1.

Table 2
Industry and time trend.

Industrial sector	*Number of observations*	*Number of penalties*	*Proportion of women directors (BGD)*
Construction	384	4.672	0.126
Manufacturing	860	4.643	0.264
Technology firms	859	2.873	0.204
Transportation, communications, and utilities	774	11.008	0.215
Retail	652	3.968	0.250
Finance, insurance, and real estate	630	4.305	0.252
Computer services	343	2.041	0.227
Health and Education	169	2.396	0.213
All industrial sectors	**4671**	**4.962**	**0.225**
Year	*Number of observations*	*Number of penalties*	*Proportion of women directors (BGD)*
2002	68	4.882	0.198
2003	85	6.365	0.221
2004	114	6.281	0.203
2005	143	6.615	0.215
2006	141	6.582	0.234
2007	153	7.588	0.214
2008	209	5.478	0.201
2009	228	6.211	0.199
2010	234	5.987	0.204
2011	261	5.870	0.198
2012	267	5.581	0.204
2013	264	4.966	0.221
2014	268	5.358	0.228
2015	377	4.454	0.220
2016	473	3.970	0.228
2017	486	4.006	0.233
2018	507	3.751	0.252
2019	393	3.608	0.276
All years	**4671**	**4.962**	**0.225**

Table 3
Correlation matrix.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	VIF
1. Proportion of women directors	1.000														1.35
2. Board size	0.268[a]	1.000													1.44
3. Board independence	0.210[a]	0.182[a]	1.000												1.12
4. Board meetings	0.074[a]	0.097[a]	0.117[a]	1.000											1.12
5. CEO-CHAIR separation	0.084[a]	0.083[a]	0.006	−0.063[a]	1.000										1.04
6. CSR committee	0.376[a]	0.299[a]	0.280[a]	0.140[a]	−0.011	1.000									1.38
7. R&D intensity	0.065[a]	0.020	0.062[a]	0.020	0.005	0.059[a]	1.000								1.21
8. Capital intensity	−0.079[a]	−0.083[a]	0.015	0.051[a]	−0.021	0.005	−0.059[a]	1.000							1.49
9. Return on assets	0.047[a]	−0.028	−0.026	−0.176[a]	0.055[a]	0.007	−0.010	−0.118[a]	1.000						1.44
10. Tobins Q	0.074[a]	−0.112[a]	−0.056[a]	−0.193[a]	0.057[a]	−0.048[a]	0.202[a]	−0.102[a]	0.524[a]	1.000					1.72
11. PPE to assets ratio	−0.061[a]	−0.045[a]	0.026	−0.011	−0.002	0.088[a]	−0.166[a]	0.541[a]	−0.049[a]	−0.092[a]	1.000				1.60
12. Cash to assets ratio	−0.033[a]	−0.125[a]	−0.059[a]	−0.041[a]	−0.011	−0.003	0.359[a]	−0.135[a]	0.168[a]	0.348[a]	−0.261[a]	1.000			1.41
13. Leverage	−0.023	−0.046[a]	0.013	0.060[a]	−0.040[a]	0.028	−0.042[a]	0.136[a]	−0.052[a]	0.027	0.215[a]	−0.193[a]	1.000		1.11
14. Firm size	0.384[a]	0.519[a]	0.194[a]	0.248[a]	0.109[a]	0.383[a]	0.031[a]	0.054[a]	−0.149[a]	−0.266[a]	−0.045[a]	−0.142[a]	−0.052[a]	1.000	1.84

This table presents the Pearson correlation coefficients for the regression variables.
[a] Represent significance at 0.05 level. All variables are as defined in Appendix 1.

Table 4
Board gender diversity and corporate misconduct (*H1-H3*).

Variables	(1)	(2)	(3)
	Penalty amount (CM)		
Proportion of women directors (BGD)	−1.0497***		
	(-3.65)		
One woman director (W1)		−0.1781	
		(-1.39)	
Two women directors (W2)		−0.2213	
		(-1.60)	
Three women directors (W3)		−0.3179**	
		(-2.01)	
Proportion of independent women directors (IND_PRO)			−1.0791***
			(-3.62)
Proportion of executive women directors (EX_PRO)			−0.7781
			(-0.61)
Board size	−0.0086	0.1038	−0.0073
	(-0.04)	(0.46)	(-0.03)
Board independence	0.7292**	0.7048**	0.7362**
	(2.24)	(2.15)	(2.25)
Board meetings	0.5682***	0.5714***	0.5675***
	(5.34)	(5.36)	(5.34)
CEO-CHAIR separation	0.1458*	0.1336	0.1454*
	(1.78)	(1.63)	(1.77)
CSR committee	0.1101	0.0622	0.1116
	(1.16)	(0.66)	(1.17)
R&D intensity	4.7751***	4.8208***	4.7666***
	(4.61)	(4.60)	(4.60)
Capital intensity	−1.2859***	−1.2849***	−1.2866***
	(-5.56)	(-5.51)	(-5.55)
Return on assets	0.0043	0.0045	0.0043
	(0.63)	(0.66)	(0.63)
Tobins Q	0.0199	0.0036	0.0206
	(0.40)	(0.07)	(0.41)
PPE to assets ratio	0.2265	0.2406	0.2248
	(1.08)	(1.15)	(1.08)
Cash to assets ratio	1.8481***	1.8848***	1.8461***
	(4.05)	(4.12)	(4.05)
Leverage	−1.0145***	−0.9838***	−1.0111***
	(-4.47)	(-4.33)	(-4.44)
Firm size	0.8942***	0.8656***	0.8944***
	(24.19)	(24.08)	(24.17)
Constant	−3.7802***	−3.5288***	−3.7880***
	(-5.14)	(-4.69)	(-5.15)
Observations	4671	4671	4671
Industry effects	Included	Included	Included
Year effects	Included	Included	Included
Adj. R^2	0.275	0.273	0.275

This table presents regression results for the relationship between women directors and corporate misconduct, considering the proportion, critical mass, and status (i.e, independent vs executive) of women directors on the board. *, **, *** Represent significance at 0.1, 0.05, and 0.01 levels, respectively. The t-statistics given in parenthesis are based on standard errors clustered by firm and year. All variables are as defined in Appendix 1.

corporate penalties amount by approximately 1.911% [0.225 × −1.0497/12.361 = −0.0191], i.e., using the mean value of the proportion of women directors and penalties amount from Table 1 and the coefficient from Table 4 (Column 1).

Table 4 (Column 2) presents the results of regression analysis investigating the critical mass of women directors (H2). The results show an insignificant but negative relationship of one (−0.1781) as well as two women directors (−0.2213) with the penalty amount whereas there is a significant negative association of three women directors (−0.3179**) with the penalty amount, corroborating second hypothesis to suggest that it is not a symbolic board gender diversity rather a critical mass of at least three women on the board to be effective to help mitigate corporate misconduct confirming the earlier studies by Gull et al. (2023) and Issa and Hanaysha (2023).

Table 4 (Column 3) presents the results of regression analysis investigating the impact of independent and executive women directors on corporate misconduct (H3). The results show a highly significant negative relationship of independent women directors (−1.0791***)

but an insignificant relationship of executive women directors (−0.7781) with the penalty amount. These results confirm the third hypothesis, support *agency theory*, and imply that executive women directors do not influence corporate misconduct, while the reduction in corporate misconduct due to gender diversity is completely driven by independent women directors.

4.3. Robustness and endogeneity

To ensure the robustness of the findings, the main results are re-examined using alternate proxies of corporate penalties and gender diversity. Table 5 (Columns 1 and 2) presents the results of regression analysis using alternate proxies of gender diversity i.e., the number of women directors on board and the presence of women directors on board (a dummy variable coded 1 when the firm has at least one-woman director and 0 otherwise). This re-examination seeks to scrutinize the sensitivity of the results to the measures of board gender diversity. There is a significant negative relationship of the number of women directors (−0.0703*) as well as the presence of women directors (−0.2062*) on board with corporate misconduct, congruent with the main results. Table 5 (Column 3) presents the results of regression analysis using alternate proxy of corporate misconduct i.e., logged value of the number of corporate penalties. The objective of this re-examination is to scrutinize the sensitivity of the results to the measure of corporate misconduct. There is a highly significant negative relationship between the proportion of women directors with the number of corporate penalties (−0.4836***), congruent with the main results.

The results of this study may be subject to endogeneity due to reverse causality and selection bias. If self-selection bias is present, it may be the case that the observed relationship between the proportion of women directors and corporate penalties may be due to biased data sampling. Therefore propensity score matching (PSM) is applied to confirm the absence of self-selection bias, in line with recent literature (Gull et al., 2023). To apply PSM, first, a dummy variable was created coded 1 when a firm has a minimum of one woman director and 0 otherwise. Based on this dummy variable, firm-year observations were classified into two categories, i.e., with women directors (treatment group) and without women directors (control group). Then, equation (1) was re-estimated (using probit regression) by replacing BGD with the dummy variable. Next, we estimated propensity scores for each firm-year observation. Based on these propensity scores, we created two similar subsamples representing the treatment and control groups and apply regression analysis on the post-matched sample. The results of post-match OLS regression (Table 6 - Column 1) reveal a highly significant negative relationship (−1.1618***) between the proportion of women directors and corporate misconduct, congruent with the main findings. Appendix 2 represents the results of the mean difference test between the control and treatment groups. The mean values of the explanatory variables used in equation (1) are not significantly different in statistical terms, thus validating the robustness of PSM.

Second, the findings could be subject to endogeneity issues resulting from reverse causality between explanatory and dependent variables; for example, firms with higher corporate misconduct may hire more women directors to seek stakeholder legitimacy. To ensure our findings are free from endogeneity due to reverse causality, GMM system regression was applied (Qureshi et al., 2024). The results presented in Table 6 (Column 2) indicate a highly significant negative relationship (−2.1430***) between BGD and corporate misconduct, consistent with the main findings.

Finally, a two-stage (2SLS) instrumental variable (IV) approach has been adopted to further ensure endogeneity concerns due to reverse causality. Following earlier studies (Gull et al., 2023) two instruments have been used i.e., i) *Women headquarters:* the ratio of female to male directors by headquarter city, ii) *Women peers:* industry peers' average proportion of women directors on board. The 1st stage results presented in Table 6 (Column 3) indicate that the IVs are significantly associated with BGD, confirming the validity of the instruments. The 2nd stage results (Table 6, Column 4) indicate a significant negative association (−1.3992***) between BGD and corporate misconduct, consistent with the main findings.

Table 5
Robustness analyses.

Variables	(1)	(2)	(3)
	Alternate IV	Alternate IV	Alternate DV
	Penalty amount (CM)	*Penalty amount (CM)*	*Penalty number (CM)*
Number of women directors	−0.0703* (-1.72)		
Presence of women directors		−0.2062* (-1.66)	
Proportion of women directors (BGD)			−0.4836*** (-5.39)
Controls	Included	Included	Included
Observations	4671	4671	4671
Industry effects	Included	Included	Included
Year effects	Included	Included	Included
Adj. R^2	0.274	0.277	0.249

This table reports the results of robustness analyses. Columns 1 and 2 present the main analysis results using alternate measures of women directors and Column 3 using an alternate measure of corporate misconduct. *, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively. The t-statistics given in parenthesis are based on standard errors clustered by firm and year. All variables are as defined in Appendix 1.

4.4. Cross-sectional analysis

Prior corporate governance (CG) literature suggests that better CG mechanism leads to improved corporate outcomes including higher profitability and better sustainability management (Nekhili et al., 2021; Shahab et al., 2022). Therefore, this study investigates whether the relationship between women board members and corporate misconduct is affected by firm-level CG quality. For this purpose, two subsamples (high-governance and low-governance firms) are created based on the industry-year average of the CG performance score provided by EIKON. The results presented in Columns 1 and 2 (Table 7) indicate that the impact of women directors is significantly negative (−1.2954**) for low governance firms and insignificant (−0.7244) for high quality governance firms implying a significant impact of women directors in reducing corporate misconduct for firms with poor governance quality. These findings are in line with prior studies suggesting a significant role of gender diversity in corporate outcomes where the governance quality of the firm is poor (Qureshi et al., 2024).

Prior studies also document that stronger external monitoring helps a harmonious alignment of organizational interests with the interests of stakeholders and alleviates organizational legitimacy concerns (Bin-Feng et al., 2022). Therefore, external monitoring is expected to complement the negative association between BGD and corporate misconduct. This study uses the ESG controversies score to divide the sample into higher (lower) media scrutiny. The results presented in Table 7 (Columns 3 and 4) indicate a stronger impact of women directors on corporate misconduct for firms with high media scrutiny (−1.0264***) and insignificant otherwise (−1.1200).

Finally, previous research suggests that firms operating in sensitive industries face higher levels of scrutiny from both regulators and stakeholders (Qureshi et al., 2020). Consequently, firms operating in these industries are likely to be more responsive to legitimacy issues. Therefore, re-estimation was carried out after classifying the sample into sensitive and other industries. The results reported in Columns 5 and 6 of Table 7 indicate that the impact of women directors is highly significant negative (−2.4536***) on corporate misconduct only for the firms operating in sensitive industries and insignificant (−0.2302) for the firms operating in other industries.

Table 6
Addressing endogeneity.

Variables	(1)	(2)	(3)	(4)
	Post-match OLS	System GMM	2SLS	
	Penalty amount (CM)	*Penalty amount (CM)*	*1st stage (BGD)*	*2nd stage (CM)*
Penalty amount $_{(t-1)}$		−0.0604***		
		(-6.77)		
Women headquarters			0.2950***	
			(40.63)	
Women peers			0.2751***	
			(4.30)	
Proportion of women directors (BGD)	−1.1618*** (−3.12)	−2.1430*** (−5.26)		−1.3992*** (−3.26)
Controls	Included	Included	Included	Included
Observations	2702	2983	4671	4671
Industry effects	Included	Included	Included	Included
Year effects	Included	Included	Included	Included
Adj. R^2	0.207	–	0.625	0.273
Kleibergen-Paap rk LM statistic (Underidentification)				461.8
Cragg-Donald Wald F statistic				1948
Kleibergen-Paap rk Wald F statistic ***(Weakidentification)***				865.1
F-stat				89.51
AR(1) p-value		0.000		
AR(2) p-value		0.154		
Sargan p-value		0.007		
Hansen p-value ***(Overidentification)***		0.162		0.608

This table presents the results of several tests to rule out endogeneity concerns. Column 1 reports the results of the post-match OLS regression. Column 2 reports the results of the system GMM estimation. Columns 3 and 4 report the results of the IV-2SLS regression estimates. *Women headquarters* is the ratio of female to male directors by headquarter city and *Women peers* is the industry peers' average proportion of women directors on board. *, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively. The t/z-statistics given in parenthesis are based on standard errors clustered by firm and year. All variables are as defined in Appendix 1.

Table 7
Cross-sectional analysis.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Low Governance	High Governance	Low Media Scrutiny	High Media Scrutiny	Sensitive Industries	Other Industries
	Penalty amount (CM)					
Proportion of women directors (BGD)	−1.2954**	−0.7244	−1.1200	−1.0264***	−2.4536***	−0.2302
	(-2.16)	(-1.28)	(-1.13)	(-3.41)	(-4.75)	(-0.66)
Controls	Included	Included	Included	Included	Included	Included
Observations	1218	1123	403	4268	1527	3144
Industry effects	Included	Included	Included	Included	Included	Included
Year effects	Included	Included	Included	Included	Included	Included
Adj. R^2	0.255	0.315	0.169	0.288	0.268	0.284

This table presents the regression results using sub-samples of firms with high and low governance quality, media scrutiny, and sensitive vs. the rest of the industries. The high governance and media scrutiny subsamples include firms in the top quartile based on the EIKON corporate governance performance score and ESG controversies score by industry-year, and the low governance and media scrutity subsamples include firms in the bottom quartile based on the EIKON corporate governance performance score and ESG controversies score by industry-year. Firms operating in the chemical, metals, mining, oil exploration, paper, petroleum, and electric sectors are included in the sample of environmentally sensitive industries, and the remaining firms are considered in the other industries sample. *, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively. The t-statistics given in parenthesis are based on standard errors clustered by firm and year. All variables are as defined in Appendix 1.

4.5. Mechanism analysis

Previous studies suggest that ESG-linked compensation enhances the sustainability performance of firms (Haque, 2017). Therefore, this study investigates whether ESG-linked compensation provides a mechanism for women directors to reduce corporate misconduct. The study follows the Joint test approach (Qureshi et al., 2024). Under the Joint test, the moderating effect is captured by the sum of the coefficients of BGD and the interaction coefficient [BGD + (ESG compensation x BGD)]. The results of the joint test show a significant negative impact (−0.712*) of BGD on the relationship between ESG compensation and corporate misconduct (Table 8, Column 2), indicating that ESG-linked compensation channels the behavior of women directors to reduce corporate misconduct.

5. Discussion

The study finds a significant economic impact of women directors on corporate misconduct, suggesting that women directors effectively use the impartiality vested in their role as well as their monitoring and social skills, ethicality, and environmental sensitivity to provide 'sentry eyes' to the corporate boards (*upper-echelon theory*), to reduce corporate misconduct that will be beneficial from both ESG and economic perspectives. The study also finds that the reduction in corporate misconduct is completely driven by the independence role of women directors. Hence, an increased number of independent women directors enables the firms to decrease their misconduct. These findings are aligned with the results by Amorelli and García-Sánchez (2020) and *agency theory*.

Regarding the *critical mass* of women directors, the results advocate a substantive (not symbolic) presence of at least three women directors, to effectively influence boardroom behavior and dynamics to make a positive difference. Women directors bring a collaborative social style

Table 8
Board gender diversity, ESG compensation, and corporate misconduct (*Mechanism analysis*).

Variables	(1) Probit	*(2) OLS*
	ESG compensation	*Penalty amount (CM)*
Proportion of women directors (BGD)	0.589***	−1.3378***
	(3.74)	(-3.96)
ESG compensation		0.1414
		(1.01)
Proportion of women directors x ESG compensation		0.6251
		(1.27)
Controls	Included	Included
Observations	4671	4671
Industry effects	Included	Included
Year effects	Included	Included
Adj. (Pseudo) R^2	(0.179)	0.277
Joint test: Proportion of women directors (BGD) + (Proportion of women directors x ESG compensation)		−0.712* (1.68)

This table presents regression results for the relationship between women directors, ESG compensation for executives, and corporate misconduct. *ESG compensation* is a dummy variable coded 1 if the firm has an ESG compensation policy for executives and 0 otherwise. All other variables are as defined in Appendix 1. *, **, and *** represent significance at 0.1, 0.05, and 0.01 levels, respectively. The t/z-statistics given in parenthesis are based on standard errors clustered by firm and year.

but ask tough questions and demand direct answers improving listening, specificity, and content enrichment in the boardroom (Konrad et al., 2008), supplemented by their unique perspectives on strategic issues promote divergent decision-making (Amorelli and García-Sánchez, 2020). Thus, the *critical mass* of at least three women directors is necessary to influence the board dynamics and reduce corporate misconduct.

Further analysis explicates the contours of enabling the corporate ecosystem by suggesting that the 'sentry eyes' of women directors are even more effective for firms with low governance quality, maintaining ESG-linked compensation, subject to high media scrutiny, and operating in sensitive industries.

6. Conclusion

The value maximization objective of the corporates may lure them to misconduct in their business activities, which may provide short-term benefits but may destroy long-term value, and hence "*We draw the line against the misconduct, not against wealth*", quoting Theodore Roosevelt, 26th president of the United States. Corporate misconduct is pervasive and carries exceptionally high financial and non-financial costs for society and the corporates. This study provides two unique contributions: one, it demonstrates that external and internal governance mechanisms can prevent corporate misconduct and consequent financial and reputational damage in the form of imposed penalties; two, it is not the BGD only but the independence of BGD that reduces corporate misconduct. Further, it provides evidence that to be effective a critical mass of three independent women directors is necessary. Finally, the firms with ESG-linked compensation, low governance quality, high media scrutiny, and operating in sensitive industries provide a corporate ecosystem that has a synergetic effect on the attributes of women directors, i.e., collaborative social style, better monitoring, empathy, ethicality, and sensitivity to environmental issues making these 'sentry eyes' even more effective. These findings have policy implications for devising better internal and external governance mechanisms to help reduce corporate misconduct and its negative impact on the economy and society.

The study has limitations, the data for corporate misconduct is based on the deducted cases, so, there is a possibility that the women directors may be helping firms in reducing the deduction of corporate misconduct. Second, the study uses data from U.S. firms only; hence, the results cannot be generalized to other economies. Future research could be carried out using datasets of European or Scandinavian firms, as due to gender quotas these countries have higher women representation on corporate boards and are viewed as less capitalist as compared to the U.S (Qureshi et al., 2024). Further, we restrict our dataset to 2019 to avoid the impact of Covid-19, however, future research may be carried out using more recent data, to investigate the impact of female directors on corporate misconduct during, pre- and post-pandemic years. Moreover, we do not have access to the data regarding the profile or background of women directors as this kind of data may reveal quite interesting findings regarding what drives the women directors' behavior other than their monitoring and ethical attributes. Future research may also be carried out by investigating the impact of the detailed attributes of the women directors.

CRediT authorship contribution statement

Muhammad Azeem Qureshi: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ammar Ali Gull:** Writing – review & editing, Writing – original draft, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Tanveer Ahsan:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A1
Definition of variables

Variable name	Definition	Source
Penalty amount	The natural logarithm of the amount of financial penalties in US dollars imposed by regulatory agencies on firm each year because of its engagement in corporate misconduct activities.	Authors' calculation based on the Violation Tracker database
Penalty number	The natural logarithm of the number of financial penalties imposed by regulatory agencies on firm each year because of its engagement in corporate misconduct activities.	Authors' calculation based on the Violation Tracker database

(*continued on next page*)

Table A1 (*continued*)

Variable name	Definition	Source
Proportion of women directors	The proportion of women directors on the board.	BoardEx
Number of women directors	The number of women directors on the board.	BoardEx
Presence of women directors (BGD)	Dummy variable equals 1 if firm has at least one-woman director and 0 otherwise.	BoardEx
One woman director	Dummy variable equals 1 if firm has one woman director and 0 otherwise.	BoardEx
Two women directors	Dummy variable equals 1 if firm has two women directors and 0 otherwise.	BoardEx
Three women directors	Dummy variable equals 1 if firm has three women directors and 0 otherwise.	BoardEx
Proportion of independent women directors	The proportion of women independent directors on the board.	BoardEx
Proportion of executive women directors	The proportion of women executive directors on the board.	BoardEx
Board size	The natural log of total number of directors on the board.	BoardEx
Board independence	The proportion of independent directors on the board.	BoardEx
Board meetings	The natural log of the number of annual board meetings.	EIKON
CEO-CHAIR separation	Dummy variable coded 1 if the CEO and chairman positions are separate and 0 otherwise.	EIKON
CSR Committee	Dummy variable coded 1 if the company has a separate CSR committee and 0 otherwise.	EIKON
R&D intensity	The ratio of research and development expenditure to sales.	WorldScope
Capital intensity	The ratio of capital expenditure to sales.	WorldScope
Return on assets	Net income divided by total assets.	WorldScope
Tobin's Q	The ratio of the sum of market capitalization and total assets minus the book value of shareholders' equity divided by total assets.	WorldScope
PPE to assets ratio	The ratio of property plant and equipment to total assets.	WorldScope
Cash to assets ratio	The ratio of cash and short-term investments to total assets.	WorldScope
Leverage	The ratio of a firm's total debt to total assets.	WorldScope
Firm size	Natural log of total assets.	WorldScope

Table A2
Post-match sample univariate analysis

Variables	N	Treated	N	Control	Mean differences	t-statistics
Board size (logged)	1350	2.336	1350	2.339	−0.003	−0.38
Board independence	1350	0.818	1350	0.817	0.001	0.24
Board meetings (logged)	1350	2.026	1350	2.022	0.004	0.27
CEO-CHAIR separation	1350	0.723	1350	0.733	−0.010	−0.58
CSR committee	1350	0.448	1350	0.456	−0.008	−0.41
R&D intensity	1350	0.012	1350	0.011	0.001	1.03
Capital intensity	1350	0.093	1350	0.090	0.003	0.45
Return on assets	1350	6.489	1350	6.229	0.260	1.03
Tobins Q	1350	1.791	1350	1.796	−0.005	−0.13
PPE to assets ratio	1350	0.330	1350	0.327	0.002	0.23
Cash to assets ratio	1350	0.084	1350	0.086	−0.002	−0.41
Leverage	1350	0.288	1350	0.283	0.004	0.65
Firm size	1350	16.155	1350	16.187	−0.032	−0.61

This table reports the results of the post-match sample univariate analysis. Treated group consists of firm-year observations with women director(s) on the board and the Control group includes firm-year observations without women directors. *, **, *** Represent significance at 0.1, 0.05, and 0.01 levels, respectively. All variables are as defined in Appendix 1.

Data availability

The authors do not have permission to share data.

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