

HOW DOES BOARD GENDER DIVERSITY DRIVE THE ESG PERFORMANCE-CASH HOLDINGS RELATIONSHIP? EVIDENCE FROM INDIA

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Abstract

The purpose of this paper is to explore how gender diversity in the board influences the relationship that exists between environmental, social and governance (ESG) performance and corporate cash Holdings among Indian listed firms between 2012 and 2023. We observe the correlation between the ESG performance and cash Holdings is positive. With the help of the critical mass theory, the research recognizes that gender diversity of the board moderates the connection between ESG performance and cash holding. The study concludes that the positive relationship exists between the ESG performance and cash Holdings. In addition, we found out that gender diversity on the board is a key determinant of the association between ESG performance and cash holdings. The greater the variety of the board the greater the positive effect of ESG on cash Holdings. Such findings make it possible to conclude that the connection between the ESG performance and the cash holdings is complicated and changing. As a result of the study, we can learn more about the complexity of the ESG issues and how it impacts financial strategies of companies.

Keywords: ESG Performance; Cash Holdings; Board Gender diversity

1. Introduction

The ESG performance or the commitment of a company to sustainable, ethical and responsible operations, is an important indicator of interest to stakeholders across the globe (Ahmed et al.,

2024). Increasingly, stakeholders consider values more important, making organizations with strong ESG performance more sustainable and reliable and, therefore, more popular (Amin et al., 2024; Beloskar & Nageswara Rao, 2024). This trend is influencing business strategy, and it is having an impact on cash policies (Z. Chen & Xie, 2022). The relationship between ESG performance and cash hold level of the company is gaining interest, particularly with respect to investment and liquidity decisions. According to S. Chen et al., (2023), this phenomenon can be explained by the growing interest of investors in ESG, regulatory demands, and the need to be sustainable in the long term (Chu et al., 2025; Ebaya et al., 2024; Hui et al., 2024). The correlation between ESG performance and cash Holdings is a significant research domain. This interaction is complex, shaped by legal frameworks, financial limitations, and industrial dynamics (Omura et al., 2021). Corporate cash policy is associated with agency difficulties (Fama & Jensen, 1986), while ESG variables function as monitoring tools (Maniora, 2017). The literature findings are inconsistent on the impacts of ESG on the cash holding, which helps to understand the necessity of further research in this area (Atif et al., 2019; Atif et al., 2022; Liu et al., 2023; Zhang & Liu, 2022). Gender diversity of the board is one of the most crucial and least investigated characteristics. Female directors complement the governance and decision-making and social corporate responsibility which can influence environmental, social, and governance practices and cash Holdings (Atif et al., 2019; Tosun et al., 2022). The knowledge of how the gender diversity in the Board can influence the correlation between ESG and cash holding, especially in the less-developed countries is absent in the body of knowledge (Shakil, 2021). India can be an interesting context of such research because it has had a significant economic growth, commitment to sustainable development, and governmental influence on corporate affairs is particularly significant (Qiang, 2003; Tang et al., 2024; Wang et al., 2018). In the post-2018 period when it was added to the MSCI index, ESG became applicable to Indian corporations in resolving the issues of climate change and in attaining the appropriate cash Holdings (He et al., 2022). Vibrancy of the Indian market and India being a leading emerging market provides a rich setting to study the effects of gender diversity on the board on the relationship between ESG performance and cash holdings (Kyaw et al., 2022; Tan & Zhu, 2022).

In this paper, the effect of ESG performance on cash Holding in Indian companies and the impact of Board gender diversity on the same are evaluated. With unbalanced panel data, using 1,480 firm-years between 2012 and 2023 and more advanced econometric analyses, we find that there is a positive link between ESG performance and cash holding. This is made even better in the event that the Board is more gender diverse. These numbers demonstrate the unstable character of the connection between the ESG factors and cash holding that differs in accordance with the corporate characteristics. In some spheres, such a study will contribute a lot to the literature and practice. The paper has offered contribution to the sustainability literature because it has taken a keen interest in the relationship between the ESG performance and cash Holdings of the companies, given the multifaceted impact of gender diversity on the board. This approach will add to the existing knowledge and cover the gap identified by Nasr et al. (2020) and Li et al. (2022) that provide an in-depth understanding of the impact of gender diversity on the corporate board on ESG-related financial performance. Second, it provides new knowledge on ESG practice integration and its impact in emerging markets based on India as a case study to generalize the findings to similar countries (Z. Chen & Xie, 2022). Third, the article also adds to the knowledge of the economic impact of the ESG practices on cash Holdings and presents the real facts and discourses of the different factors. Fourth, it also supplements the corporate finance literatures on gender diversity, including by demonstrating the critical mass theory and highlighting the

tremendous financial implications of female representation in the boards (Amorelli & García-Sánchez, 2021). The practical implications of the paper can be used in business strategy and policy because it addresses the valuable information about the economic advantages of the firms improving their ESG practices and the significance of gender diversity in governance, and can therefore present the policymakers and regulatory bodies with the knowledge needed in establishing the governance mechanisms of sustainable development and financial stability. The document is organized as follows: Section 2 examines the literature and formulates hypotheses. Section 3 delineates the methodology, sample selection, and data sources. Section 4 presents empirical findings. Section 6 addresses consequences, policy recommendations, and conclusions.

2. Literature Review and Hypothesis Development

2.1 Agency Theory and ESG Performance

The agency theory can be used to explain the correlation between corporate governance tools, such as ESG performance, and cash holdings. As the agency theory states, conflicts between the managers and shareholders may result in agency costs, such as inefficient cash management (Ahmed et al., 2024; Elsayed & Elshandidy, 2021). Managers may hoard cash for personal security or to fund projects that enhance their power rather than maximizing shareholder value (Fama & Jensen, 1986). ESG performance can play a dual role in this context.

Strong ESG performance may serve as a governance mechanism that aligns the interests of managers and shareholders. Companies with robust ESG practices often demonstrate higher transparency, accountability, and ethical standards, mitigating agency problems (Barnea & Rubin, 2010; Fama & Jensen, 1986). These firms are perceived as more responsible and sustainable, attracting long-term investors and reducing the need for excessive cash reserves. Conversely, ESG initiatives driven by managerial opportunism rather than genuine commitment can lead to financial inefficiencies. Managers might invest in ESG projects that do not contribute to shareholder value but enhance their reputation or fulfil personal interests (Barnea & Rubin, 2010). Thus, while ESG performance can improve governance, it can also exacerbate agency costs if not aligned with shareholder interests.

2.2 ESG performance and corporate cash holdings

The correlation between ESG performance and corporate cash Holdings is intricate, characterized by differing theories and empirical findings. According to the agency theory, ESG programs, being impacted by managerial opportunism, may negatively influence cash Holdings by shifting the company focus out of the shareholder interest and leading to financial inefficiency (Atif et al., 2022; Barnea & Rubin, 2010). Robust corporate governance frameworks can alleviate agency concerns, with elevated ESG scores signifying strong governance and diminished agency issues (Fama & Jensen, 1986; Liu et al., 2023). The empirical studies are also gaining popularity to the fact that there exists a positive correlation between the ESG performance and the cash Holdings. Firms that have well-developed ESG activities are said to be long-term sustainability and risk management oriented which may require them to hold even more cash to engage in activities such as research and development, and environmentally sustainable investments (He et al., 2022; Zhang & Liu, 2022). ESG engagement is seen as a risk reduction technique that may enhance organizational value and performance. Research demonstrates that companies exhibiting higher ESG or CSR performance experience reduced capital limitations, increased cash Holdings, and are more highly regarded by investors, particularly in contexts with robust shareholder protection rights (Yang & Susanto, 2021). Conversely, some studies indicate a negative correlation, especially in environments characterized by robust labor rights safeguards or significant reputational risks,

where ESG engagements may result in diminished financial reserves (Atif et al., 2022; Liu et al., 2023). The diverse findings indicate that the relationship between ESG performance and cash holdings is complex and shaped by numerous external and internal factors. Our research shall therefore attempt to explore this correlation further by hypothesizing that there exists a positive correlation between ESG performance and corporate cash Holdings based on the premise that strong ESG performance indicates good management of resources and stakeholder trust which in turn enhances the financial health of a firm. Our hypothesis is the following:

H1. The ESG performance is correlated positively with cash holdings of firms.

2.3 The moderating effect of board gender diversity

The contribution of women directors to the improvement of ESG performance and its effect on corporate cash holding becomes clearer. Studies show that female board members contribute significantly to better governance, reducing agency-related problems and influencing cash holding decisions (Abdelkader et al., 2024; Atif et al., 2022; Ezeani et al., 2023; Ezeani et al., 2022; Liu et al., 2023). This improvement in governance is attributed to the risk averse and conservative decision-making tendencies generally associated with female directors, contrasting with the higher risk tolerance often exhibited by male directors (Mahran & Elamer, 2024; Niessen-Ruenzi & Ruenzia, 2019; Ullah et al., 2024). Empirical research supports this notion, showing that female-led firms or those with significant female board representation tend to have more prudent financial strategies, including lower leverage and cash holdings (Atif et al., 2019; Falconieri & Akter, 2023). The influence of gender on investment decisions and company outcomes is determined by cultural norms, stereotypes, and the presence of women in leadership roles (Bilal et al., 2023; Elamer & Kato, 2025; Elamer & Boulhaga, 2024; Niessen-Ruenzi & Ruenzia, 2019). Critical mass theory posits that the impact of women on boards becomes substantial once reaching a specific threshold, generally recognized as a minimum of three female members (Kyaw et al., 2022). This threshold is crucial for women to move beyond tokenism and meaningfully impact board dynamics, ESG performance, and financial decisions, including cash holdings.

Behavioral theory and feminist theory provide significant insights. Behavioral theory perceives directors as 'bounded rational beings' and can reveal the impact of varied boards on decision-making processes and risk perceptions (Lu et al., 2022). Boulouta, (2013) discovered that female directors exhibit heightened awareness and responsiveness to harmful business practices, as evidenced by enhanced scores on the KLD index. Feminist theory posits that organizations with a greater representation of women in leadership roles are likely to demonstrate superior ESG performance and cash management techniques. Xu et al. (2019) demonstrate that female CFOs correlate with increased corporate cash Holdings, suggesting a precautionary intent to alleviate future financial concerns. Female CEOs typically maintain higher cash reserves, indicating a more cautious strategy in company finance (Zeng & Wang, 2015). Our research asserts that the inclusion of female directors on boards, especially when they represent a substantial proportion, enhances the favorable correlation between ESG performance and cash Holdings. Our hypothesis is that the higher the proportion of females in a board the greater positive impact it will have on the connection between ESG performance and cash holdings. We suggest:

H2. The positive correlation between cash holdings and ESG performance is reinforced by the presence of female directors.

3. Data and Methodology

This research concentrates on non-financial corporations listed on Indian stock markets. Utilizing ESG scores from the Refinitiv database, we examine an unbalanced panel dataset comprising 1,480

observations from 718 publicly traded companies on the Indian stock exchange from 2011 to 2023. This prolonged duration facilitates a comprehensive analysis of environmental, socioeconomic, and governance effects and trends. The designation of these economies as emergent is founded on MSCI Global Market Accessibility standards. The data for this analysis was obtained from the Thomson Reuters database, recognised for its trustworthiness and extensive coverage of financial and sustainability information. Cash holding is a dependent variable. To quantify the extent of cash holding, we follow other available studies (Atif et al., 2022; Atif et al., 2019; Nikolov & Whited, 2014) and measure the ratio of cash and marketable securities to net assets where net assets is measured as the book value of total assets, less cash and marketable securities. It is a ratio that accounts for the level of cash that the management has in relation to assets (Atif et al., 2019, 2022). The ESG performance scores are used as independent variables in this paper: The ESG measures provided by Refinitiv are highly respected in scholarly research due to their rich and longitudinal data, which has been available since 2002 (Ayu Nindita & Hanggraeni, 2024; Duque-Grisales & Aguilera-Caracuel, 2021). Refinitiv collects publicly available information on websites, annual reports of companies, and supplements them with direct company data, which is then audited to obtain ESG scores. Board gender diversity is the focal moderating variable of the study. Gender diversity on the board can be measured as the percentage of female members on the board in relation to their total number (Brahma et al., 2021; Kyaw et al., 2022). In our analysis, a wide set of control variables is included to cover firm-level features that are usually associated with cash holdings based on the literature (Elnahass et al., 2022; Faccio et al., 2011). We also use control variables based on previous research, such as firm size (natural logarithm of total assets), financial leverage (debt-to-equity ratio), tangibility (property, plant, and equipment to total assets), audit quality (dummy variable equal to 1 in case of being audited by a Big Four firm, otherwise 0), board gender diversity (percentage of female board members relative to the total), sales growth (percentage change in annual sales), financial development, and GDP growth (Giannopoulos et al., 2022; Naeem & Çankaya, 2022; Aydoğmuş et al., 2022).

Table -1: Descriptive statics

Variable Name	N	Mean	SD	Min	Max
<i>Cash holding</i>	1480	0.140	0.106	0.008	0.456
<i>ESG-Performance</i>	1480	46.160	21.766	4.865	87.300
<i>Leverage</i>	1480	1.510	3.051	0.001	22.812
<i>Firm Size</i>	1480	8.810	1.534	5.464	13.578
<i>Tangibility</i>	1480	0.750	1.862	0.007	14.433
<i>Audit Quality</i>	1480	0.090	0.286	0.000	1.000
<i>BG-diversity</i>	1480	9.53	10.512	0.000	44.444
<i>Economic Growth</i>	1480	5.150	2.897	-5.831	9.550
<i>FSD</i>	1480	0.820	0.280	0.134	1.000

Table-1 shows the descriptive statistic of the study variables. The average cash holdings is 0.140. A Tobin Q greater than one is a sign of an overvalued stock. Therefore, it is possible to conclude that the majority of the companies included in our database are overpriced. The average of ROA is 0.13; typically, the higher ROA means that the company is more efficient in terms of the profits. The average of the ESG performance is as follows: ESG Combined Score 46.16, Environment Score 34.285, Social Score 45.88, Governance Score 50.05. The average of the control variables

is 8.81 and 1.51 of Size and Leverage respectively. The leverage ratio can be considered just right in most companies with some companies having much more debt as compared to their assets.

3.1 Econometric Model and Methods

Building on the existing literature, we specified the following econometric models to empirically test our hypotheses;

$$\text{Cashh}_{i,t} = \beta_0 + \beta_1 \text{ESG}_{it} + \beta_2 \text{BG} - \text{diversity} + \beta_i X_{i,t} + \sum_{i=1}^n \beta_i \text{Firm_Dummies}_{i,t} + \sum_{i=1}^n \beta_i \text{Year_Dummies}_{i,t} + \mu_i + e_{i,t} \dots \dots \dots (1)$$

$$\text{FV}_{i,t} = \beta_0 + \beta_1 \text{ESG}_{it} + \beta_2 \text{BG} - \text{diversity} + \beta_3 \text{ESG}_{it} * \text{BG} - \text{diversity}_{i,t} + \beta_i X_{i,t} + \sum_{i=1}^n \beta_i \text{Firm_Dummies}_{i,t} + \sum_{i=1}^n \beta_i \text{Year_Dummies}_{i,t} + \mu_i + e_{i,t} \dots \dots \dots (2)$$

This study employs a robust econometric approach to analyses the impact of ESG performance on cash holdings, including board gender diversity as a moderating variable. Our study commences with a fixed effects model to account for unobserved heterogeneity. By integrating fixed effects for both firm and year, we control for attributes specific to each firm and temporal fluctuations, therefore guaranteeing our results are not distorted by factors that remain constant within firms or years. Subsequently, to address concerns about endogeneity, we apply Two-Stage Least Squares (2SLS). Endogeneity is a concern because ESG performance may be affected by factors that also influence cash holding, which could lead to biased estimates. We take the mean of ESG performance in the industry as an instrumental variable to overcome this. As a further robustness check, we use Feasible Generalized Least Squares (FGLS) to deal with any possible heteroscedasticity and autocorrelation problem in the data. FGLS offers more accurate and consistent estimates compared to Ordinary Least Squares (OLS), enhancing the reliability of our conclusions. Together, these methods ensure a comprehensive and reliable assessment of how ESG performance impacts cash holding. The pre-estimation tests, results such as correlations, VIF and unit roots are reported in the appendix A in Tables A1-A3. All of which supports the selection our model and methods.

3.2 The impact of ESG performance on cash holding using fixed-effects regression

Table 2. Results of the impact of company ESG performance on cash holdings utilizing a firm and year fixed-effects regression model. The proposed relationship between ESG performance, board gender diversity, and corporate cash holdings in Indian non-financial enterprises in the period 2012 to 2023 is strongly supported by the model results in Table 2 based on the empirical evidence. The findings show that there is a strong and significant relationship between ESG performance and cash Holdings, the relationship coefficient is 0.013 ($t = 3.72$, $p < 0.01$), and the initial hypothesis that the companies with the higher commitment to ESG are likely to have higher amounts of cash is accepted.

Variable Name	Cash
<i>ESG-Performance</i>	0.013***

	(3.72)
<i>Leverage</i>	0.036***
	(3.84)
<i>Size</i>	0.087***
	(4.05)
<i>Tangibility</i>	0.073***
	(3.77)
<i>Firm Growth</i>	0.043
	(0.15)
<i>Audit Quality</i>	0.071*
	(1.81)
<i>BG-Diversity</i>	0.009**
	(1.99)
<i>Economic-Growth</i>	0.080***
	(3.03)
<i>FSD</i>	0.043***
	(4.42)
<i>Firm Fixed effects</i>	Yes
<i>Year Fixed effects</i>	Yes
<i>Constant</i>	11.158***
	(4.29)
<i>Observations</i>	1480
<i>Adj R²</i>	0.346

Table -2: Year fixed affect results

Parentheses denote t-statistics. Significance levels: *p<0.10, **p<0.05, and ***p<0.01

This implies that sustainability-oriented firms may have more cautious financial practices, perhaps in expectation of some uncertainty in the future, or to meet long-run stakeholder expectations. Board gender diversity demonstrates a positive and statistically significant effect on cash holdings (coefficient = 0.009, t = 1.99, p < 0.05), hence supporting the second hypothesis. This outcome suggests that the inclusion of female directors increases the firm's propensity to retain cash, probably owing to an enhanced emphasis on prudent risk management and improved governance monitoring. The beneficial impact of ESG performance on cash holdings is additionally affected by various firm-level regulations. Leverage (0.036), firm size (0.087), and tangibility (0.073) exert significant positive impacts, suggesting that firms with more leverage, greater size, and increased

asset intensity are inclined to maintain larger cash reserves, in alignment with precautionary and operational requirements.

There is a positive correlation between audit quality and cash holdings at the 10% significance level which means that organizations with high audit quality can adopt more transparent and judicious cash management policy. Economic growth and financial sector development (FSD) are positively and significantly correlated with cash holdings, underscoring the influence of macroeconomic and institutional circumstances on liquidity decisions. Conversely, firm expansion exhibits a positive albeit statistically negligible effect, indicating a minimal impact in this context. The model incorporates country and year fixed effects to account for unobserved heterogeneity and macroeconomic shocks, explaining 34.6% of the variation in cash holdings (Adjusted $R^2 = 0.346$). The results emphasize the synergistic functions of ESG performance and board gender diversity in affecting corporate financial behavior and emphasize the significance of sustainable governance practices in determining liquidity management in emerging markets such as India.

3.3 IV2SLS results

Table-3 displays the outcomes of a Two-Stage Least Squares (2SLS) regression examining the correlation between ESG performance and cash holdings, utilizing sector averages for ESG performance as an instrument. The findings substantiate that ESG performance markedly improves cash Holdings. In the initial phase, ESG performance exhibits a robust correlation with its instrument (coefficient = 0.003, t-statistic = 2.53), hence confirming the instrument's validity. During the second stage, ESG performance poses a positive and significant impact on company value (coefficient = 0.001, t-statistic = 2.59), which means that improved ESG performance contributes to an increase in cash flow. These results bring to the fore the strategic importance of ESG involvement in driving the creation of long-term value.

Table -3: Instrument Testing

	ESG performance
<i>Anderson canon. corr. LM statistic</i>	166.883
<i>P-Value</i>	0.000
<i>Cragg-Donald Wald F</i>	190.150

Table 3 displays the outcomes of instrument testing for ESG performance utilizing industry means as instruments. The Anderson Canonical Correlation LM statistic assesses under-identification by verifying the adequacy of correlation between instruments and endogenous variables. The findings indicate elevated LM statistic values for ESG performance (166.883), accompanied by p-values of 0.000, signifying statistical significance at the 1% threshold. These data confirm the instrument's relevance, eliminating worries of under-identification. The Cragg-Donald Wald F statistic, utilized to assess weak instruments, further corroborates the robustness of the instruments. The F-statistic is elevated at 190.150 for ESG performance, far surpassing the conventional threshold of 10. These results affirm that the instrument is both pertinent and a reliable predictor of the related ESG measures. The instrument testing results indicate that the industry standard for ESG performance is both valid and robust. The high values of LM and Cragg-Donald Wald F statistics and large p-values certify the reliability of the 2SLS regression results, which provides a strong foundation of the study of the relationship between ESG performance and stock liquidity.

Table-4: IV2SLS Regression Results for Robustness Checks

Variable Name	Cashh	
	First Stage	Second Stage
<i>ESG-Performance</i>	0.003** (2.53)	0.001*** (2.59)
<i>Firm Growth</i>	0.026*** (10.97)	0.026*** (10.95)
<i>Leverage</i>	0.001*** (3.31)	0.001*** (3.32)
<i>Size</i>	0.011*** (7.28)	0.011*** (7.34)
<i>Tangibility</i>	0.012*** (4.67)	0.012*** (4.71)
<i>Audit Quality</i>	0.759*** (6.40)	0.761*** (6.55)
<i>BG-Diversity</i>	0.001** (2.00)	0.001** (1.98)
<i>Economic-Growth</i>	0.003 (1.54)	0.003 (1.56)
<i>FSD</i>	0.072** (2.44)	0.072** (2.46)
<i>Firm Fixed Effects</i>	Yes	Yes
<i>Year Fixed Effects</i>	Yes	Yes
<i>Constant</i>	0.958*** (24.61)	0.991*** (22.45)
<i>Observations</i>	1480	1480
<i>Adj R²</i>	0.348	0.346

Parentheses denote t-statistics. Significance levels: *p<0.10, **p<0.05, and ***p<0.01

3.4: The Moderating Effect of BG-Diversity

Table 4 shows the findings of the moderating role played by BG-Diversity. The table shows that cash holdings are positively and significantly correlated with improved ESG practices, with the coefficient of 0.004 (p<0.01). In the meantime, the coefficient of the interaction term (i.e., ESG performance * BG-Diversity) is 0.011 (p<0.01) which shows that the relationship is positive and statistically significant. This means that the extent to which ESG performance enhances cash holdings is increased by higher gender diversity in the board. These results illustrate the significance of BG-Diversity in the maximization of the benefits of ESG initiatives because they indicate that an ESG performance is positively correlated with the cash holdings, and the association is especially strong in firms with more gender diversity on the board.

Table-5. The Moderating Effect of BG-Diversity

Variable Name	Cashh
<i>ESG-Performance</i>	0.004*** (3.66)
<i>ESG-Performance * BG-Diversity</i>	0.011*** (2.79)

<i>Leverage</i>	0.001*** (3.18)
<i>Size</i>	0.011*** (7.10)
<i>Tangibility</i>	0.012*** (4.58)
<i>Firm Growth</i>	0.051*** (4.11)
<i>Audit Quality</i>	0.067*** (6.73)
<i>BG-Diversity</i>	0.001* (1.67)
<i>Economic-Growth</i>	0.003 (1.41)
<i>FSD</i>	0.043*** (4.42)
<i>Firm Fixed effect</i>	Yes
<i>Year Fixed effect</i>	Yes
<i>Constant</i>	2.581*** (4.81)
<i>Observations</i>	1480
<i>Adj R²</i>	0.343

Parentheses denote t-statistics. Significance levels: *p<0.10, **p<0.05, and ***p<0.01

3.5 Robustness Testing

The benchmark regression results indicated that robust ESG performance significantly enhances cash holding. Alternative estimating technique (i.e.FGLS model) is employed to confirm the robustness of these results.

3.5.1 FGLS regression results for robustness checks

Table 5 displays the robustness tests employing a Feasible Generalized Least Squares estimation model to further substantiate the correlation between ESG performance and company value. The FGLS model addresses any heteroscedasticity and autocorrelation in the data, hence providing more reliable estimates. The robustness checks in Table 5, using FGLS, provide strong evidence of consistent relationships between Cash holding and ESG-Performance. ESG-Performance show highly significant positive coefficients, indicating ESG engagement correlates positively with cash holding at the 1% significance level.

Table -6: FGLS results for robustness checks

Variable Name	Column-A
<i>ESG-Performance</i>	0.251*** (4.84)
<i>Firm growth</i>	0.681*** (4.20)

<i>Leverage</i>	0.008*** (3.34)
<i>Size</i>	0.147*** (17.15)
<i>Tangibility</i>	0.155*** (4.57)
<i>Audit Quality</i>	0.031*** (6.37)
<i>BG-diversity</i>	0.008** (1.23)
<i>Economic-Growth</i>	0.040 (1.40)
<i>FSD</i>	0.872** (2.44)
<i>Firm Fixed effects</i>	Yes
<i>Year Fixed effects</i>	Yes
<i>Constant</i>	13.458*** (26.73)
<i>Observations</i>	1480
<i>Adj R²</i>	0.391

T-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

4. Conclusion

The aim of the research is to test the effect of Environmental, Social, and Governance (ESG) performance on corporate cash Holdings through the moderating effect of board gender diversity in the Indian non-financial companies of the period 2012-2023. The findings support the original hypothesis, which points to a positive relationship between ESG performance and the amount of cash Holdings at a firm level. It means that firms who have a strong ESG activity tend to have greater cash Holdings, which is likely a precautionary step to minimize the risks related to sustainability and maintain operational freedom in turbulent situations. The second hypothesis tested in the study that the impact of the female director inclusion on the positive relationship between ESG performance and cash Holdings is significant is supported by the study. This implies that gender-diverse boards can focus more on long-term preservation of value and risk management and therefore be more inclined to the role of ESG in financial policy-making, such as cash retention. Female representation on the boards appears to enhance the quality of governance and align the actions of the managers with the interests of the stakeholders. These results add to the existing body of knowledge on ESG and corporate finance in developing countries by suggesting the strategic financial action of Indian companies in reaction to ESG factors. Policy-wise, the findings indicate that gender diversity in boardrooms and ESG disclosure should be mutually beneficial in terms of improving the financial management. Regulators and corporate stakeholders ought to thus take into account encouraging board diversity and ESG integration as a means of enhancing financial resilience and sustainability outcomes within the Indian corporate sector. Despite these insights, the study has some limitations. It excludes financial firms due to their distinct regulatory and capital structures, which may affect generalizability. Moreover, while panel regression and interaction models address potential endogeneity and unobserved heterogeneity, residual omitted variable bias cannot be ruled out. Future research could extend this analysis by including financial firms, exploring alternative corporate governance factors, and examining firm behavior across different industry sectors and macroeconomic conditions.

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Variables Name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Cashh</i>	1.000									
<i>ESG-Perfromance</i>	0.018*	1.000								
<i>Firm Growth</i>	0.163*	0.225*	1.000							
<i>Leverage</i>	0.012	0.035*	0.023	1.000						
<i>Size</i>	0.095*	0.156*	0.317*	0.068*	1.000					
<i>Tangibility</i>	0.153*	0.044*	0.232*	0.028*	0.190*	1.000				
<i>Audit Quality</i>	0.032*	0.047*	0.001	0.031*	0.070*	0.011	1.000			
<i>BG-diversity</i>	0.015	0.017	0.029*	0.059*	0.114*	0.016	0.068*	1.000		
<i>Economic-Growth</i>	0.103*	0.073*	0.014	0.091*	0.045*	0.072*	0.070*	0.062*	1.000	
<i>FSD</i>	0.068*	0.030*	0.034*	0.001	0.250*	0.024	0.023	0.192*	0.043*	1.000

Appendix

Table A1. Correlation matrix

Table A2. Variance inflation factor

Variable Name	VIF	1/VIF
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<i>Cashh</i>	1.027	0.973
<i>ESG- performance</i>	1.110	0.901
<i>Size</i>	1.411	0.709
<i>Firm Growth</i>	1.356	0.738
<i>Tangibility</i>	1.213	0.825
<i>FSD</i>	1.177	0.849
<i>Tangibility</i>	1.161	0.861
<i>Leverage</i>	1.096	0.913
<i>Economic Growth</i>	1.080	0.926
<i>BG-diversity</i>	1.073	0.932
<i>Audit Quality</i>	1.062	0.942
<i>Mean VIF</i>	1.143	.

TableA3. Unit root testing

Variable Name	Adjusted t	P- Value
<i>Cashh</i>	-53.232	0.000
<i>ESG Performance</i>	-33.274	0.000
<i>Firm Growth</i>	-17.789	0.000
<i>Leverage</i>	-14.902	0.000
<i>Firm Size</i>	-25.558	0.000
<i>Tangibility</i>	-11.402	0.000
<i>Audit Quality</i>	41.677	0.030
<i>DG-Diversity</i>	-17.907	0.000
<i>Economic Growth</i>	-43.750	0.000
<i>FSD</i>	24.261	0.000