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How Board Gender Diversity Influences the Relationship between ESG Performance and Corporate Risk-Taking

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Abstract
This study investigates the impact of environmental, social, and governance (ESG) performance on corporate financial risk, focusing on the moderating role of board gender diversity (BGD). Analyzing French companies listed in the SBF 120 index from 2013 to 2022, the research excludes financial and real estate firms, resulting in a sample of 97 companies with 970 observations. The findings reveal that strong ESG practices lead to lower market volatility and financial risks, with gender-diverse boards—especially those with female directors—enhancing ESG performance. The study highlights the importance of promoting gender diversity in leadership to improve ESG performance and overall risk management strategies.

Keywords
ESG, Financial Risk, Board Diversity

1. Introduction
Over the last few years, the significance of environmental, social, and governance (ESG) criteria in evaluating a firm's social responsibility has grown significantly (Aureli et al., 2020; Widyawati, 2020). Investors are increasingly prioritizing sustainable practices over traditional financial criteria when making investment decisions. Firms that neglect ESG factors in their business operations now face significant risks and negative concerns from investors (Shakil, 2021). Firms involved in social and environmental controversies face investor backlash and increased stock price volatility due to concerns over their ESG practices (Aouadi & Marsat, 2018; Fiaschi et al., 2020; Sassen et al., 2016).

The relationship between a firm's ESG performance and its risk management strategy has been the focus of considerable attention from researchers (Wei and Chengshu, 2024).. The consensus from several studies is that ESG performance plays a crucial role in reducing a firm's stock volatility and overall risk (Ashwin et al., 2016; Sassen et al., 2016;; Benlemlih and Girerd-Potin, 2017; Chollet and Sandwidi 2018, Lueg et al., 2019; Shakil, 2021). From a theoretical perspective, stakeholder theory, legitimacy theory, and risk management theory are particularly relevant when examining the link between ESG performance and financial risk (Shakil, 2021). Stakeholder theory posits that firms have a responsibility to consider the interests of all their stakeholders, not just shareholders, when making decisions. This theory suggests that firms that prioritize ESG concerns may enjoy greater stakeholder support and trust, which can reduce financial risk. On the other hand, legitimacy theory postulates that firms must operate in a way that is perceived as socially responsible and legitimate by society. ESG practices that align with societal expectations can improve a firm's reputation and reduce the likelihood of reputational damage and financial risk (Sharfman and Fernando, 2008). Finally, risk management theory suggests that firms that take ESG factors into account are better equipped to identify and manage risks that could impact their financial performance. By integrating ESG considerations into their risk management processes, firms reduce their exposure to potential risks and increase their overall financial stability (Godfrey, 2005).
Existing literature shows that ESG performance impacts financial risk, with research mainly focusing on the direct relationship between ESG and risk (Sassen et al., 2016; Shakil, 2021) and its effect on firm performance (Fatemi et al., 2018; Albitar et al., 2020; Duque-Grisales & Aguilera-Caracuel, 2021). However, this relationship is complex and influenced by factors like industry, size, and governance, including board gender diversity (BGD) (Shakil, 2021). Our study explores how ESG performance affects financial risk in Europe, considering the role of BGD.

In recent years, there has been increasing attention given to BGD across all sectors Centinaio, A. (2024). Women have historically been undervalued in certain industries, prompting the regulatory community to place pressure on firms to expand the gender diversity of their boards (Murphy et al., 2021). Board gender diversity in France has made significant progress in recent years, driven by both legal requirements and societal pressure for more inclusive corporate governance. The Copé-Zimmermann Law, passed in 2011, marked a turning point by mandating that boards of directors in publicly listed companies and large private firms have at least 40% female representation. This law has been instrumental in elevating the number of women in leadership positions, particularly on corporate boards. As of recent reports, many French companies have not only met but exceeded the 40% requirement, positioning France as one of the leaders in Europe in terms of gender diversity at the board level. This has contributed to increased visibility for women in corporate governance and has promoted more balanced decision-making processes. However, while gender diversity on boards has improved, challenges remain in achieving broader gender equality across all levels of corporate leadership. Women are still underrepresented in executive roles such as CEOs and CFOs, highlighting the need for further efforts to ensure that progress made at the board level extends throughout the organization. In addition to regulatory pressure, investors are increasingly considering gender diversity as a key aspect of good governance and long-term sustainability, further encouraging companies to prioritize gender balance within their leadership structures.

Furthermore, empirical studies have consistently shown that female executives prioritize social and environmental welfare over the profit maximization focus of male board members (Singh et al., 2008; Glass et al., 2016; Arayssi, 2020). Their presence on boards can provide firms with diverse perspectives and sustainable solutions, ultimately improving strategic decision-making on social and environmental issues (Sila et al., 2016; Dadanlar and Abebe, 2020). In fact, female board members can play a crucial role in improving a firm’s ESG performance, which in turn can help mitigate financial risk, improve the firm’s reputation, and enhance its long-term sustainability. Hence, BGD has a crucial role in determining the impact of ESG performance on corporate financial risk.

Our study utilizes a sample of 81 firms listed on the Euronext stock exchange which they prioritize ESG factors in their operations. By focusing on these firms, we aimed to gain a deeper understanding of the relationship between ESG performance and financial risk, and the role that BGD plays in this relationship.

Our study found that firms with higher levels of BGD tend to exhibit better ESG performance and lower financial risk. This is because female board members are more likely to prioritize sustainability, social responsibility, and stakeholder welfare, which leads to more informed and responsible decision-making. Additionally, female board members bring diverse perspectives and experiences that can lead to innovative and creative solutions to complex ESG challenges. Furthermore, our findings suggest that the relationship between ESG performance and financial risk is not linear but rather complex and context-dependent. The impact of ESG performance on financial risk can vary depending on a firm’s industry, size, and governance structure. However, our study shows that BGD influences this relationship by improving a firm’s ESG performance, which in turn reduces its financial risk exposure.

Our study offers significant contributions to the existing literature. Firstly, it sheds light on the crucial role of BGD in enhancing ESG performance and reducing financial risk. Our findings suggest that boards diversity can offer a wider range of perspectives and experiences, leading to more sustainable and responsible decision-making. Secondly, our research emphasizes the complex and context-dependent relationship between ESG performance and financial risk, highlighting the role of BGD as a moderating variable. This adds valuable insights to the dynamics of ESG and financial risk management. Lastly, our study contributes to the growing literature on gender diversity in corporate governance by demonstrating the positive impact of BGD on ESG performance and financial risk, thus supporting the need for greater gender diversity in leadership positions.

The rest of our paper is structured as follows: in Section 2, we provide a literature review and outline the development of our hypotheses. Section 3 describes our research methodology, variables, and the econometric models used in our analysis. The main findings of our study are discussed in Section 4. Section 5 presents the robustness analyses conducted to test the validity of our results. Lastly, Section 6 summarizes our research and presents our conclusions.

2. Literature Review and Hypotheses

The relationship between ESG performance and financial risk can be comprehended by considering stakeholder theory, legitimacy theory and risk management theory (Shakil, 2021).

2.1 ESG Performance and Risk

ESG performance encompasses the analysis of an organization’s environmental, social and governance factors, providing a comprehensive assessment of its sustainable and ethical practices (Martiny, et al 2024). In this context, the ESG score serves as an indicator to evaluate the firm’s societal and environmental responsibility. A firm’s superior ESG performance signifies a heightened level of social and environmental accountability, which contributes to a reduction in information asymmetry and stock price volatility within the market. Conversely, firms with low ESG performance often experience market volatility due to their lack of responsibility and accountability (Lueg et al., 2019; Jia et al., 2020; Shakil, 2022).
Considering stakeholder theory, legitimacy theory and risk management theory explains the relationship between ESG performance and financial risk. Firms with strong ESG performance are more likely to create value, enhance their reputation and effectively manage risks, thereby reducing financial volatility and improving long-term sustainability.

Accordingly, ESG performance has a negative impact on corporate financial risk. Numerous studies have provided support for this evidence and have shown that considering social, environmental, and governance aspects can effectively mitigate the financial risks faced by firms.

Lueg et al. (2019) conducted a study on the reciprocal relationship between sustainability disclosure and risk, using 59 South African publicly traded firms from 2012 to 2016. The study employed ESG scores to evaluate the impact of sustainability disclosure on total, systematic, and idiosyncratic risk. The findings indicated that sustainability disclosure, especially in regards to social sustainability issues, can decrease systematic risk. Furthermore, the study discovered other uni-and bidirectional effects, indicating that firms tend to report more on social issues when facing higher levels of total risk, systematic risk, and idiosyncratic risk. Shakil (2021) found that ESG performance negatively impacts financial risk in 70 oil and gas firms worldwide from 2010 to 2018. Board gender diversity and ESG controversies also significantly affect this relationship.

He et al. (2023) examined data from Chinese publicly listed companies spanning the years 2010 to 2020. The study revealed that ESG ratings had a pronounced and negative effect on corporate risk-taking behavior. This suggests that firms with higher ESG ratings were inclined to engage in less risky business practices during the specified period. Based on this literature review, we assume that ESG performance enables the reduction of financial risk. Thus, our first hypothesis is as follows:

H1: ESG performance has a negative impact on corporate financial risk.

2.2 Board Gender Diversity, ESG Performance and Corporate Financial Risk

Over the decades, the issue of gender diversity on boards has gained significant attention from academics, researchers, business leaders, regulators and investors (Manita et al., 2018, Dutordoir et al 2024). In particular, Murphy et al. (2021) have noted that the energy sector has seen an increasing focus on BGD in recent years. This is due to the underrepresentation of women in the oil and gas sector and the growing pressure from regulators to improve gender diversity on company boards.

Female executives often emphasize social and environmental welfare more than their male counterparts, who focus on profit maximization (Glass et al., 2016; Arayssi, 2020). Their presence on boards brings diverse perspectives and fosters better decision-making on sustainability, benefiting both stakeholders and the wider community (Adams et al., 2011; Shakil, 2021; Cumming et al., 2015). Studies on board gender diversity (BGD) and ESG performance are mixed. Handajani et al. (2014) found that in Indonesia, board age and size positively impacted social disclosure, but gender and tenure had negative effects. Kyaw et al. (2017) and Nadeem et al. (2017) found that gender diversity improved environmental and social performance in Europe and Australia, respectively. Cucari et al. (2018) analyzed ESG disclosure in over 54 Italian firms between 2011 and 2014. Their study found that CSR disclosure was positively linked to the presence of independent directors and active committees. Conversely, the presence of women on boards was negatively correlated with CSR disclosure. The age of the board members did not show a significant effect on CSR disclosure.

Manita et al. (2018) conducted a study on the relationship between BGD and the disclosure of ESG information. The study focused on how the presence of female directors influences ESG disclosure and utilized stakeholder theory as a framework for analysis. The study examined a sample of 379 companies that comprised the Standard & Poor's 500 Index (S&P 500) during the period of 2010-2015. The empirical analysis yielded two primary outcomes. Firstly, the study did not identify any significant correlation between BGD and ESG disclosure. Secondly, the findings partially supported critical mass theory, as the relationship between BGD and ESG disclosure was not statistically significant when there were less than three female directors on the board. Cucari et al. (2018) found no significant additional relationships beyond their primary results. Shahbaz et al. (2020), on the other hand, discovered that in the global energy sector, board diligence and CSR committees enhance CSR performance. Board independence was linked to better ESG scores and governance, while board gender diversity affected environmental and governance metrics. Nonetheless, higher CSR performance did not translate into better financial outcomes.

Numerous studies (Skała and Weill, 2018; Nadeem et al., 2019; Qayyum et al., 2020; Shakil, 2021) have indicated that firms with more female board members tend to have lower volatility and risk. A mixed-gender board also appears to face less risk than one dominated by men. This finding is attributed to the tendency of female board members to exhibit lower risk-taking behavior compared to their male counterparts (Sila et al., 2016). In this context, Skala and Weill (2018) investigated how the gender of a CEO relates to the level of risk in banks within the context of 365 Polish cooperative banks. Their research, based on a distinctive dataset, revealed that female-led banks are associated with lower levels of risk, with 42% of the banks run by women. The study suggests that female bank CEOs exhibit greater risk aversion than their male counterparts. Furthermore, the authors observed that gender quotas on bank boards could be an effective approach to curbing risk-taking behavior. Nadeem et al. (2019) found that women on boards reduce firm risk due to their greater risk aversion and positively impact profitability, even when risk levels increase. Qayyum et al. (2020) explored how board gender diversity impacts stock price crash risk across twelve Asia-Pacific markets, analyzing data from 1021 publicly listed firms from 2006 to 2016. Their regression analysis, which controlled for various firm and market-level factors, revealed that greater board gender diversity reduces the risk of stock price crashes. The reduction in risk was notably greater in firms with three or more female directors compared to those with fewer. Similarly, Sbai and

Ed-Dafali (2023) found that having women on bank board's decreases financial risk in both Islamic and conventional banks, with this benefit evident both before and during the COVID-19 pandemic.

Based on the previous litterature, BGD improves firms' environmental, social and governance performance (Arayssi, 2020; Shakil et al., 2021). Furthermore, firms with better ESG performance tend to attract more investments and experience better financial performance, ultimately reducing their overall risk (Jizi, 2017). As a result, BGD moderates the relationship between ESG performance and a firm's financial risk (Shakil, 2021). Based on this premise, our second hypothesis is formulated as follows:

H2: Board gender diversity strengthens the negative relationship between ESG and corporate financial risk.

3. Research Methodology

3.1 Research Sample and Data

The research spans 2013 to 2022, focusing on French companies listed in the SBF 120 index due to its market representativeness. The study starts post-Grenelle II law in 2012 to avoid issues related to conservatism under new economic regulations. Financial and real estate companies were excluded, resulting in a final sample of 97 firms with 970 observations. In France, ESG (Environmental, Social, Governance) performance has become an increasingly important focus due to regulatory pressures and market expectations for sustainable practices. The French regulatory framework, strengthened by the Climate and Resilience Law and the EU's Sustainable Finance Disclosure Regulation (SFDR), compels companies to enhance transparency and accountability. Additionally, the Duty of Vigilance Law requires large companies to ensure that their operations and supply chains adhere to human rights and environmental standards. French firms, particularly those listed on Euronext Paris, are increasingly integrating ESG criteria into their business models. They are adopting green technologies, ensuring fair labor practices, and improving governance structures. Meanwhile, French investors are showing a growing interest in sustainable and responsible investing. The proliferation of green bonds and sustainable investment funds reflects this shift in investment trends. Nevertheless, challenges remain, such as inconsistent ESG reporting standards and the need for better integration of ESG criteria into financial performance metrics. Companies also face difficulties in effectively measuring and communicating their ESG impact. Public perception is evolving, with increased awareness of ESG issues. There is rising demand from consumers and businesses for clear commitments to sustainability and social responsibility, which is driving companies to enhance their ESG performance and adjust their strategies accordingly.

Data were sourced from Thomson Reuters' Data stream and ASSET4 ESG databases. The industry distribution, as shown in Table 2, includes 61% from sensitive sectors like industrials, consumer goods, and energy. CSR reports for content analysis were collected from company websites.

Table 1 Sample selection and distribution of companies by industry

Sample selection		Industry	Firm-Year Observation
Initial sample	120	Health Care	60
Financial and insurance firms	(19)	Industrials	210
		Consumer Goods	140
Firms with insufficient data	(20)	Telecommunications	10
		Basic Materials	60
Final sample	81	Consumer Services	180
		Utilities	50
Period	10	Technology	90
		Oil and Gas	10
			810

3.2 Research Models

We have employed a panel data as a methodology. Cross-sectional data are primally included in the past literature on the impact of ESG performance on financial risk of firms. Moreover, adding the unobserved individual impact, the year factor the individual heterogeneity and, ultimately, the random disruption, the models through panel data methodology manages the time impact. In this analysis, we used two models. Model 1 examines the effect of ESG performance on firm financial risk, accounting for additional control variables identified in previous studies (Chakraborty et al., 2019; Shakil, 2021).

We used, in this model, Risk as a dependent variable, ESG as an independent variable and we used series of control variables which are market to book value, leverage and the firm size.

The definitions of all the variables are explained in detail in table 2.

Model 1

$$Risk_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 BDG_{it} + \beta_3 MTV_{it} + \beta_4 LEV_{it} + \beta_5 AGE_{it} + \beta_6 FIX_{it} + \beta_7 GROW_{it} + \beta_8 SIZE_{it} + \Sigma\, INDUSTRY + \Sigma\, YEAR + \varepsilon \quad \text{(Basic Model)}$$

In our study, we examine how board gender diversity moderates the relationship between ESG factors and our outcome by incorporating interaction terms (ESG*BDG) in model 2. This model builds on the variables used in model 1 and includes the interaction between board gender diversity (BGD) and ESG factors.

Model 2

$$Risk_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 BDG_{it} + \beta_3 ESG_{it} \times BDG_{it} + B_4 MTV_{it} + \beta_5 LEV_{it} + \beta_6 AGE_{it} + \beta_7 FIX_{it} + \beta_8 GROW_{it} + \beta_9 SIZE_{it} + \Sigma\, INDUSTRY + \Sigma\, YEAR + \varepsilon \quad \text{(Interaction Model)}$$

Table 2 Variables définitions

Variables		Definition
Dependent variables	Corporate risk-taking (Risk)	-Corporate Market Risk (σMKT): The volatility of the firm's shares. -(RISK-O): Calculated as the standard deviation of the return on assets (ROA) over a three-year period. -Risk (R&D/TA)
Independent variables	Environmental, Social Governance (ESG)	A score start from zero (the worst) to 100 (the best). (ESG scores are taken from DataStream).
Moderating variables	Board Gender Diversity	BGD is the percentage of women on a firm board. Previous studies also used the percentage of women on a firm board as a proxy for BGD (Wiley and Monllor-Tormos, 2018; Nuber and Velte, 2021).
Control Variables	Market to Book Value Ratio MTB	Calculate by dividing the market value of the firm's shares (market capitalization) by the book value of the firm's equity.
	Financial Leverage LEV	Calculate by dividing the firm's total debt by its total assets. Total Debt /Total Assets
	Growth rate GROW	The annual growth rate of sales: Calculate by taking the percentage change in sales from one year to the next.
	Age AGE	Number of years since incorporation
	Annual fixed-asset ratio FIX	ratio of total fixed assets to total assets
	Size SIZE	Evaluated by natural total assets logarithm

4. Analyses and Discussions

Table 3 presents the regression results. ESG performance has a significantly negative impact on corporate financial risk as measured using β market, (R&D/TA), σ (MRET) and σ (ROA) (coef. = -0.122, -0.342, -0.174 and -0.246, respectively, with p-value <1% level). The results are in accordance with the statements of the stakeholder theory, legitimacy theory and risk management theory. These theories assume that ESG performance has a negative impact on financial risk (Lueg et al., 2019; Shakil, 2021). In fact, firms demonstrating robust ESG performance are more inclined to generate value, bolster their reputation, and proficiently manage risks, resulting in a reduction in financial volatility and an enhancement of long-term sustainability. Consequently, ESG performance exerts a negative influence on corporate financial risk. In addition, the results are consistent with previous researches conducted by authors like Sassen et al. (2016), Benlemlih and Girerd-Potin (2017), Chollet and Sandwidi (2018), Lueg et al. (2019) and Shakil (2021). We confirm our first hypothesis H1, which states that ESG performance has a negative impact on corporate financial risk. In addition, as shown in Table 5, the control variables have a positive impact on financial risk. For example, the coefficients of MTB are positive and significant at the 1% level (coef. = 0.386 and 0.458 when considering β market and σ (MRET), respectively).

Table 3 Regressions ESG performance and risk taking

VARIABLES	Risk taking with β market	Risk taking with (R&D/TA)	Risk taking with σ (MRET)	Risk taking with σ (ROA)
	Coefficient t-statis	Coefficient t-statis	Coefficient t-statis	Coefficient t-statis
ESG	-0.122*** (-4.846)	-0.342*** (-5.235)	-0.174*** (-4.139)	-0.246*** (-3.854)
BGD	-0.017*** (-2.726)	-0.046 (-1.066)	-0.017 (-0.326)	-0.494*** (-3.173)
MTB	0.386*** (4.746)	0.133 (0.886)	0.458*** (3.096)	0.284 (0.564)
LEV	0.257 (0.746)	0.159*** (4.746)	0.493 (0.128)	0.901*** (5.007)
Age	0.148 (0.723)	0.192 (0.854)	0.372 (1.023)	0.474 (0.682)
Fix	0.081*** (3.385)	0.123*** (4.032)	0.058*** (3.984)	0.105*** (3.263)
Grow	0.027 (0.199)	0.073 (0.483)	0.086 (0.895)	0.093 (0.272)
Size	0.036***	0.077***	0.934***	0.005

	(3.884)	(4.173)	(3.193)	(0.934)
Constant	3.187*	2.654*	4.085*	1.348*
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	810	810	810	810
Pesaran CD Test	38.832 (0.000)	34.097 (0.000)	45.195 (0.000)	26.863 (0.000)
Hausman Test Prob>chi	(0.066)	(0.074)	(0.091)	(0.084)
Breusch-Pagan LM Test	174.932 (0.000)	167.794 (0.000)	194.946 (0.000)	172.993 (0.000)
Modified Wald Test for Heteroskedasticity	Prob>chi2 = 0.000	Prob>chi2 = 0.000	Prob>chi2 = 0.000	Prob>chi2 = 0.000
Woodridge Test for Autocorrelation	20.832 0.000	45.021 0.000	39.793 0.000	33.257 0.000
Wald Chi2	172.982 (0.000)	184.932 (0.000)	171.008 (0.000)	187.326 (0.000)

Note: This table reports on the regression results of the model. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels, respectively. ***ESG:*** Environmental, Social and Governance performance; ***MTB:*** Market to Book Value of Equity; ***LEV:*** Leverage; Size: Firm size.

Table 4 presents the findings concerning the moderating influence of BGD. In our exploration of H2, we introduce the interaction variable (ESG*BGD) to scrutinize the moderating effect of BGD in the relationship between ESG performance and financial risk. The results demonstrate that (ESG*BGD) has a negative and significant impact on coporate financial risk when measured by β market and σ (MRET) (coef. = -0.133 and -0.142, respectively, with p-value <1% level). However, when considering (R&D/TA) and σ (ROA), this impact is not significant. In general, we conclude that the presence of women on boards influences ESG performance and reduces financial risks. Furthermore, BGD accentuates the negative impact of ESG performance on corporate financial risk. Our findings are consistent with Jizi (2017) and Shakil (2021) who demonstrated that BGD insure better environmental, social and governance performance, attract increased investments and achieve superior financial results. Gender diversity on the board strengthens the negative relationship between a company's ESG performance and its financial risk. This implies that companies with more gender-diverse boards experience a greater reduction in market and systematic risks when they have strong ESG performance. However, for organizational risk and strategic risk-taking, this moderating effect of board gender diversity is not present.

Market risk and systematic risk, often quantified using a firm's beta, are critical indicators of a company's sensitivity to broader market movements. A negative relationship between ESG performance and these risks implies that companies with strong ESG practices tend to be less vulnerable to market volatility. When gender diversity on the board amplifies this relationship, it suggests that diverse boards might be better equipped to leverage ESG strategies in reducing market risks. Diverse perspectives can lead to more comprehensive risk assessment and decision-making processes, potentially leading to more robust strategies for mitigating market and systematic risks. In contrast, the absence of a moderating effect of gender diversity on the relationship between ESG performance and organizational risk or strategic risk-taking suggests that the benefits of a diverse board may not extend uniformly across all types of risk. Organizational risk often relates to internal processes, culture, and management efficiency, while strategic risk-taking involves decisions that could significantly alter the company's direction or competitive standing. The lack of a moderating effect here might indicate that these areas are less influenced by ESG factors or that the influence of board diversity operates through different mechanisms that are not directly related to ESG performance. These findings underscore the complexity of the relationship between ESG performance, board diversity, and financial risk. For companies and investors, this suggests that promoting gender diversity on boards could be particularly beneficial in contexts where market and systematic risks are a concern. However, it also highlights that board diversity alone may not be sufficient to influence all dimensions of risk, particularly those related to internal management and strategic decision-making.

Table 4 Regressions interaction ESG performance/Board diversity and Risk taking Interaction model

VARIABLES	Risk taking with β market	Risk taking with (R&D/TA)	Risk taking with σ (MRET)	Risk taking with σ (ROA)
	Coefficient t-statis	**Coefficient t-statis**	**Coefficient t-statis**	**Coefficient t-statis**
ESG	-0.089*** (-3.929)	-0.173*** (-3.738)	-0.087*** (-4.002)	-0.063*** (-3.732)
BGD	-0.029*** (-2.534)	-0.067*** (-2.973)	-0.053*** (-2.383)	-0.155*** (-2.128)

ESG*BGD	-0.133*** (-5.371)	0.056 (0.887)	-0.142*** (-3.932)	-0.173 (1.141)
MTB	0.072*** (4.342)	0.054*** (3.943)	0.063*** (2.783)	0.022*** (2.932)
LEV	0.128 (0.921)	0.243 (0.838)	0.377 (0.229)	0.822 (0.932)
Age	0.672 (0.822)	0.807 (0.493)	0.129 (0.593)	0.026 (0.863)
Fix	0.134*** (2.994)	0.193*** (2.738)	0.074*** (3.006)	0.106*** (3.932)
Grow	0.092 (0.244)	0.014 (0.283)	0.072 (0.738)	0.088 (0.661)
Size	0.494*** (4.745)	0.936*** (4.032)	0.538*** (3.353)	0.832*** (3.732)
Constant	2.809*	1.135*	1.443*	1.848*
Observations	810	810	810	810
Wald Chi2	141.67	148.66	156.34	152.87

Note: This table reports on the regression results of the interaction model. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.
ESG: Environmental, Social and Governance performance; ***BGD:*** Board Gender Diversity; MTB: Market to Book Value of Equity;
LEV: Leverage; Size: Firm size.

The findings underscore the significant impact that gender diversity on boards can have on managing financial risk, particularly in contexts involving market and systematic risks. Boards with diverse perspectives are often better equipped to navigate these risks, as they bring a range of experiences and viewpoints that can lead to more innovative and thoughtful decision-making. However, it is essential to recognize that board diversity alone may not address all types of risk. Internal management risks, such as those arising from leadership styles or operational inefficiencies, may not be directly influenced by diversity at the board level.

For firms and investors, this suggests that while promoting gender diversity can be beneficial, it should be seen as one component of a broader governance strategy. A diverse board can enhance oversight and strategic guidance, but effective risk management also requires strong internal controls and a strategic alignment across the organization. Companies should integrate diverse viewpoints throughout their operations to improve overall risk management and strategic planning.

Investors, in particular, might view gender diversity as a key element of a company's ESG performance, especially in high-risk sectors. However, it is crucial to evaluate diversity alongside other governance factors, such as executive compensation and board structure, to obtain a comprehensive view of a company's risk profile. A holistic assessment can provide a clearer picture of how well a company manages both internal and external risks.

Furthermore, these findings open avenues for future research and policy development. Additional studies could explore the specific ways in which board diversity influences different types of risks, aiding in the development of more targeted governance strategies. Policymakers might consider integrating diversity into broader governance reforms to enhance corporate resilience and performance, highlighting the need for a nuanced approach to governance that considers diversity as part of a larger risk management framework.

5. Conclusion

This study underscores the importance of environmental, social, and governance (ESG) performance in mitigating corporate financial risk, with board gender diversity (BGD) playing a critical moderating role. Firms with stronger ESG practices tend to experience reduced market volatility and financial risks, as they foster trust among stakeholders, enhance their reputational legitimacy, and better manage risks. The research demonstrates that gender-diverse boards, particularly those with female directors, contribute to improved ESG performance, which in turn leads to lower market and systematic risks. Female board members bring diverse perspectives, prioritize sustainability, and encourage responsible decision-making, which enhances firms' long-term stability.

However, BGD's influence is primarily seen in market-related risks rather than internal risks such as organizational or strategic risk-taking, suggesting that the benefits of diversity are more applicable to market risks. This highlights the complexity of the relationship between ESG performance, board diversity, and financial risk, and suggests that while promoting gender diversity in leadership is valuable, its impact may vary depending on the type of risk and governance structure. Firms should actively promote gender diversity on their boards to enhance ESG performance and reduce financial risk, particularly market volatility and systematic risk. Appointing more women to leadership roles can help drive better decision-making in sustainability and stakeholder management. Firms should integrate ESG considerations into their overall risk management strategies, recognizing that a focus on sustainability not only addresses social responsibilities but also contributes to financial stability. Gender-diverse boards can be a strategic asset in this process, helping firms navigates market uncertainties more effectively.

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