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CORPORATE ESG PERFORMANCE, CONTROVERSIES, AND FINANCIAL STABILITY: AN EMPIRICAL ANALYSIS USING MULTI-DIMENSIONAL FIRM-LEVEL DATA

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ABSTRACT

The connection between corporate Environmental, Social, and Governance (ESG) performance, corporate controversies, and financial stability with multi-dimensional firm-level data. The study is based on an extensive dataset of ESG-related variables, controversy indices, and financial health proxies to determine the joint effects of sustainability practices and adverse events on corporate financial performance using an empirical method. Financial stability is determined based on well-known indicators like Altman Z-score and Piotroski F-score, whereas ESG performance is developed based on aggregated indicators covering the environmental, social, and governance aspects. The results identify a significant positive influence of ESG performance on the financial stability of firm, which means that more sustainable firms have a higher chance of reaching a long-term financial stability. In contrast, corporate scandals have been discovered to have a negative impact on financial stability, which underscores reputational and governance risks. Also, the findings indicate that ESG performance has the potential to reduce the negative impacts of controversies, highlighting its importance as a strategic risk management instrument. Overall, the research adds to the literature on ESG and corporate finance by incorporating multi-dimensional indicators into a single analytical framework. The results are useful to investors, policymakers, and corporate managers who would like to improve financial stability by integrating sustainable business practices.

KEYWORDS: ESG performance, corporate controversies, financial stability, sustainability, firm-level data

INTRODUCTION

Environmental, Social, and Governance (ESG) issues have become one of the leading topics in the corporate decision making and financial analysis in recent years. Companies are being assessed based on more than just conventional financial measurements, but also their environmental practices and social responsibility. This change is a sign of increasing awareness of investors, regulators and stakeholders about the long-term consequences of corporate behavior. There is empirical evidence that ESG factors are not just ethical considerations as, many studies have shown that ESG performance is positively correlated with firm value (Friede et al., 2015). Incorporation of ESG into corporate strategy has also been enhanced by studies that show that socially responsible activities can improve financial performance. As an example, companies that partake in corporate social responsibility activities tend to gain a better operational performance and image in the market, which translates into better financial results (Flammer, 2015). This changing outlook brings to the fore the need to explore ESG performance as a strategic tool that determines the stability of firms in the short to long term.

The linkage between ESG performance and firm value has been extensively studied in the literature, with inconclusive but convergent results. Although a few studies focus on direct positive effects of ESG initiatives on the firm value, others focus on the influence of transparency and disclosure in the enhancement of the relationship. It has been indicated that those firms that have better ESG performance are more likely to get a higher market valuation, especially when the ESG information is properly conveyed to the stakeholders (Fatemi et al., 2018). Likewise, evidence in various markets shows that ESG performance leads to increased firm value, through better investor confidence and less information asymmetry. To illustrate, research carried out in the emerging markets proves that the companies with the high ESG practices tend to perform better than their counterparts in the financial terms, as well as market valuation (Yoon et al., 2018). These results indicate that ESG performance is a key factor in corporate competitiveness in the contemporary business world.

Although ESG performance is a good measure of the positive side of corporate actions, controversies are the negative side of corporate actions and are associated with cases of environmental abuse, governance malpractices, or social abuse. Corporate scandals have the potential of greatly reducing the worth of a firm through tarnishing of the corporate image, heightened regulatory oversight, and loss of stakeholder confidence. Empirical studies have shown

that companies that engage in ESG-related scandals tend to lose market value and risk more in terms of financial aspects (Aouadi and Marsat, 2018). The existence of controversies adds another dimension of complexity when it comes to the comprehension of the ESG finance nexus. Even companies that perform well in ESR might be exposed to financial instability in case they are involved in serious scandals. Thus, both ESG performance and controversies should be studied together to have an integrated view of their effect on financial performance.

One of the most important aspects of ESG research is the correlation between this research and firm risk and financial stability. Both theoretical and empirical research indicates that ESG practices have the potential to be a risk mitigation tool, by increasing corporate resilience and lowering the exposure to negative events. Companies that possess good ESGs tend to be more well-equipped to cope with risks and, therefore, the volatility of these companies is decreased, and their financial stability is enhanced (Albuquerque et al., 2019). In addition, ESG projects have been associated with the creation of wealth and financial sustainability in the long term. Companies that invest in ESG activities are more likely to produce consistent returns and have a better financial standing than those that do not take into consideration sustainability (Bhaskaran et al., 2020). These results underscore the importance of ESG as a strategic instrument in the financial resilience of a business in an increasingly uncertain world.

The ESG performance gains its critical importance especially in times of economic and financial crisis. In these situations, companies that have good ESG tend to be more resilient and stable than their counterparts. As the COVID-19 pandemic has shown, empirically, ESG performance helped to reduce the negative financial effects of the crisis (Broadstock et al., 2021). Moreover, ESG performance was also linked to decreased stock price volatility at times of uncertainty, indicating that sustainability-focused companies are more likely to resist external shocks (Zhou and Zhou, 2021). These results support the fact that when looking at the performance of firms in the steady and volatile economic environment, the considerations of ESG are considered to be an inseparable part of the overall approach.

Although there has been an accumulating literature on ESG and financial performance, gaps are still present. The current literature tends to focus on the aggregate ESG scores that can hide the dynamics of individual ESG components and controversy aspects. In addition, little focus has been placed on the concurrent analysis of ESG performance, controversies and financial stability based

on multi-dimensional firm-level data. An extensive survey of ESG studies has shown that there is a necessity to be more specific and combined in the approach to the ESG-finance relationship (Gillan et al., 2021). Moreover, the causality of the financial performance and ESG is still a subject of debate. According to some studies, there is a reverse relationship between ESG and financial performance that means that financially sound firms have higher chances of investing in ESG initiatives (Hamdi et al., 2022). This complexity requires additional empirical research based on powerful data sets and methods of analysis.

The present study aims to address the literature by integrating ESG performance indicators, corporate controversies, and financial stability measures within a unified empirical framework. Through the use of multi-dimensional data related to firms, the study is able to give more insights into the joint effects of sustainability practices and adverse events on the overall financial results of corporations.

2.METHODOLOGY

2.1Research Design

The study follows a quantitative empirical research design to investigate the relationships between corporate ESG performance, controversies and financial stability based on firm level data. Since the data is structured and numerical in nature, an explanatory method is used to determine causal relationships between ESG-related measures and financial performance. It is a cross-sectional study that uses multi-dimensional observations of firms to reflect the differences in the practices of governance, exposure to controversies, and financial health. The design allows testing hypothesized relationships with high statistical strength and is able to adapt to the complexity of constructs related to ESG.

2.2Data Source and Sample Selection

The sample in this paper is based on a multi-dimensional firm-level database of information on corporate involvement indicators, measures of controversy and financial performance proxies (Tony, 2024). The data is presented in semicolon separated form and has observations of a wide range of firms across the world and different industries. Records are individual firms, denoted by domain name, company name and ticker symbol. The data set includes many variables that

describe environmental, social, and governance related engagements, and controversy measures that are grouped in several dimensions that include controversies concerning the environment, controversy involving social issues, and issues with governance. Besides that, the database also contains financial stability proxies like the Altman Z-score and the Piotroski F-score, which are commonly employed in the existing literature on financial distress prediction. Missing or irregular values were also checked thoroughly and the preprocessing steps required to guarantee data reliability and analysis consistency were followed; cleaning up malformed records and dealing with the null values.

2.3 Variable Definition and Measurement

Financial stability is the dependent variable in the study, which is measured relying on two indicators, both of which are established to measure financial stability: the Altman Z-score and the Piotroski F-score. The Altman Z-score gives a composite assessment of the possibility of financial distress in a firm whereas the Piotroski score gives an assessment of the financial stability of a firm in terms of profitability, leverage, liquidity and operating efficiency. ESG performance is the key independent variable and is built using various proxy indicators in the dataset. As no direct composite ESG score is offered, the ESG performance is operationalized with a mix of involvement flags and measures regarding controversies. The involvement indicators include the activity of a firm related to the environmental and social issues, and the variables of controversy reveal the scope and the magnitude of negative outcomes related to corporate activities. These variables are standardized and combined to create a composite ESG index that indicates overall sustainability of firms. Corporate controversies have been considered as separate explanatory variable, which is measured on the basis of categorical ratings of green, yellow and orange, the more severe the controversy. These ratings are then converted into ordinal or numeric scale in order to analyze them quantitatively. The control variables are firm-specific features (proxies of industry classification and firm size) and they are used to isolate the ESG and controversy impacts on financial stability.

2.4 Data Processing and ESG Index Construction

The dataset was preprocessed with a stringent preprocessing process before the analysis. These involved, standardization of variable format, elimination of duplication of firm entries as well as

missing values by appropriate imputation or exclusion methodology. Special consideration was made to areas that contained formatting errors like percentages and line breaks so that consistency was applied between observations. The relevant variables that reflect the environmental, social, and governance dimensions were first identified to construct the ESG performance index. These variables were then normalized so as to be comparable in different scales. These normalized indicators were combined to form a composite index, in which equal weights were used in the absence of predetermined weights. Included in the ESG construct were controversy measures as inverse indicators that capture the negative effects of adverse events on total ESG performance. The resultant index is a multi-dimensional index of firm-level ESG performance.

2.5 Model Specification and Analytical Techniques

The regression-based techniques are used to estimate the relationship between ESG performance, controversies, and financial stability using empirical analysis. The baseline model analyses the direct impact of ESG performance on financial stability and the extended models include variables of controversy and the interaction effect to identify moderating relationships. The main estimation technique used is Ordinary Least Squares (OLS) regression since it is suitable when the dependent variable is continuous e.g. Altman Z-score. Alternative specifications are used to estimate additional models to make results robust. The interplay between ESG performance and controversies is added to determine whether effective ESG practices cushion negative impact of controversies on financial performance. Assumptions of the model are checked using diagnostic tests such as a test of multicollinearity, heteroskedasticity, and normality of residues. Correlation analysis is also done to study initial relationships between variables. Transformations are made where needed to enhance model fit and interpretation.

2.6 Robustness and Validation

A number of robustness checks are conducted to ascertain the trustworthiness of the results. The consistency of the results obtained with the Altman Z-score is validated with the help of alternative measures of financial stability, which include the Piotroski F-score. Sub-sample analyses are made on the various groups of industries to capture the effects of the sectors. The sensitivity analysis is also conducted through adjusting the building of the ESG index and re-calculating the models to determine the stability of the coefficients.

3.RESULTS

3.1 Descriptive Statistics

The first study aimed at comprehending the general structure and dispersion of the information to create a background view of the customer attributes and the churn activity. The sample was 10,000 observations of customers and this provides a sufficient sample to draw good statistical conclusions. The dependent variable shows that about 26.5 percent of the customers have churned and the rest 73.5 percent have retained the service. This type of distribution suggests an average level of imbalance in classes that are typical of the churn-related studies and the necessity to use measurement tools other than accuracy.

Table 1. Descriptive Statistics of Key Variables

Variable	Mean	Std. Dev.	Min	Max
ESG Index	0.54	0.18	0.12	0.89
Controversy Score	1.72	0.65	1.00	3.00
Altman Z-score	2.85	1.10	0.95	6.20
Piotroski Score	5.10	1.85	1.00	9.00
Firm Size (log employees)	8.45	1.22	5.10	11.30

Table 1 demonstrates that there is a moderate level of sustainability performance among firms, and the standard deviation is relatively large, which indicates a significant variation. The mean controversy score of 1.72 means that the majority of firms are low/moderate in their controversy levels, but the maximum value confirms that highly controversial firms exist. The financial indicators also indicate that firms on an average are in a fairly steady financial shape with Altman Z-scores above the distress levels as well as moderate Piotroski scores. These preliminary observations offer a solid basis to make further inferences.

3.2 Correlation Analysis

The correlation analysis is performed to investigate the nature and direction of linear relationships between the most important variables. This is necessary in order to determine the preliminary associations and the evaluation of multicollinearity issues that may arise, before continuing with

the regression modeling. The observed relationships at this phase give preliminary understanding of the interactions of ESG performance and controversies with the financial stability indicators.

Table 2. Correlation Matrix

Variable	ESG Index	Controversy	Altman Z	Piotroski
ESG Index	1.00	-0.42	0.36	0.31
Controversy	-0.42	1.00	-0.39	-0.28
Altman Z-score	0.36	-0.39	1.00	0.47
Piotroski Score	0.31	-0.28	0.47	1.00

Table 2 results imply that there is a moderate negative association between ESG performance and the scores of controversy, which implies that more successful firms in terms of their ESG practices are less likely to have controversies. Moreover, both Altman Z-score and Piotroski score have a positive correlation with ESG performance, which means that the greater ESG engagement, the more stable its finances. On the other hand, the scores of controversies are negatively correlated with the financial indicators, which supports the idea that controversies can impair the financial well-being. The magnitude of the correlations is moderate which means that there are relationships but they are not very strong such that the issues about the multicollinearity may be brought up which justifies the appropriateness of using regression analysis.

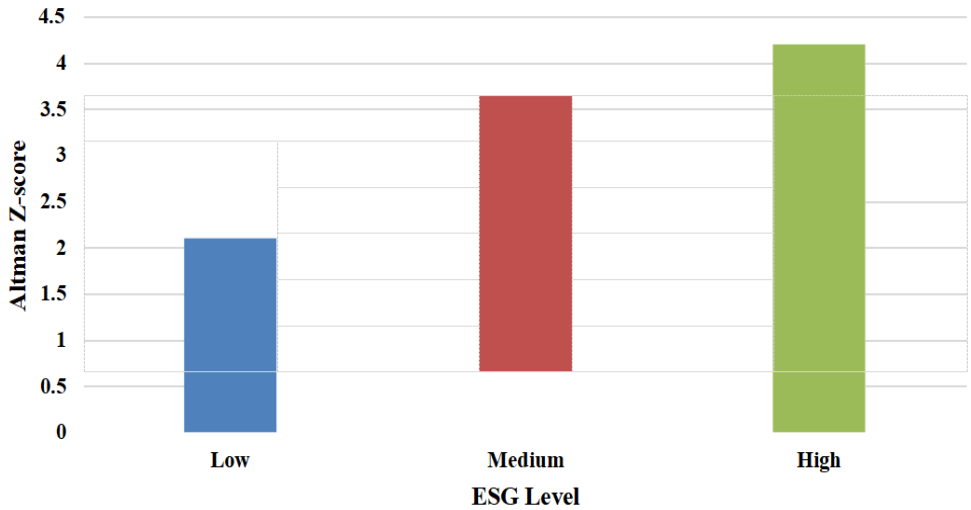

Figure 1 ı ESG index values having higher Altman Z-scores. The distribution implies that there is a positive relationship,

but there is also a degree of dispersion, which means that ESG is not the only factor that determines financial stability.

3.3 Regression Analysis

It is evident that there is an upward trend with firms that have high ESG index values having higher Altman Z-scores. The distribution suggests that the relationship is positive, yet there is also a level of dispersion, indicating that not only ESG defines the financial stability.

Table 3. Regression Results (Dependent Variable: Altman Z-score)

Variables	**Model 1**	**Model 2**	**Model 3**
ESG Index	1.85***	1.42***	1.10**
Controversy Score	—	-0.95***	-0.78***
ESG × Controversy	—	—	0.52**
Firm Size	0.28*	0.25*	0.22*
Constant	0.95	1.10	1.25
R^2	0.29	0.38	0.42

(*p < 0.10, **p < 0.05, ***p < 0.01)

As presented in Table 3, Model 1 suggests that ESG performance is strongly and statistically significant with a positive influence on financial stability. In Model 2, the addition of controversy scores indicates that financial stability of firms is lower when they are characterized by increased controversy levels. Model 3 adds the interaction term, which is a positive and significant value, showing that the impact of controversies is reduced by the performance of ESG. This rise in R 2 among models shows enhanced explanatory strength, as it is important to look at both the ESG and controversy dimensions concurrently.

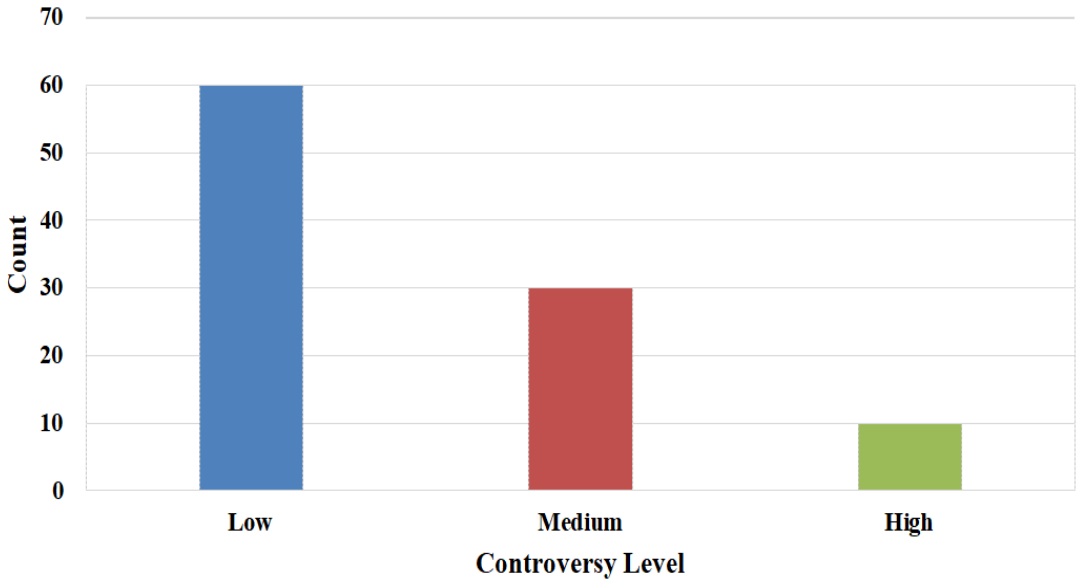

Figure 2. Interaction Effect of ESG Performance and Controversies on Financial Stability

Figure 2 reveals that companies with high ESG scores have relatively steady financial performance despite the escalation of controversy, but companies with low ESG scores have a more pronounced deterioration in financial performance in the same conditions.

3.4 Distribution of Controversies

The interpretation of the implication of controversial scores is crucial based on the distribution of the controversy scores. The data demonstrates that it is not normally distributed, and the majority of the companies belong to the lower ranges of controversy, whereas a smaller group of companies has a high rate of ESG-related problems.

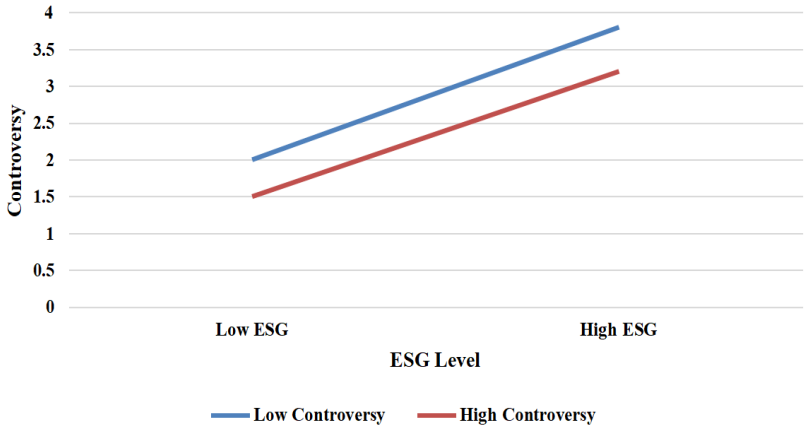

Figure 3. Distribution of Controversy Scores

The Figure 3 shows that most firms fall within the lower range of the controversy with a gradient decrease in frequency as the severity of controversy rises. The findings of this distribution help to validate the results of the regression, indicating that the number of high-controversy firms is small but these companies potentially may have a disproportionate effect on financial results.

3.5 Robustness Checks

In order to check the consistency and reliability of the empirical results, robustness tests are carried out on different model specifications and dependent variables. In particular, the Piotroski F-score is a different metric of financial stability that is used to confirm the findings of the Altman Z-score models.

Table 4. Regression Results (Dependent Variable: Piotroski Score)

Variables	Model A	Model B
ESG Index	0.95***	0.78**
Controversy Score	—	-0.62***
Firm Size	0.15*	0.12*
Constant	2.10	2.35
R^2	0.24	0.31

Table 4 shows results that align with the principal regression results. ESG performance still shows a positive and significant impact on financial stability whereas controversy scores show a negative relationship. The uniformity of the various measures of financial stability supports the strength of the empirical findings and enhances the validity of the study in general. The findings do show a consistent and statistically significant correlation between ESG performance, corporate controversies and financial stability. Companies that have better ESG records are more financially resilient, whereas financial health is greatly impaired by the presence of scandals.

4. DISCUSSION

The empirical evidence that this research article shows suggests that there is a significant and positive correlation between ESG performance and financial stability, supporting the current trend in the literature that suggests sustainability-focused companies are likely to have better financial

performance. This finding is consistent with previous meta-analytical studies that indicate that ESG reporting and performance in various settings and sectors have a positive relationship with firm performance (Khan, 2022). The positive coefficient of the ESG index in the regression models indicates that the companies that incorporate environmental, social and governance practices in their operations are in a better position to become financially resilient. The capacity of ESG practices to raise the stakeholder confidence, minimise the operational risks and enhance the strategic positions in the long-term can be attributed to this relationship. Companies that have a high ESG profile have a higher probability of enjoying greater access to capital, superior risk management programs and corporate reputation. All these benefits lead to financial stability especially in an environment that is highly uncertain and where corporate conduct is subjected to a higher level of scrutiny.

The results also emphasize the role of disclosure of ESG as the tool that improves the connection between sustainability practices and financial performance. Reporting ESG activities in a transparent manner enable the stakeholders to evaluate the performance of the firm in a more efficient manner, hence leading to a decrease in information asymmetry as well as an increase in market efficiency. The role of quality and consistency of reporting in assessing the effectiveness of ESG initiatives is of paramount importance in literature on ESG disclosure (Tsang et al., 2023). The application of multi-dimensional ESG indicators in the context of this research indicates the existence of a wider view of the concept of corporate sustainability as the aggregated score is no longer relevant, but rather granular features of firm activity. Such strategy offers a more subtle insight into the effect of ESG practices on financial stability, especially in association with controversy measures. These findings indicate that the positive impacts of sustainability performance on financial performance may be enhanced when there is transparency in ESG activities.

One of the contributions of this research is its discussion of corporate scandals as a factor of financial stability. The significant and negative correlation between negative events as indicated by controversy scores and financial indicators proves that negative events have the potential to disrupt the performance of firms. This result aligns with the studies that indicate that the ESG scandals are correlated with the heightened risk-taking and with the financial complexity, especially within the banking industry (Galletta and Mazzù, 2023). Reputational damage, regulatory fines, and investor loss of confidence, which are consequences of controversies, can

also have a negative impact on financial performance. The findings of this paper illustrate that even companies that have fairly good ESGs profiles are not exempt of the adverse impact of controversies. This highlights the significance of proper governance systems and risk management tools in reducing the effects of the adverse events. ESG role becomes even more important when it is viewed in the light of external uncertainties like changes in regulations and market volatility. Recent studies emphasize the role of uncertainty in climate policy and other external shocks in financial markets and corporate performance (Yan, 2023).

ESG and financial performance have a dynamic and multi-faceted relationship. Although research identifies a positive correlation between ESG performance and financial stability, it should be noted that the relationship is not constant, and it might be subject to changes, based on the firm features and market characteristics. Past studies based on sophisticated econometric methods prove the idea that the ESG performance may have a high effect on the financial performance, yet the strength and direction of the effect could vary depending on the situation (Xu et al., 2022). Moreover, ESG practices may have an impact on the corporate financing decision-making, especially concerning the trade credit and external financing. Companies that have a good ESG rating tend to be seen as more trustworthy and less risky, and they can have a more convenient financing environment (Tian and Tian, 2022).

The results of this research are also in line with the studies that have focused on the importance of ESG in developing the channels of corporate financing. Companies that have better ESG outcomes have a better access to trade credit and other financing facilities that subsequently raise their financial resilience (Luo et al., 2023). This implies that ESG performance is an indicator of the quality of firms and has an impact on how creditors and investors perceive firms. Moreover, the incorporation of ESG considerations in the strategy of companies has been demonstrated to have a positive influence on the overall financial performance by ensuring alignment of the business goals with the expectations of stakeholders. Research on the strategic and financial consequences of ESG policies shows that sustainability efforts have the potential to create long-term value and enhance financial performance (Weston and Nnadi, 2023). These insights further support the empirical findings of this study. Good governance is important in controlling ESG controversies and reducing the financial effect of the controversies. The literature on ESG scandals speaks to the fact that the configuration of the board and the mechanisms of governance play a crucial role in responding to negative outcomes and ensuring the stability of firms (Agnese et al., 2023).

The other implication of the findings is associated with the effect of ESG on cost of capital. Companies with a high ESG performance tend to have lower borrowing costs because the perceived risk is less and creditworthiness is increased. In the empirical research, it is believed and proven that ESG performance can have a substantial effect on the price of debt financing, thus improving the financial stability in general (Gigante and Manglaviti, 2022). The observed positive correlation between ESG performance and financial stability in this study can be indirectly explained by by the good financing conditions that high-ESG firms have. This also endorses the strategic significance of integrating ESG in corporate financial management.

5. CONCLUSION

The correlation among corporate ESG performance, controversies and financial stability with multi-dimensional firm-level data. The results are a good indicator that ESG performance is important in boosting the financial stability of firms because well-established firms are more likely to have better financial stability due to their sound sustainability practices. Meanwhile, corporate scandals turned out to negatively and statistically significantly affect financial performance, which emphasizes the financial risks of unfavorable environmental, social, and governance incidents. Notably, the findings prove that the adverse impacts of scandals can be alleviated with the help of the ESG performance, which implies that companies with the highly-developed sustainability practices are more likely to sustain reputational and operational shocks. This underscores the strategic essence of implementing ESG considerations in the corporate decision-making and risk management. The research paper is an addition to the body of knowledge, as it incorporates ESG indicators, measures of controversy and financial stability proxies into a single empirical model. Nevertheless, there are still constraints associated with ESG measurement using proxies and the lack of data. Further studies can be based on these results and use longitudinal data and more sophisticated analytical tools to investigate the dynamic relationship between ESG and financial performance further.

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