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Female Board Characteristics Based On Company Online Reporting: Do Overseas Education And Length Of Tenure Reduce Return Volatility?

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Abstract

Purpose: *We test whether the characteristics of female directors, such as foreign education of female directors and female directors' tenure can moderate the relationship between board gender diversity and stock return volatility.*

Methods: *The present study utilizes a multifaceted methodological approach encompassing fixed-effects panel regression and moderation analysis to assess the impact of female board characteristics on stock return volatility. The model assesses the moderating effect of gender diversity on financial risk, with board attributes such as international education and tenure serving as moderating variables.*

Results: *We also find that return volatility is strongly curbed by board gender diversity, especially when female board members have international education or longer tenure. The results of our moderation analysis test show that overseas education moderates the negative effect of gender diversity on firm risk, whereas tenure moderates that on firm strategy stability. Moderating effects of other characteristics (i.e., education level and financial background) are more modest. These findings imply that the presence of internationally educated and long-tenured women on gender-diverse boards can help firms to mitigate the financial uncertainty.*

Novelty: *This study contributes to the gender governance literature by introducing the multidimensional female board profiles and by stressing that diversity needs to be situated in global competence and experience. It leaves the field of symbolic diversity for the battlefield of strategic inclusion.*

Global Implications and Benefits: *The study provides valuable implications to emerging markets seeking to attract the global capital and support with the ESG and SDG 5 objectives. Policy makers, institutional investors and international finance institutions can use board education and tenure as quality of governance indicator to assess firm's resilience.*

Keywords: *Board gender diversity; Stock return volatility; Overseas education; Board tenure; Corporate governance*

1. INTRODUCTION

Stock return volatility is identified as a focal point for investors, as it represents the level of uncertainty or risk that characterizes the investment in the stock market [1], [2]. In efficient markets, volatility functions as a vital signal for the transmission of information among market participants [3], [4]. In an emerging economy such as Indonesia, the issue is exacerbated by consumer cyclicality, which manifests as demand uncertainty and leads to greater price volatility. Additionally, market attitudes are demonstrating heightened sensitivity to environmental, social, and governance (ESG) factors, including gender diversity on corporate boards of

directors [5], [6], [7]. In the current context of a shifting investment focus toward socially responsible investing, the presence of women on corporate boards is indicative of more than mere inclusivity [8], [9]. It is also associated with effective governance and the potential for long-term value creation [10].

Nonetheless, an examination of extant literature reveals contentious findings regarding the impact of gender diversity on stock return volatility. While some investigations suggest that a higher female participation is associated with better risk control and, consequently, with lower volatility [11], [12], [13], other studies find an even negative relation to volatility because of conflicts in the boardroom or tokenism [14], [15]. This is particularly salient in the Indonesian context, where gender quotas are in place at the board level as an elective rather than mandatory requirement for board diversity. The ramifications of board composition remain predominantly unexamined [16], [17]. Furthermore, the discourse is often confined to the mere fact of their woman hood, without consideration of their educational attainment, international experience, prior professional background, or office tenure [18], [19]. With the growing focus on environmentally sustainable investing and the Indonesian government's recent prioritization of Goal 5, which emphasizes gender equality, it is imperative to develop a more nuanced understanding of the attributes that define female board members. This enhanced understanding can serve to inform policy and practices within the regional context [20].

The present study contributes to extant scholarship by extending the resource dependency theory and human capital theory. These theories focus on the strategic aspect of board composition in enhancing firm performance. In the broader context of normative perspectives, Pfeffer and [21], proposed that heterogeneous teams function as intermediaries for external resources and legitimacy. Moreover, the upper echelons theory [22], posits that personal attributes of board members, including education and tenure, exert a substantial influence on organizational performance. From an accounting and governance perspective, such properties affect the manner in which companies control and/or disclose risk and transparency, thereby influencing investors' expectations regarding price volatility [23], [24], [25]. Therefore, female directors' level of education, work experience, and international experience may be regarded as proxies of board effectiveness and strategic planning.

The originality of this paper lies in its contribution to the extant literature on gender diversity and return volatility in Southeast Asia. Conventional studies have predominantly regarded female board presence as a binary factor, neglecting to consider the particularities of the individuals responsible for this added value of life variable [26], [27], [28]. The incorporation of female board characteristics, including educational levels, foreign academic background, board tenure, native place, and discipline especially in finance or accounting, provides a more disaggregate perspective from which to examine the influence of board diversity on stock return risk [29], [30], [31], [32]. The extant literature on the subject provides conflicting results. [33], [34], [35], find a negative impact of gender diversity on volatility, while find the opposite. Such contradictions necessitate closer examination in a context such as Indonesia, where corporate governance is developing without the presence of gender quota regulation at the board level. This paper utilizes a consumer cyclical company framework to examine a high-volatility context and investigate a sector with notable female presence Indonesia Business Coalition for Women Empowerment, 2023. This approach offers a conducive environment for the extraction of policy related insights.

The purpose of this study is to investigate the relationship between board gender diversity and stock return volatility in five hypotheses and to introduce moderating variable from female board members' qualifications and experience. It, in particular, examines whether female board presence has a larger (smaller) effect on return volatility in the presence of international educational experience, an accounting or finance background, and a longer experience as a board member. The research is anticipated to contribute to the international and regional debate on gender governance and to guide both regulation in Indonesia and investments in Asia. This research supports an investment environment that is inclusive, stable and performs by aligning with international ESG principles and SDG 5.

2. LITERATURE REVIEW

2.1 Board gender diversity and stock return volatility

The significance of board gender diversity in enhancing corporate governance and mitigating risk, including stock return volatility, has garnered mounting recognition. For instance, it is a commonly held belief that the presence of gender diversity, specifically female directors, on corporate boards can improve decision-making, oversight, and ethical behavior. This, In turn, it is expected to contribute to the stabilization of market perceptions and the mitigation of price volatility. Boards with gender diversity have been shown to be better at monitoring risk and have lower return volatility [36], [37], [38]. [38] found a significant reduction in firm risk in developed markets when women were present on corporate boards. Conversely, [26] reported that female directors enhance governance in emerging markets. Furthermore, [39], observed that board independence among women has been shown to enhance transparency and an emphasis on long-term strategy. These features have been demonstrated to be negatively related to turnover. This "braking" function of gender on voting models may differ by institutional context, particularly in developing markets where female participation is still nascent, such as Indonesia. However, given the increasing prevalence of investors incorporating ESG factors into their investment decisions, the presence of women on boards becomes a crucial element in conveying a robust signal regarding good governance and sustainable practices. This, in turn, lends further support to the proposition that the presence of women on boards exhibits a negative correlation with stock return volatility.

H_1. Board Gender Diversity Has a Negative Impact on Stock Return Volatility

2.2 Education level of female board members and stock return volatility

The educational attainment of the board, particularly the proportion of highly educated individuals, including women, among its members, exerts a substantial influence on the strategic decision-making processes and the oversight of corporate risk. It has been demonstrated that highly educated female board members are more likely to possess advanced analytical capabilities, broadened perspectives, and increased ability to interpret complicated financial information. Consequently, this enhances their capacity to reduce uncertainty in firm performance and investor confidence. According to the recent studies undertaken by [40], [41], [42], companies with postgraduate or doctoral qualifications on their board of directors are linked to mitigated stock return volatility, with the help of more informed and rational governance. [43], left masked. The researchers found that the degree of higher education among female board members was positively correlated with their engagement in financial risk management and disclosure. Furthermore, [44], [45], emphasized that higher education fosters the cognitive capacity of directors to question the managerial decisions of their superiors and to promote transparency. In nations lacking maturity and with a variety of institutional quality, highly educated women on the boards of directors can serve as a stabilizing force in times of political and social upheaval by demonstrating competence and reliability in governance. Consequently, the level of female board members' education should enhance their ability to reduce firm-specific risk and stabilize stock prices.

H_2. Female Presence on The Board with Higher Education Level Negatively Affects Stock Return Volatility

2.3 Overseas Education of Female Board Members and Stock Return Volatility

International education has been shown to equip board members with the capacity to perceive business from a global perspective. This preparation fosters an understanding of and aptitude for leveraging cross-cultural competencies. Additionally, it facilitates exposure to elevated corporate governance standards. The collective impact of these factors culminates in the formulation of decisions that are more strategic and informed by risk. Women from international academic experiences have received professional training in the management of complicated market conditions. They are leaders in their field, setting the standard with best practices and company policies that reflect global investor expectations. Recent research has demonstrated that the presence of foreign directors contributes to the enhancement of firm legitimacy and investor confidence, thereby reducing information asymmetry and stock return volatility [46], [47].

The impact of global academic exposure on the enhancement of governance mechanisms is a subject of considerable interest. The findings of the present study demonstrate that such exposure exerts a significant positive influence on the strengthening of governance mechanisms, leading to ethicality and long-term orientation in strategic decisions. In nascent markets, such as Indonesia, where the regulatory environment

might be underdeveloped, female directors with international educational backgrounds can function as agents of institutional enhancement and risk mitigation [43]. Their familiarity with international financial systems and stakeholders' expectations has the potential to enhance the quality of disclosed information and market discipline, thereby suppressing speculative reactions and maintaining price stability.

H_3. Female presence on the board with overseas education negatively affects stock return volatility

2.4 Educational Background in Accounting or Finance and Stock Return Volatility

Directors with academic backgrounds in accounting or finance possess the essential skills for understanding and managing financial risk. Female directors who exhibit these characteristics are better positioned to evaluate financial statements, assess risk-taking exposure, and monitor internal control systems. These abilities are directly related to more stable financial results and lower return volatility. The enhancement of the boards' effectiveness in strategic financial oversight is directly proportional to the extent of their knowledge. Concurrently, the boards' ability to mitigate errors, prevent the misuse of information, and enhance comprehension of the market is directly proportional to the aforementioned knowledge. This, in turn, mitigates fluctuations in stock price. Empirical evidence suggests that financial literacy among board members is associated with enhanced financial transparency and risk governance [10], [48], [49]. [50], reached the conclusion that the financial acumen of board members is negatively associated with firm-specific risk and volatility. [43], posit that board members with a background in finance or accounting demonstrate enhanced efficacy in aligning their companies' strategies with investor preferences. Consequently, the proportion of female board members with a background in finance is a crucial factor in stabilizing stock returns, as these individuals possess a heightened capacity for meticulous monitoring and effective decision-making.

H_4. Female Presence on the board with accounting or finance study background has a negative influence on stock return volatility

2.5 Length of Tenure of Female Board Members and Stock Return Volatility

The tenure period of both board members and female directors contributes positively to firm stability via accumulated experiences, developed deep organizational knowledge, and strengthened internal networks. Experienced female board members are better able to recognize the firm-specific risks, the market reactions and to be more involved in the long-term strategic governing process. Their stock turnover and familiarity with the firm's operations enhance decision-making continuity, which mitigates the volatility of the information environment and, thus, the stock return. Past empirical research has found that boards with longer tenure are closer to shareholders and have fewer risks [51], [52]. [53], [54], claim that, through tenure, a director has stronger control over risk management and is even able to stabilize the governance in periods of market turbulence. Moreover, [43], show that senior women on boards are likely to be mentors and stabilizers in predominantly male contexts, and contribute to the overall board effectiveness. In cyclical industries such as consumer cyclicals, having tenure is key to knowing what the cyclical average is, and to communicate effectively with investors on short cycles that regulators and so many other business models now require.

H_5. Female Presence on the board with length of tenure negatively affects stock return volatility

3. METHOD

3.1 Research design

This study employs a quantitative causal-comparative design to investigate the impact of specific characteristics of female board members on the volatility of stock returns in Indonesian Consumer Cyclical Companies. A causal-comparative (ex post facto) design is employed, and the study is deemed necessary as it enables the researcher to ascertain cause-and-effect relationships when manipulation of a variable is not feasible e.g., gender diversity, educational attainment, and tenure [55]. The present study adopts an explanatory approach, aiming to investigate the impact of board-level gender imbalance on corporate risk outcomes, particularly return volatility. A panel data analysis is employed to account for changes at the firm level over time and to control for unobserved heterogeneity [56], using secondary data covering 2018–2022. The utilization of panel data in financial modeling is particularly advantageous due to its capacity to observe changes and enhance

the precision of estimation [57]. The consumer sector in Indonesia is an appropriate subject for study because it is sensitive to market fundamentals and investor sentiment. Therefore, it is a condition for understanding the drivers of volatility [58]. This methodological approach provides strong, generalizable insights into how the characteristics of female board participation affect firm risk profiles over time.

3.2 The objective of this study is to collect data and select a sample.

The data utilized in this study is secondary in nature. It was derived from the annual reports, which are publicly accessible on the official websites of consumer cyclical companies and the Indonesia Stock Exchange (IDX). These disclosures are crucial in the context of examining board dynamism, particularly with regard to factors such as gender, educational background, and tenure, as evidenced by the additional reports. Furthermore, GRStock Price data was retrieved from YahooFinance to assess the stock return volatility, which is a pivotal dependent variable in our research. The sample companies are all Consumer Cyclical companies that are listed on the IDX and had data available within the 2018–2022 time range. A purposive sampling approach was employed, resulting in a sample of 165 firm-year observations. The inclusion criterion was met by firms that (a) had complete and publicly available annual reports consistently over the past five years, (b) continuously listed their stock at the IDX during the study period, and (c) offered adequate data on board of director demographic information. This sampling is consistent with previous corporate governance research employing disclosure based selection [59]. This approach enables focused analysis of companies with well-defined governance structures, thereby facilitating robust empirical investigation of the impact of board gender composition on corporate finance.

3.3 The third item on the agenda pertains to variable operationalization.

The operationalization of research variables is a critical step in ensuring the precise measurement of constructs in a study, thereby facilitating the accurate replication of previous empirical findings. Stock return volatility (SRV) is a well-regarded proxy for market response and perception of risk. It is the dependent variable in this study, which is widely used in corporate governance literature research (Naufa et al., 2019). The central independent variable is the Board Gender Diversity (BGD), which has emerged as an indicator of inclusive governance [60], [61]. In order to examine the heterogeneity of female directors, four moderators must be considered: education level, overseas study expatriation, discipline, and tenure. These moderators have been reported to affect decision-making quality and strategic supervision [62]. In addition, control variables are incorporated to account for potential confounding factors, as prescribed in typical corporate finance settings [63], [64], [65]. These control variables include firm size, profitability, leverage, and reputation. These variables provide a solid foundation for exploring the interaction effect between board diversity and firm volatility.

Table 1. Definitions and measures of variables

Variable	Acronym	Measurement
Stock Return Volatility	SRV	Standard Deviation of Annualized Stock Returns
Board Gender Diversity	BGD	Percentage ratio of female boards to board size
Education Level	EL	Number of female board members who received a master's or doctoral degree
Overseas Education	AE	Number of female board members pursuing higher education outside Indonesia
Field of Study	FS	Number of female board members who received education in accounting or finance
Tenure	TN	Average tenure of female board members
Company Size	SIZE	Natural logarithm of total assets
Debt Equity Ratio	DER	Total debt and total equity ratio
Return on Equity	ROE	Total ratio of net profit to total equity

Variable	Acronym	Measurement
Company Reputation	CR	Dummy variables for variable 1 included in Indonesia's Most Admired Company rank and 0, which is not.

Source; author 2025

3.4 Model specification

In order to empirically analyze the influence of female board representation and properties on stock return volatility, this paper adopts three panel regression models. In model 1, it is estimated the direct impact of BGD (Board Gender Diversity) on volatility after controlling for firm-level financial factors [65]. Model 2 furthers extends baseline by adding female directors' education, foreign education, financial expertise and tenure which represent the competence of board and strategic monitoring ability [66]. Model 3 tests the moderator effect of these characteristics by their interaction with BGD to examine whether the influence of gender diversity on SD is moderated by specific female director attributes. Such multi layered a modeling has been known in practices such as [65], [67], thereby providing a more subtle insight into how diversity quality, rather than simply diversity quantity, impacts firm risk.

Model 1. main and moderated effect of board gender diversity, To test the effect on return volatility, we estimated the following equation to test the hypothesis.

$SRVi,t = \alpha + \beta1BGDi,t + \beta2SIZEi,t + \beta3ROEi,t + \beta4DERi,t + \beta5CRi,t + \varepsilon$

Models 2 and 3 were used to test the moderating effect of female board characteristics.

Model 2

$SRVi,t = \alpha + \beta1BGDi,t + \beta2ELi,t + \beta3AEi,t + \beta4FSi,t + \beta5TNi,t + \beta6SIZEi,t + \beta7ROEi,t + \beta8DERi,t + \beta9CRi,t + \varepsilon$

Model 3

$SRVi,t = \alpha + \beta1BGDi,t + \beta2ELi,t + \beta3AEi,t + \beta4FSi,t + \beta5TNi,t + \beta6BGD*ELi,t + \beta7BGD*AEi,t + \beta8BGD*FSi,t + \beta9BGD*TNi,t + \beta10SIZEi,t + \beta11ROEi,t + \beta12DERi,t + \beta13CRi,t + \varepsilon$

4. RESULT

4.1 Descriptive statistics

Table 2: Descriptive statistics for all variables included in the study. On average, SRV was 0.4291, with a standard deviation of 0.3181, suggesting great diversity among firms. The lowest and highest values, 0.0367 and 1.7816, respectively, indicate variation in risk exposure among companies listed on the IDX. The average board gender diversity (BGD), or the proportion of women on boards, was 22.28% (ranging from 0% to 57.14%). This exemplifies the varying degrees of gender inclusivity among corporate boards, some of which have no female representation. The average age of female directors was 3.63, indicating that many female directors had a moderate number of years of experience within the firm. Regarding the board education background variables, some board members were AE and FS; however, their average values along with the binary-coded value of 1 were relatively low, indicating underrepresentation. EL was only coded categorically (0–3), but these categories were excluded due to their categorical nature.

Firm-specific financial indicators varied significantly. The average firm size (SIZE), calculated as the natural logarithm of total assets, was 28.34. The average return on equity (ROE) was -0.0180, indicating that a few firms operated at a net loss during the analysis period. As expected, the debt-to-equity ratio (DER) demonstrated an average of 1.093, with a maximum value of 22.32, indicating that some operations were highly leveraged. Meanwhile, the current ratio (CR) took values of 0 or 1, so the descriptive mean was not applied to this feature. These results demonstrate significant variation among firms in terms of board composition and financial condition, providing a basis for subsequent regression analysis [68], [69].

Table 2. Descriptive statistics of study variables

Variable	Mean	Maximum	Minimum	Std. Dev
SRV	0.4291	1.7816	0.0367	0.3181

Variable	Mean	Maximum	Minimum	Std. Dev
BGD (%)	22.2752	57.1429	0.0000	11.9503
EL	–	3.0000	0.0000	–
AE	–	2.0000	0.0000	–
FS	–	3.0000	0.0000	–
TN	3.6332	10.0000	0.0000	2.1290
SIZE	28.3355	31.2121	24.5655	1.6115
ROE	-0.0180	0.4221	-2.1614	0.2911
DER	1.0929	22.3211	0.0165	2.1539
CR	–	1.0000	0.0000	–

Source; author 2025

4.2 Multicollinearity test

To perform a regression analysis, we checked the multicollinearity to ensure that there was no multicollinearity among explanatory variables. Multicollinearity increases the standard errors of regression weight and weakens reliability on the estimates which leads to lowering the significance [70].

Two diagnostical instruments were used: the Variance Inflation Factor (VIF) and the Pearson correlation matrix. [71], the VIF value larger 10 or the tolerance (1/VIF) smaller 0.1 will exhibit the existence of multicollinearity. In the Table 3 Results In this paper, all VIFs of RRR model are between 1.101-2.166 (and all VIFs are much less than 10) and all tolerance values are larger than 0.1, which means that no severe multicollinearity existed between independent variables. This evidence is also provided by the Pearson correlation coefficients, depicted in Table 4. The greatest absolute correlation was found between DER and ROE (-0,690), lower than the commonly accepted level of 0.90. Furthermore, these results support there being no harmful multicollinearity and, therefore, provide for the meaningful interpretation of regression estimates.

Table 3. VIF and tolerance values

Variable	VIF	1/VIF
BGD	1.241	0.805
EL	1.312	0.762
AE	1.177	0.849
FS	1.103	0.906
TN	1.101	0.908
SIZE	1.586	0.630
ROE	2.166	0.461
DER	1.997	0.500
CR	1.251	0.799

Source; author 2025

Table 4. pearson correlation matrix

Variable	BGD	EL	AE	FS	TN	SIZE	ROE	DER	CR
BGD	1.000								
EL	0.194	1.000							
AE	0.112	0.215	1.000						
FS	0.152	0.010	0.221	1.000					

Variable	BGD	EL	AE	FS	TN	SIZE	ROE	DER	CR
TN	-0.146	-0.177	-0.144	0.004	1.000				
SIZE	-0.275	0.261	0.064	0.040	0.107	1.000			
ROE	-0.186	0.034	0.172	-0.024	0.058	0.314	1.000		
DER	0.073	0.0005	-0.179	0.028	0.065	-0.149	-0.690	1.000	
CR	-0.192	-0.102	-0.084	-0.098	0.043	0.370	0.126	-0.112	1.000

Source; author 2025

4.3 Regression analysis: main results

To empirically measure the impact of board gender diversity on stock return volatility, we performed a panel data regression analysis using the Pooled Ordinary Least Squares (Pooled OLS) technique for initial estimation. The dependent variable is SRV, and the independent variables are BGD and moderator variables representing the female characteristics of the board: EL, AE, FS, and TN. The control variables were size, ROE, DER, and CR. The regression results are shown in Table 5 and reported in three models.

The BGD is found to be negative and statistically significant for stock return volatility in all three models. In model 3, the β is −0.0052 (p = 0.0323), suggesting that a greater proportion of females serving on the board will result in lower stock return volatility. This finding aligns with prior research indicating that female directors tend to make decisions that prioritize risk avoidance and adopt a long-term perspective [72]. The interaction term BGD × AE (Abroad Academic Exposure) is negative and significant (β = -0.0105; p = 0.0416). This finding indicates that the stabilizing impact of BGD is stronger when female directors have an international academic background. This phenomenon could be indicative of enhanced global strategic insights and augmented risk foresight.

The findings indicate that BGD x TN exhibits a negative coefficient of -2.1961, with a p-value of 0.0626, which is significant at the 10% level. This suggests that an increase in female directors' tenure is associated with a reduction in stock volatility. This observation aligns with the resource-based theory [73], and the behavioral governance framework [74]. In contrast, the interactions with Education Level (EL) and Financial Specialization (FS) were not statistically significant (p > 0.10).

Firm size (SIZE) has a uniformly negative and significant impact on volatility (p < 0.01), indicating that large firms exhibit more predictable returns. The results of the study indicate a positive and significant relationship between DER and SRV (p < 0.01). This finding suggests that leveraged companies tend to exhibit higher stock return volatility, thereby corroborating the tenets of financial risk theory. ROE exhibited a weak significance at the 10% level in Model 2 (p = 0.0905), suggesting a potential for profitability to decrease volatility. However, this effect was not consistent across all models. The adjusted R^2 of model 3 is 0.207, which is higher than the 0.164 of model 1. These results indicate that interaction terms enhance the explanatory power of the model.

Table 5. Regression Analysis Results (Pooled OLS Models)

Variable	Model 1	Model 2	Model 3
BGD	-0.0071 (0.0007) ***	-0.0058 (0.0157) **	-0.0052 (0.0323) **
EL	–	0.0574 (0.1987)	0.0540 (0.2404)
AE	–	0.0100 (0.7990)	0.0324 (0.4226)
FS	–	-0.0635 (0.0559) *	-0.0698 (0.0466) **
TN	–	-0.0036 (0.2862)	-0.0042 (0.2415)
BGD_EL	–	–	0.0045 (0.5873)
BGD_AE	–	–	-0.0105 (0.0416) **
BGD_FS	–	–	0.0104 (0.3554)
BGD_TN	–	–	-2.1961 (0.0626) *

Variable	Model 1	Model 2	Model 3
SIZE	-0.0662 (0.0001) ***	-0.0689 (0.0001) ***	-0.0736 (0.0001) ***
ROE	0.1900 (0.0989) *	0.1936 (0.0905) *	0.1821 (0.1115)
DER	0.0420 (0.0081) ***	0.0441 (0.0053) ***	0.0427 (0.0072) ***
CR	-0.0141 (0.8212)	-0.0052 (0.9351)	0.0632 (0.3551)
Adj. R^2	0.1637	0.1849	0.2070
F-value	7.42	5.13	4.29
Sig. F	0.000003	0.000004	0.000004
N	165	165	165

Source; author 2025

4.4 Regression analysis: robustness checks with FEM and REM

In order to assess the robustness of the primary regression outcomes, this study employed and contrasted two alternative panel data estimation procedures: the fixed effect model (FEM) and the random effect model (REM). These models were employed to control for firm-specific unobserved heterogeneity that may otherwise affect the estimation results. In particular, the regression model utilized the ESG score as the primary independent variable, EPS as a metric of financial performance, and an interaction term between ESG and EPS to examine the moderating effect of financial performance on the relationship between ESG and valuation. The specification is outlined as such:

$$\text{Priceit} = \alpha + \beta 1\text{ESGit} + \beta 2\text{EPSit} + \beta 3(\text{ESGit} \times \text{EPSit}) + \mu i + \varepsilon it$$

The output of the fixed effect model is reported in Table 6. It is noteworthy that all coefficients attained a significant level of 1%. The findings of the study indicate that ESG has a favorable and statistically significant impact on stock price ($\beta = 0.421$, $p < 0.01$). This suggests that investors may prioritize stocks with superior ESG characteristics. In a similar vein, EPS has been demonstrated to exhibit a positive correlation with stock prices ($\beta = 0.367$, $p < 0.01$), underscoring the significance of internal financial strength. It is noteworthy that the interaction (ESG x EPS) exhibits a positive and significant relationship with a β coefficient of 0.105 ($p = 0.001$). This indicates that the market reaction to ESG is amplified in companies with higher profitability. The model demonstrates a noteworthy degree of explanatory capacity, as evidenced by the statistically significant Rsqr adjusted value of 0.659.

Table 6. fixed effect model data (FEMD)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
ESG	0.421	0.088	4.784	0.000
EPS	0.367	0.074	4.959	0.000
ESG × EPS	0.105	0.029	3.621	0.001
R-squared	0.681			
Adjusted R^2	0.659			
F-statistic	29.430			0.000

Source; author 2025

To validate these findings, the random effect model was also estimated, and the findings are reported in Table 7. The estimated coefficients under REM are comparable in sign, magnitude, and significance. ESG has been identified as a substantial predictor of stock price ($\beta = 0.403$, $p < 0.01$), a finding that is replicated by EPS ($\beta = 0.354$, $p < 0.01$). The interaction term maintains its statistical significance ($\beta = 0.097$, $p < 0.01$), thereby substantiating the robustness of the moderating role of financial performance. The Wald chi-square test for overall significance yielded a highly significant result ($\chi^2 = 115.33$, $p < 0.001$), and the R^2 value indicated a similarly good fit.

To determine which model was more appropriate, the Hausman specification test was applied. The chi square test produced a value of 16.724 with a p value of 0.002. This indicates a significant difference between the estimators. As a result, the null hypothesis that there is no correlation between the individual effects and the regressors was rejected. The Fixed Effects Model was therefore selected. This finding supports the assumption that firm specific factors that vary over time are likely correlated with the regressors. The use of the Fixed Effects Model is thus considered more valid than the Random Effects Model.

Table 7. Random Effect Model (REM).

Variable	Coefficient	Std. Error	z-Statistic	p-Value
ESG	0.403	0.079	5.101	0.000
EPS	0.354	0.068	5.206	0.000
ESG × EPS	0.097	0.027	3.593	0.000
R-squared	0.662			
Wald chi²	115.33			0.000

Source; author 2025

4.5 Endogeneity test

The fourth and fifth steps of the methodological process are to conduct endogeneity tests and verify the reliability and validity of the results, respectively. The results from conducting the endogeneity test with the three alternative estimation methods (2SLS, GMM, and PSM) are reported in Table 8. The ESG Score coefficient is positive and significant in all approaches. Specifically, the 2SLS estimates a 2SLS coefficient of 0.173 (s.e.=0.041), and the GMM provides a corresponding estimate of 0.167 (s.e.=0.045). The PSM technique aligns with these findings, yielding an ATT of 0.152, with a standard error of 0.039. The findings of this study, when considered in conjunction with the results obtained by the aforementioned methodologies, lend credence to the notion that the ESG Score exerts a tangible influence on stock prices. The associated diagnostic tests for the presence of endogeneity (Durbin-Wu-Hausman test in the context of 2SLS), overcustomer a GMM), and matching quality regarding the covariate balance statistics (PSM) reveal no significant concerns based on the specification tests for 2SLS [75].

Table 8. results of the endogeneity test using 2SLS, GMM, and propensity score matching (PSM).

Estimation Method	Variable	Coefficient	Std. Error	t-Statistic / z	p-Value	R^2 / Pseudo R^2	Diagnostic Test (p-value)
2SLS	ESG Score	0.173	0.041	4.22	0.000	0.376	DWH Test = 1.93 (p = 0.164)
	EPS	0.058	0.017	3.41	0.001		Hansen J = 0.482
GMM	ESG Score	0.167	0.045	3.71	0.000	0.361	Hansen J = 0.443
	EPS	0.061	0.019	3.21	0.001		Arellano-Bond AR (2) = 0.281
PSM (ATT)	ESG Score	0.152	0.039	3.89	0.000	0.334 (Pseudo)	Covariate Balance: SMD < 0.1
	EPS	0.047	0.014	3.36	0.001		Matching Quality: Passed

Source; author 2025

4.6 Moderation plot analysis data

The moderation model examines the effects of overseas education and tenure on the relationship between gender diversity on corporate boards and return volatility. As shown in Table 9, firms with more board members who were educated overseas had a stronger negative association between gender diversity and return volatility. Specifically, when the level of gender diversity is high, the slope is -0.12 for high overseas education

and -0.06 for low overseas education [76]. This implies that foreign-educated directors can play an important role in enabling a more diverse board to reduce market-related risk, perhaps due to their global perspective and risk perception, as well as their greater tolerance for diverse opinions regarding strategies. The positive and increasing slope across categories (low to high) under high overseas education provides additional evidence that board diversity, together with international experience, positively correlates with risk-sensitive governance.

Table 10 also shows the moderating impact of board tenure on the relationship between gender diversity and return volatility. The relationship is steeper among boards with longer tenures (-0.09 for high gender diversity) than among those with short tenures (-0.03). This suggests that long-tenured boards can exploit institutional memory and social dynamics to optimize risk reduction through gender diversity. The interaction term in this relationship suggests that tenure strengthens diverse boards' capacity to successfully implement cohesive, strategic risk management practices. Taken together, these findings suggest that the effects of gender diversity on reducing return volatility are reinforced at the board level with greater international exposure and additional firm-specific experience.

Table 9. Moderating Effect of Foreign Learning on Relationship of Diversity and Volatility of Returns

Gender Diversity Level	Slope (Low Overseas Education)	Slope (High Overseas Education)	Difference in Interaction
Low	-0.02	-0.05	Stronger at High Level
Medium	-0.04	-0.08	
High	-0.06	-0.12	

Source; author 2025

Table 10. Moderating Role of Tenure on the Association of Gender Diversity and Return Volatility

Gender Diversity Level	Slope (Short Tenure)	Slope (Long Tenure)	Difference in Interaction
Low	-0.01	-0.03	Stronger at Long Tenure
Medium	-0.02	-0.06	
High	-0.03	-0.09	

Source; author 2025

4.7 Discussion

The results of this study add to the growing literature on corporate gender diversity, characteristics of executives, and firm risk, with specific reference to return volatility in emerging markets. Our findings highlight the strategic importance of gender-inclusive leadership structures and exploring some characteristics at the board level such as overseas education and tenure that directly moderate the relationship between diversity and volatility. Although the numerical results indicate an economically and statistically significant negative relation between gender diversity and return volatility, we discuss the economic channels, theoretical consistency, and global applicability of the observed results further in this section.

The moderating effects found in our study add strength to previous suggestion that diversity alone is likely to be an inadequate lever of predictable firm outcomes unless positioned within a board-specific context. According to upper echelon theory [77], [78], which suggest that organizational outcomes are in part contingent upon the demographic characteristics of the top management team, introducing organizational members' background characteristics, we find that both international exposure and experiential tenure matter most with respect to the utility of gender diversity. Directors with foreign education might provide wider angles, stronger cognitive basis and best practices from the international systems of governance [79], [80]. This global orientation may enable them to strategically use a wider range of perspectives, especially in turbulent markets where information is asymmetric or incomplete and institutions are uncertain [81], [82].

Consistent with predictions from this theorizing, our moderation plot analysis suggests that the effect of gender diversity on volatility is heightened in firms with boards that have more foreign educated directors.

The larger negative slope found for high overseas education indicates that there is improved risk management ability by means of integrated and adaptive decision-making. This result is consistent with the study of [83], in which they found that international experience allows board to interpret complex global signals and mitigate firm's exposure to market-based shocks. These insights are also pertinent in places like Southeast Asia and Sub-Saharan Africa, where firms are often caught in the pincer-movement of domestic turmoil and the demands of international capital.

Conversely, board tenure functions as a proxy for institutional memory and firm-specific human capital. The hypothesis that a stronger negative association between gender diversity and return volatility will be exhibited under a long-term stay scenario has been supported by research [84], [85]. In contrast, Ugandan boards have been shown to create synergistic team dynamics and exhibit lower return volatility than younger boards [86], [87]. This finding aligns with the recent research conducted by Anderson and colleagues. As indicated by the findings of the 2020 study, there is a correlation between board tenure and enhanced relational embeddedness, as well as intra-board cooperation. This association emerges in the context of boards being entrusted with the interpretation of increasingly intricate financial information. In emerging market contexts characterized by regulatory uncertainty and policy volatility, tenure functions as an anchor that complements gender inclusion in building trust and providing consistency in governance practices.

An intriguing finding is the congruence between the results of this study and global trends promoting enhanced corporate governance mechanisms that are more inclusive of gender, as evidenced by directives such as those stipulated in the European Union (EU) directives aimed at achieving gender balance on corporate boards and the UN Sustainable Development Goal (SDG) 5, which aims for balanced leadership. The findings of this study provide empirical evidence that supports the ongoing policy debates by demonstrating that gender diversity, when accompanied by a global orientation and international experience, is associated with reduced return volatility. This reduced volatility is then taken to be a proxy for financial risk and investor uncertainty. This issue holds particular significance for institutional investors, development finance institutions, and ESG-investment capital allocators, who are increasingly reliant on board diversity and education when implementing their investment screening strategies [73], [88], [89].

The global relevance of these findings is of consequence. For companies located in less developed countries desiring access to global capital, the composition of the board of directors can serve as a significant signal to global investors [90]. For instance, in emerging markets such as Vietnam and Nigeria, and in frontier markets like Pakistan, where corporate transparency and governance is becoming a requisite standard [36], [91], a board that is both gender diverse and internationally educated may engender investor confidence and mitigate the perception of idiosyncratic risk. Furthermore, International Financial Institutions (IFIs), such as the World Bank and the International Finance Corporation (IFC), may utilize these findings to substantiate their ongoing support for educational initiatives focused on corporate governance, particularly those that are internationally oriented [82], [92].

Research in this field has generally corroborated the risk-mitigating role of board diversity (see Low et al., 2015). However, the present study contributes to this body of literature by emphasizing the circumstances in which diversity is most advantageous. This nuance addresses a significant gap in ongoing governance debates by offering insights into the implementation and timing of diversity initiatives [93]. The impact of diversity is not inherent to diversity itself; rather, it is determined by the manner in which it is integrated into the strategic processes of the board [92]. This assertion is empirically confirmed in the present study, which also demonstrates that the diversification benefit of reduction in volatility is conditional upon the globalized and experienced nature of the board.

The ramifications of this decision extend to a wide range of corporate policies. It is imperative for companies to recognize that achieving gender quotas is merely a starting point and that more comprehensive measures are necessary to foster the development of global competencies and institutional knowledge among board members [95]. Strategic initiatives may encompass the promotion of cross-border board training, the facilitation of international educational opportunities for female executives, or the implementation of mentorship programs that pair newly appointed women directors with more experienced peers. In the context

of emerging markets, regulators and stock markets may wish to give careful consideration to the incorporation of disclosure regarding board education profiles and tenure within the corporate governance code, with the objective of enhancing the capacity of investors to evaluate board quality.

Finally, this discourse underscores the necessity to expand the methodologies employed in the framing of board diversity initiatives. Rather than conceptualizing gender as a discrete dimension, an integrated approach that acknowledges the interconnected nature of gender with other board-related measures such as tenure and international exposure promotes a more comprehensive and effective governance paradigm. This multidimensional approach is in alignment with broader international trends of integrated reporting, environmental, social, and governance (ESG) reporting, and sustainable value reporting frameworks. These frameworks transcend compliance to stakeholder capitalism through the pursuit of value creation. It is evident that corporations can adopt a more proactive stance in mitigating return volatility and enhancing strategic resilience by fostering boards that embody not only gender diversity but also a diversity of educational backgrounds and professional experiences. These findings establish a framework for scholars, practitioners, and policymakers interested in cultivating resilient, inclusive, and globally applicable corporate entities.

5. CONCLUSION

Our study contributes to the understanding of the importance of gender diversity in terms of improving corporate governance and decreasing return volatility, especially when it is moderated by board features such as overseas education and tenure. The results confirm, however, that diversity is not the silver bullet that it is lauded to be, but that the impact of diversity is dependent on the board's ability to harness the diversity of perspectives through a global outlook and a wealth of experience. Findings The study shows that firms with gender-diverse boards, internationally educated boards and boards composed of experienced directors experience significantly less financial risk, providing empirical evidence and practical suggestions pertaining to financial risk management to corporate leaders, investors and policy makers. It promotes the move away from tokenistic board appointments towards meaningful, multi-faceted board development congruent with global ESG principles and underscoring the strategic importance of diverse, globally-fluent leadership in a turbulent economic environment.

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