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ESG Disclosure and Firm Value: Dynamic Threshold Effects of Corporate Governance and Financial Flexibility

Abdulkadri Toyin Alabi
Department of Accounting and Finance, Kwara State University, Malete, Nigeria
alabiabdulkadri@gmail.com, ORCID

Abstract

This study investigates the dynamic panel threshold effect of Environmental, Social, and Governance (ESG) disclosure on firm value, while examining the critical role of corporate governance effectiveness and financial flexibility as threshold determinants in the relationship between ESG disclosure and firm value creation. The primary objective is to ascertain the extent to which ESG disclosure contributes to firm value creation, as well as to explore the variability of this impact across different levels of corporate governance and financial flexibility. The study is based on secondary data from audited annual and sustainability reports of 94 sampled companies listed on the Nigerian Exchange Group (NGX) from 2016 to 2022. The results from the differential Generalized Method of Moments (GMM) regression revealed a positive significant relationship between ESG disclosure and firm value creation, which indicates that companies that prioritize ESG disclosure can achieve superior financial performance and market valuation. The dynamic threshold model results indicate non-linear positive effects of ESG disclosure on firm value in organizations with lower governance practices, however, the effect is significantly amplified in firms demonstrating higher governance effectiveness. Also, as financial flexibility increases, the threshold effect of *ESG* disclosure becomes more pronounced. In firms characterized by low financial flexibility, the contribution of *ESG* to firm value is minimal. However, as firms enhance their financial flexibility, the positive effects of *ESG* disclosure become increasingly significant, suggesting that the capacity to invest in *ESG* initiatives is critical to realizing their value-generating potential. This study offers important insights into the complex interplay between *ESG* disclosure, corporate governance, and financial flexibility in the context of firm value creation. It is recommended for firms to not only engage in ESG disclosure but to also ensure the alignment of their corporate governance and financial strategy in order to maximize the resultant value.

Keywords: ESG, firm value, sustainability, value relevance, corporate governance, financial flexibility

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Introduction

In recent times, pressing problems such as climate change, global warming, and environmental degradation have contributed to the occurrence of numerous natural disasters, societal and economic catastrophes [1–3]. The paradox that companies face in today's modern day is that while the reporting companies disclose their financial performance to stakeholders, they often neglect to reveal how their actions impact society and the environment in the pursuit of profit [4]. This creates a disconnect, as stakeholders, including investors, consumers, and the public, are increasingly interested in understanding not just a firm's results in terms of the financial aspect, but also their footprint as it relates to social and environmental impact. The paradox lies in the fact that companies may present positive financial outcomes without being transparent about the potentially harmful effects their operations have on people and the planet, raising concerns about the long-term sustainability of their practices [5].

Inherent in sustainability practices are the environmental and social issues that have created growing pressure on companies to address and disclose their sustainability actions, social accountability, and governance practices. However, there is a current debate regarding the role environmental, social, and governance (ESG) disclosures play in improving company value [6–8]. Despite increasing demands for transparency in how companies manage and report on these issues, the ESG disclosure impact on the valuation of firms remains uncertain and unresolved in academic literature. ESG reporting is an extension of sustainability and integrated reporting frameworks, which aims to broaden the scope of corporate reporting beyond traditional financial data. ESG includes non-financial information, focusing on the role of entities on their environment and society at large [9; 10]. This shift reflects a growing recognition among companies that success is not solely defined by financial performance, but also by how their operations affect stakeholders and the world at large. Companies are now increasingly developing sustainability strategies and providing non-financial reports to offer a more comprehensive picture of their activities [11; 12].

ESG disclosure has thus gained significant attention within the corporate world, as firms face increasing pressure to be not only profitable but also responsible in their social and environmental practices [13]. Companies are now focusing on sustainability in order to demonstrate stronger governance and commitment to eco-friendly practices [6]. Firms tend to prioritize ethical behaviour, social well-being, and responsible practices which is believed to lead to improved performance and increased firm value. When companies disclose ESG information with the aim of strengthening their competitive edge, it not only boosts investor confidence but also enhances their reputation in the market. This, in turn, positions them for superior future performance and a more sustainable path forward [14].

In the context of the Nigerian economy, the phenomenon of ESG disclosure has gained significant traction in the developing economies like Nigeria, where corporate governance and financial practices remain under scrutiny [15]. More so, peculiar corporate reporting challenges within Nigeria including rampant governance noncompliance, weak regulatory frameworks, and limited accountability have intensified the need for transparency and value relevance in corporate operations [16]. On this note, companies operating in Nigeria are increasingly being called upon to disclose their ESG practices to build stakeholder trust, mitigate potential reputational risks, and enhance firm value [17; 18]. Despite these pressures, many firms in the Nigerian corporate sector struggle with effective ESG reporting, highlighting a significant gap between corporate aspirations and actual practices.

Therefore, this study investigates the interplay between ESG disclosure, corporate governance effectiveness, and financial flexibility, as these factors are pivotal in determining a firm's value in Nigeria's unique economic landscape. Corporate governance effectiveness serves as a vital mechanism that not only promotes ethical behaviour but also enhances accountability among management, thereby leading to improved ESG disclosures [19; 20]. Financial flexibility, on the other hand, allows firms to adapt their capital structure in response to new ESG-related initiatives, demonstrating resilience and sustainability [21; 22]. Together, the investigation into all these will offer a comprehensive context in understanding the multidimensional connection between ESG disclosure and firm value. Furthermore, in consideration of the increasing literature on ESG practices and firm value, limited studies have adequately researched the complex roles of the effectiveness of corporate governance and the effect of financial flexibility within the Nigerian context. Existing studies often overlook the unique socio-economic and cultural dynamics that influence governance structures and capital management strategies in Nigeria. This paper therefore intends to bridge this lacuna by investigating how these concepts are related, offering a more comprehensive perspective on corporate behaviour in transitional markets like Nigeria [23; 24].

This study is structured into five sections. The next part, which is the second section, presents an extensive literature review, including hypothesis development grounded in existing studies and evidence. The third segment delineates the methodology employed, outlining the data collection and analytical techniques utilized in the paper. Section four offers empirical results and a discussion of the findings, integrating insights from the data to elucidate the relationships explored. Finally, the conclusion summarizes the key findings, contributions and present policy recommendations aimed at fostering improved ESG disclosures among Nigerian firms, thereby enhancing their overall value in the marketplace.

Literature review and hypotheses development

The connectedness between ESG disclosure and firm value creation has gathered substantial consideration in recent research. As global environmental and economic issues intensify, the inclusion of ESG factors in corporate reporting has become a critical focus for various stakeholders. Several studies have highlighted the influence of ESG disclosure on the value of the firm, emphasizing their role in signalling sustainable practices to investors. Similarly, prior research conducted across different countries and regions has employed diverse datasets and models to perform extensive theoretical analyses and empirical investigations to reveal that the value of firms is affected by various factors such as sustainability performance [5; 6; 8] earnings quality [23; 25–28] corporate governance mechanisms [24; 29–33], and firm characteristics [7; 34; 35]. Of these factors, financial variables and corporate governance attributes revealed a pivotal impact on the creation of firm value.

With respect to the growing emphasis on integrating non-financial information with traditional financial reporting, the study by Constantinescu et al. [36] disclosed the association between ESG factors disclosure and firm value, particularly in the energy sector. The study confirmed the association between ESG disclosure and firm value, suggesting that incorporating ESG factors into corporate reporting could positively influence a firm's ability to attract capital. Similarly, Yoon et al. [8] and Wang et al. [9] found that ESG disclosure enhances firms' attractiveness to investors by presenting a holistic view of value creation that integrates long-term sustainability with short-term profitability. This notion aligns closely with the findings of Abdulqadir [37], who reported that firms demonstrating robust ESG practices experience improved market valuation, particularly through environmental and governance disclosures. Similarly, Fu and Zhou [38] identified a significant positive association between ESG disclosures and firm value in China, particularly when firms emphasize environmental and social dimensions. These studies collectively emphasize the growing investor preference for companies that balance financial performance with sustainability objectives. This implies that firms can better leverage ESG initiatives to attract investors. However, while ESG disclosure has been generally found to positively influence firm value, the individual dimensions, i.e., environmental, social, and governance, exert varied effects. Alabi and Issa [5] and Ortas et al. [39] demonstrated that environmental disclosure significantly enhances firm value, reflecting investors' prioritization of sustainable practices and reduced environmental risks. In contrast, social disclosure often yield mixed results. For example, in Nigeria, Ibrahim and Tahir [4] revealed that sustainability disclosure contributes to firm valuation and enhances market performance.

Furthermore, the role of ESG disclosure and firm-specific characteristics in shaping firm value in emerging markets was examined in the study conducted by Suretno et al. [3]. The study investigated the relationship between ESG disclosure and firm value, focusing on companies listed on the Indonesia Stock Exchange. The study analysed a sample of 27 companies over a five-year period and found a positive and significant effect of environmental and social disclosures on firm value. This indicates that companies emphasizing these aspects can enhance their market valuation. In addition, the study also revealed that governance disclosure, in contrast, had a negative and significant impact on firm value, suggesting potential concerns over governance practices or misalignment with investor expectations. In a similar vein, Yordudom and Suttipun [40] examined the extent and impact of ESG disclosure on firm value, focusing on 60 listed Thai companies. The study found a positive relationship between environmental and social disclosures and firm value, indicating their potential to enhance investor perceptions and market performance. Conversely, governance disclosures were found to negatively influence firm value, suggesting that certain governance practices or reporting approaches might not align with shareholder expectations. Likewise, with a focus on China's listed companies, Zhang et al. [14] explored the interaction between corporate social responsibility on firm value and revealed that the environmental and social disclosures have a positive effect on firm value.

In the Nigerian context, drawing inspiration from the crisis of credibility that emerged in the investment sector after the collapse of several companies, Ebimobowei [30] examined the impact of corporate governance mechanisms on the valuation of Nigerian banks. The findings demonstrated that corporate governance mechanisms have a positive and significant effect on the value of these banks. This study implies that adopting robust corporate governance practices can enhance the overall value of firms operating within Nigeria's deposit money banking sector. Igbinovia and Agbadua [15] explored the impact of ESG reporting on value-based performance and the results indicate that stand-alone ESG reporting does not have a significant direct impact on firm value. However, when moderated by firm advantage, the effect becomes both significant and positive. This suggest that ESG disclosure exclusively enhances firm value when it is strategically leveraged to improve profitability, such as by boosting sales through an enhanced public image or lowering financing costs. Likewise, Terkuma and Aga [18] investigated the impact of ESG disclosure on the market value of listed manufacturing firms in Nigeria, specifically analyzing its effects on share prices. The study indicated that environmental disclosure positively and significantly affects market value, suggesting its importance in attracting environmentally conscious investors. Social disclosure also positively influences market value but the effect is insignificant, highlighting their limited direct impact on investor decisions. In contrast, governance disclosure shows a significant but negative effect on market value, implying potential misalignment between governance practices and market expectations.

While the literature consistently highlights the positive role of ESG disclosure, several gaps remain, particularly from a conceptual and methodological perspective. Methodological rigor has been critical in advancing the understanding of ESG's effect on firm value. Quantile regression, as employed by Buallay et al. [41] and Wu and Chang [42], reveals that the positive impact of ESG disclosure and green innovation is more pronounced in firms with medium to high market value. Similarly, Alsulami [43] and Meng et al. [44] utilized dynamic panel threshold regression models to capture non-linear effects, providing insights into the varying influence of ESG factors across different thresholds of firm performance and economic development. Thus, it is presented that ESG disclosures are critical drivers of firm value, particularly in emerging markets like Nigeria. Environmental and governance disclosure tends to exert stronger positive effects, while social disclosure requires further refinement to deliver measurable financial benefits. Therefore, the study proposes the first hypothesis:

Hypothesis 1 (H_1): *ESG disclosure significantly contributes to firm value creation.*

The study further considered the connection between ESG disclosure and firm value, in consideration of the possible threshold effect of corporate governance effectiveness, with recent studies highlighting the significant role that effective governance effectiveness plays in enhancing sustainability performance and mitigating risks. Importantly, it is crucial to align governance mechanisms with legal frameworks in order to improve the importance of voluntary disclosure for attracting investors and then improve the overall firm performance. For instance, Assidi [1] investigated the impact of voluntary disclosure and corporate governance on firm value, in consideration of the moderating effect of legal changes in the French context. Using data from 1001 observations of firms included in the SBF 120 index, the results demonstrate that voluntary disclosure influences firm value in a positive manner. The study found that regulatory changes, such as the EU Directive 2013/34, amplified the positive effects of ESG disclosure by promoting transparency and aligning corporate governance practices with investor expectations. Moreover, the presence of legal reforms enhances this relationship by fostering improved governance practices, indicating that the interaction between voluntary disclosure and corporate governance creates value under favourable legal conditions.

Moreover, Wu et al. [45] suggest that efficient corporate governance can moderate the relationship between ESG initiatives and firm value, especially when governance is strong, with internal factors like board gender diversity and independence being particularly important. Similarly, Bukari et al. [46] emphasize that corporate governance attributes, such as board diversity, independent boards, and regular meetings, positively influence firm value, while the integration of ESG performance further strengthens this relationship. Mishra et al. [47] extend this by demonstrating that effective governance structures that incorporate climate considerations reduce risks and improve long-term sustainability, thereby contributing to higher financial performance. These studies also highlight a threshold effect where the effectiveness of corporate governance may influence the extent to which ESG factors affect firm value. In line with Shrivastava and Addas [48], the evidence suggests that disciplined governance tends to translate to better and higher ESG disclosure scores, which in turn can enhance firm value. Moreover, Fahad and Rahman [49] identify a more precise relationship, where certain board characteristics, like board age and employee CSR training, can weaken the disclosure of CSR activities. Also, Bello and Abdullahi [50] noted that governance disclosure sometimes negatively influences firm value in developing economies like Nigeria. This could stem from misalignment between governance practices and investor expectations or the excessive cost of compliance in less-developed regulatory environments. However, Mishra et al. [47] and Sharma et al. [2] revealed that while ESG disclosure can negatively impact firm value in some contexts, particularly when governance structures are weak, strong governance can mitigate these effects. This suggests that the effectiveness of corporate governance may have a threshold effect on the relationship between ESG practices and firm value, potentially influencing how firms respond to stakeholder expectations and environmental challenges. Given this, the study formulated the second hypothesis:

Hypothesis 2 (H_2): *The impact of ESG disclosure on the value of a firm varies by the effectiveness of corporate governance and is greater in firms with higher corporate governance effectiveness.*

Furthermore, this study likewise considered the threshold effect of financial flexibility on the relationship between ESG disclosure and firm value creation. The literature on the relationship between financial flexibility, ESG performance, and firm value highlights the fundamental role of financial flexibility in enhancing the positive impact of ESG performance on firm value. Naseer et al. [51] find that financial flexibility moderates the effects of climate change risks on firm value and ESG performance, which implies that firms with higher level of financial flexibility can mitigate risks and capitalize on ESG opportunities. Similarly, Akbar and Setiana [52] confirm that financial flexibility reinforces the positive effect of ESG performance on firm value, although they argue that financial flexibility does not mediate this relationship. Zhang and Liu [53] further support this by revealing that ESG performance enhances financial flexibility, especially in high-uncertainty environments. These studies collectively emphasize that companies with robust ESG practices are better positioned to improve their financial stability and adaptability, especially when facing external challenges. Conversely, Yunica and Rokhim [10] suggest that while ESG performance enhances financial flexibility, financing constraints do not significantly mediate this relationship, highlighting that the direct effect of ESG on financial flexibility remains robust.

The findings across these studies suggest that financial flexibility is crucial for firms to leverage ESG disclosure and effectively improve firm value. The threshold effect of financial flexibility appears particularly significant, as revealed by Sheng and Ann [54], who argue that excessive financial flexibility could lead to diminishing returns in sustainable performance, depending on external factors like environmental uncertainty and government grants. Istan [55] further asserts that financial flexibility, alongside asset structure and income volatility, plays a critical role in enhancing corporate performance and capital structure, reinforcing the notion that financial flexibility is a key driver of firm success. Based on these insights, the third hypothesis for this study is formulated:

Hypothesis 3 (H_3). *The influence of ESG disclosure on the value of a firm varies by level of financial flexibility and is greater in firms with higher levels of financial flexibility.*

Methodology

Sample and Data Source

Relying on the positivist approach, the study investigated the role of ESG disclosure of listed Nigerian firms in their value creation, in consideration of their financial flexibility and the effectiveness of adopted corporate governance. The study utilizes secondary data obtained from the audited annual reports and sustainability reports of companies listed on the Nigerian Exchange Group (NGX) between 2016 and 2022. A total of 94 quoted companies were included in the sample, representing a diverse range of sectors. The study considered the listed companies across all sectors to improve its generalizability and relevance. This broad coverage ensures that the findings apply to a wide variety of businesses, industries, and corporate environments.

Variables definition and measurement

Dependent variable: The study employed the Tobin's Q (TQ) ratio, which is a market-based performance indicator as a measure of a firm's value. Tobin's Q is calculated by dividing the sum of a firm's market capitalization, its liabilities, equity, and minority interest by its total assets [56]. The reason for choosing this metric is that it reflects the expectations of shareholders regarding the firm's future performance, taking into account its past or current performance [17; 56]. Tobin's Q is a metric commonly used to assess companies' performance in meeting or exceeding stakeholder expectations, as well as to evaluate how well a company maximizes shareholder returns by increasing the firm's equity value [57]. Unlike traditional accounting measures of performance, which overlook systematic risks, Tobin's Q incorporates these risks, providing a more comprehensive valuation of firm performance and value creation [20].

Main explanatory variable: ESG disclosure (ESG) is the core explanatory variable of this study. In order to assess the extent of ESG disclosure across the sampled firms, the study developed a checklist of twenty-six (26) items. The full 26-item ESG checklist is provided in Appendix A. Items were selected based on Ortas et al. [39] and cross-checked against global reporting frameworks (GRI Standards) and relevant Nigerian reporting guidance to ensure contextual relevance. The study utilized a dichotomous (0/1) coding approach primarily due to data availability and to ensure consistent scoring across firms and years. The dichotomous scoring was conducted as follows: companies were awarded a score of "1" if they provided either full or partial disclosure of an item and "0" if they made no disclosure. The total ESG information disclosed is then divided by the total number of possible ESG disclosures.. Utilizing this approach, an overall ESG disclosure score was calculated for each company to quantify their level of ESG disclosure.

Control variables: The study incorporates several control variables that can influence a firm's value creation. Using a two-step process, the study developed a corporate governance (CGE) index based on the 2018 Nigerian Code of Corporate Governance. In the first step, following the methods of Dembo [58] and Nsour and Al-Rjoub [19], five key corporate governance components were identified: board structure, board procedure, disclosure, ownership structure, and minority shareholder rights. A sub-index was constructed for each component, specifying governance requirements based on Nigerian best practices, governance guidelines, and existing literature. The detailed breakdown of items composing each of the five CGE sub-indices is provided in Appendix B. In the second step, a binary scoring system was applied, where companies received a score of "1" if they complied with and disclosed a specific governance provision and "0" if they did not. Each element within a sub-index was equally weighted, and the scores were averaged to determine the overall score for that dimension. The choice for equal weights was driven by (a) comparability to previous studies in similar contexts, (b) interpretability for policy audiences, and (c) data limitations preventing reliable estimation of differential weights across certain sparse items.

Financial flexibility (FINFL) is assessed using a combination of two key financial indicators: cash holdings and debt levels, consistent with previous studies [51; 59]. While cash flexibility represents a firm's ability to use its internal funds and is calculated by dividing cash and cash equivalents by total assets, debt flexibility reflects the firm's ability to access external financial resources and is measured as 1 minus the corporate debt ratio. The overall financial flexibility is then determined by adding cash flexibility and debt flexibility [21; 22]. The final index score was calculated by averaging the scores across all sub-indices, ensuring a systematic and balanced evaluation of corporate governance practices. The study acknowledges that this FINFL measure used (cash/assets + (1 – debt ratio)) is a simplified composite that conflates different forms of flexibility. Alternative approaches, such as constructing separate indices for liquidity and debt capacity, or using scaled z-scores and principal component analysis to combine them, may better capture the trade-offs between cash holdings and debt headroom. Due to data availability and to follow precedent in similar emerging-market studies, the study presents the additive index in the baseline analysis. The study further controlled for firm-specific variables; financial leverage (FLEV) is a proportion of total liabilities to the total assets. Growth (GRW) was measured by the percentage change in total assets, while the value of the total assets was used as a proxy for firm size (FSIZ) [9; 17].

Model Construction

At the initial stage of this study, the direct impact of ESG disclosure on firm value was considered. Due to the inertia inherent in firm value (Tobin's Q), which is not easily changed or redefined because of its dependence on historical decisions, strategies, and investments, hence, the study further included a one-period lag of firm value proxied with Tobin's Q as one of the explanatory variables in the dynamic panel model. The study specified the first model in consideration of the direct effect in the absence of the selected control variables of the study, while the second model included the effects of the control variables. Thus, these baseline models are constructed as follows:

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 TQ_{it-1} + \varepsilon_{it}; \quad (1)$$

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 TQ_{it-1} + \beta X_{it} + \varepsilon_{it}, \quad (2)$$

where *TQ* refers to Tobin's Q; *ESG* is the constructed *ESG* disclosure index score, while *X* represents the control variables; *i* signifies the selected sampled listed firms on the *NGX* across all sectors ($i = 1, 2, ... 20$); *t* represents the year in question; ε refers to the random disturbance terms in the model.

Subsequently, with reference to the prime validation of the impact of *ESG* disclosure on firm value, the models of the dynamic threshold regression are intended to investigate the likely threshold effects between *ESG* and firm value. The level of corporate governance effectiveness (*CGE*) and the sampled firms' financial flexibility (*FINFL*) were selected as the two variable thresholds. In order to examine whether there is any distinction in the level of *ESG* impact on firm value at different levels of corporate governance effectiveness and the intervals of financial flexibility, the process further involved testing the variables threshold's significant effects, and the next step was to estimate the precise threshold number and values corresponding to the variable thresholds.

The dynamic threshold regression models have been extensively employed in prior literature [37; 38; 60]. Hansen [61] initially introduced a stationary panel threshold model based on fixed effects, but it required strong exogeneity of the explanatory variables, which limited its applicability. In order to address this limitation and adapt the model for dynamic contexts, Kremer et al. [62] further developed a dynamic threshold model. Building on this foundation, this study constructs two single-threshold dynamic models, utilizing both CGE and FINFL as thresholds correspondingly:

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} \cdot I(CGE_{it} \leq \lambda) + \alpha_2 ESG_{it} \cdot I(CGE_{it} > \lambda) \; \alpha_3 TQ_{it-1} + \beta X_{it} + \varepsilon_{it}; \quad (3)$$

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} \cdot I(FINFL_{it} \leq \lambda) + \alpha_2 ESG_{it} \cdot I(FINFL_{it} > \lambda) \; \alpha_3 TQ_{it-1} + \beta X_{it} + \varepsilon_{it}. \quad (4)$$

In Models (3) and (4), the threshold value to be estimated is denoted by λ, while $I(\cdot)$ characterises the threshold indicator function. If the condition inside the brackets is true, then $I(\cdot)$ equals 1; else, it equals 0. The coefficients estimating the impact of *ESG* on firm value are represented by α when the level of *CGI* or *FINFL* (as the case may be) is beneath the threshold value (CGE_{it} or $FINFL_{it} \leq \lambda$), and α_1 when the level of *CGI* or *FINFL* exceeds the threshold value (CGE_{it} or $FINFL_{it} > \lambda$). The significance of the threshold effect in these models is tested by evaluating the hypothesis H_1: $\alpha_1 = \alpha_2$. If this hypothesis is rejected, it indicates significant differences in how *ESG* impacts the firm value of companies listed on the *NGX*. All other symbols in Models (3) and (4) retain the same meanings as in Model (1).

As specified earlier, Models (3) and (4) incorporate only a single threshold, however, it is essential and practical to extend the framework to include two thresholds, denoted as λ_1 and λ_2. This leads to the development of double-threshold dynamic panels as presented in Models (5) and (6), which respectively utilized corporate governance effectiveness and financial flexibility as threshold variables. Specifically, the estimated coefficients in Model (5) that reflect the impact of *ESG* on firm value are represented as α_1, α_2, and α_3, corresponding to the three intervals of corporate governance effectiveness: $CGE_{it} \leq \lambda_1$, $\lambda_2 < CGE_{it} \leq \lambda_3$, and $CGE_{it} > \lambda_4$. Similarly, Model (6) is also constructed by substituting financial flexibility as the threshold variable, resulting in three financial flexibility intervals: $\ln FINFL_{it} \leq \lambda_1$, $\lambda_2 < \ln FINFL_{it} \leq \lambda_3$, and $\ln FINFLit > \lambda_4$. The equations for Models (5) and (6) are expressed as follows:

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} \cdot I(CGE_{it} \leq \lambda_1) + \alpha_2 ESG_{it} \cdot I(CGE_{it} \leq \lambda_2) + \alpha_3 ESG_{it} \cdot I(CGE_{it} > \lambda_2) + \alpha_4 TQ_{it-1} + \beta X_{it} + \varepsilon_{it}; \quad (5)$$

$$TQ_{it} = \alpha_0 + \alpha_1 ESG_{it} \cdot I(FINFL_{it} \leq \lambda_1) + \alpha_2 ESG_{it} \cdot I(FINFL_{it} \leq \lambda_2) + \alpha_3 ESG_{it} \cdot I(FINFL_{it} > \lambda_2) + \alpha_4 TQ_{it-1} + \beta X_{it} + \varepsilon_{it}. \quad (6)$$

All the symbols in both Models (5) and (6) retain the same meanings as in Models (3) and (4).

Results and discussions

Summary statistics

Table 1 illustrates the relationships in the form of correlations, variance inflation factors (VIF), and descriptive statistics for the variables involved in this study. The first seven columns (1)–(7) present the pairwise correlations between the variables, suggesting that all the independent variables do not exhibit any indication of multicollinearity, which is essential for reliable regression analysis. In order to provide a deeper understanding, Columns (10)–(11) present the VIF values, confirming that they fall within the range deemed acceptable in statistical analysis. Typically, a VIF value above 10 indicates potential multicollinearity, but in this case, all the values suggest that multicollinearity is not a concern. This confirms the independent variables' robustness against multicollinearity.

Further, columns (8) and (9) offer descriptive statistics, focusing mainly on the crucial elements of the means and standard deviations, which provides insights into the central tendency and variability of the study variables. From the results on Table 1, the mean value of *TQ* (4.663) sug-

Table 1. Correlations, descriptive statistics and VIF results

Variables	(1) *TQ*	(2) *ESG*	(3) *CGE*	(4) *FINFL*	(5) *FSIZ*	(6) *GRW*	(7) *FLEV*	(8) *Mean*	(9) *Std Dev*	(10) *VIF*	(11) *1/VIF*
(1) TQ	1							4.663	9.129		
(2) ESG	0.568	1						1.161	0.984	2.08	0.480
(3) CGE	0.18	0.34	1					10.63	0.95	2.10	0.476
(4) FINFL	–0.02	–0.08	0.563	1				1.245	1.742	4.89	0.205
(5) FLEV	0.032	0.02	0.053	–0.02	1			0.50	0.23	1.01	0.991
(6) GRW	0.22	0.3	0.445	0.76	–0.03	1		1.137	1.87	4.13	0.242
(7) FSIZ	0.432	0.29	0.143	0.25	0.016	0.47	1	29.03	149.385	1.36	0.737
Mean VIF										2.6	

gests a moderate level of firm value creation within the studied entities. The substantial standard deviation (9.129) indicates a wide variation in value creation across firms, signalling that while some firms create significant value, others lag considerably behind. The mean for *ESG* disclosure is relatively low at 1.161, with a standard deviation of 0.984, implying that most firms have limited *ESG* disclosures. This limited disclosure may correlate with lower overall firm value, indicating that firms with stronger *ESG* practices potentially exhibit higher firm valuation. Further examining the other variables, corporate governance effectiveness shows a mean of 10.63 with minimal variability (0.95), suggesting a relatively uniform level of governance across firms. In contrast, financial flexibility and financial leverage have means of 1.245 and 0.50, respectively, which, in tandem with their higher standard deviations, indicate variations in financial strategies among firms. The mean firm size of 29.03, accompanied by a notably high standard deviation (149.385), suggests that the sample includes a diverse group of firms ranging among all sectors from small startups to large corporations. This diversity is essential for analysing how different contextual factors, such as financial flexibility and governance effectiveness, interact with ESG disclosure to affect overall value creation.

Regression Result

A structured approach was employed in testing the hypothesis regarding the relationship between *ESG* disclosure and firm value among listed firms in Nigeria. First, the study employed the differential generalized method of moments (*DF-GMM*) to address the issue of endogeneity, which is a common challenge in panel data analysis. This method ensures the reliability of the results while allowing for a theoretical exploration of how *ESG* disclosure influences firm value. Second, in order to account for the inertia or path dependence of firm value over time, the study incorporates a dynamic perspective by including lagged firm value as an explanatory variable. Furthermore, the dynamic threshold regression models were examined to investigate whether the effects of ESG disclosure on firm value vary depending on the effectiveness of corporate governance and the sampled firms' financial flexibility. These thresholds allowed the study to identify specific conditions under which the impact of *ESG* disclosure might change.

DF-GMM Estimation Results

The effect of *ESG* disclosure on firm value was evaluated using the *DF-GMM* technique. The study estimated two models: Model 1 (M1) includes only the independent variable (*ESG* disclosure), and Model 2 (M2) adds the control variables to test the robustness of the findings. As illustrated in Table 2, the examination of the first-order serial autocorrelation (AR (1)) revealed a significant p-value at the 5% threshold for the residuals in models (1) and (2). In contrast, the second-order serial autocorrelation (AR (2)) did not show significance, suggesting that the series is free from autocorrelation issues and also implies that once the first-order dynamics are accounted for, no further dependence exists, which reinforces the robustness of the model. This result thus validates the appropriateness of employing the differential *GMM* technique in this analysis. However, the Hansen test for instrument validity in M1 reports a statistically significant statistic, indicating potential issues with instrument validity. In contrast, M2, which

Table 2. Differential GMM (DF-GMM) regression results

	(M1)		(M2)	
	Dep. Var. TQ			
ESG	0.563***	(0.0919)	0.694***	(0.0673)
TQ with a one-period lag	0.445***	(0.111)	0.177**	(0.0759)
CGE			0.794**	(0.382)
FINFL			-0.0264	(0.0384)
FLEV			0.112	(0.0722)
GRW			-0.121	(0.0832)
FSIZ			-0.0140	(0.0244)
Individual effects	Yes		Yes	
Year effects	Yes		Yes	
Industry effects	Yes		Yes	
Constant Term	–25.63	(16.43)	–16.05	(17.87)
AR (1)	–2.47 **	(0.014)	–2.87**	0.004
AR (2)	0.16	0.872	–1.32	0.186
Hansen	20.69**	0.023	8.83	0.116

Standard errors in parentheses *** p<0.01, ** p<0.05/

captures control variables, does not exhibit this issue. This suggests that the inclusion of control variables helps to address concerns about instrument validity. The consistency of findings across both models and improved instrument validity in M2 lend support to the robustness of the *DF-GMM* regression results presented in Table 2.

Specifically, the findings indicate a statistically significant positive relationship between *ESG* disclosure and firm value creation, as represented by the Tobin's Q (*TQ*). In order to conduct a thorough examination of the value relevance of *ESG* disclosure, the study disaggregated the model. While the first model (M1) conducts a clear examination of the direct effect of ESG on firm value without the potential confounding effect of control variables, the second model (M2) includes the control variables to account for other factors that might influence firm value. This approach helps confirm whether the relationship observed in the first model holds true when these additional factors are considered.

Table 2 revealed significant coefficients of ESG disclosure (0.563 and 0.694) in both models, indicating a strong positive relationship with firm value at the 1% significance level. This portrays the compelling importance of ESG reporting as a strategic tool for improving firm performance in the Nigerian market. Numerous studies have established that robust ESG practices are increasingly viewed as indicators of a firm's resilience and long-term profitability [9; 38; 39]. In the context of emerging markets like Nigeria, the significance of ESG disclosures becomes even more pronounced. For instance, the studies of Alabi and Issa [5] and Terkuma and Aga [18] suggest that firms engaging in comprehensive *ESG* reporting tend to attract a more diverse investor base, which can enhance their capital access and ultimately drive firm value. This correlation is particularly vital within developing markets, where governance and sustainability practices can differentiate firms in a crowded marketplace. The Nigerian market presents unique challenges and opportunities, as highlighted by the work of Terkuma and

Table 3. Threshold value and threshold effect test of corporate governance effectiveness

Threshold Variable	No. of Thresholds	Threshold Value	F Value	p Value	95% Confidence Intervals	1%	5%	10%
CGE	Single**	9.683	70.73	0.0333	[7.146 11.420]	116.2683	62.7897	47.9071
	Double	9.831	8.52	0.8267	[4.092 6.651]	159.8779	86.2378	56.4183

The bootstrap value is 300. ** Represents a 5% significance level.

Aga [18], who note that strong *ESG* disclosure can help mitigate risks associated with regulatory changes and volatility. As companies navigate a rapidly evolving landscape, the proactive communication of *ESG* efforts appears to correlate with enhanced investor confidence and firm value. Therefore, the proposed first hypothesis (H_1) of this study is proven in the sense that ESG disclosure plays a significant and crucial role in promoting firms value of listed Nigerian firms.

Additionally, the significant positive coefficient of the one-period lag firm value are 0.445 in Model 1 and 0.177 in Model 2, both of which pass significance tests at the 1% and 5% levels. This finding implies that the current firm value in both models is significantly influenced by the *ESG* disclosures from the previous period. This indicates a robust path-dependence effect, implying that previous performance metrics, such as total quality (*TQ*), have a lasting impact on a company's current value creation, reaffirming the need for consistent *ESG* engagement over time.

Threshold Effects of Corporate Governance Effectiveness

In order to test the threshold effect of corporate governance effectiveness, Model 3 and Model 5 were estimated with corporate governance effectiveness as the threshold variable, with the threshold value and confidence intervals of 95%. The threshold effect significance tests are presented in Table 3. The results of the threshold regression analysis clearly indicate a significant non-linear relationship between the effectiveness of corporate governance (CGE) and the impact of ESG disclosure on firm value.

In Model (3), the analysis revealed that the threshold effect is significant at the 5% level, highlighting the notion that the effectiveness of corporate governance plays a critical role in mediating the relationship between *ESG* and firm value. This suggests that strong corporate governance mechanisms can enhance the positive effects of *ESG* performance on firm valuation, as good governance not only mitigates risks but also improves stakeholder confidence and long-term strategic alignment. However, Model (5) fails to exhibit significant threshold effects, suggesting that adding complexity does not necessarily enhance the explanatory power regarding the *ESG*-firm value relationship when considering governance effectiveness. This reinforces the idea that a single-threshold model from Model (3) provides a clearer, more interpretable framework for policymakers and corporate leaders, guiding strategic decisions regarding ESG investments and governance practices.

The specific threshold value identified at 9.683 is particularly noteworthy, as it identifies two distinct regimes in regard to *CGE*'s impact on firm value: the low effectiveness of corporate governance interval (*CGE* ≤ 9.683) and the high effectiveness of corporate governance interval (*CGE* > 9.683). Firms with a CGE score lower than this threshold exhibit a negligible or even negative response to *ESG* initiatives, implying that weak governance structures may hinder the potential benefits that *ESG* considerations could otherwise yield. In contrast, however, firms surpassing this threshold experience a markedly positive relationship between *ESG* and firm value, supporting the hypothesis that effective governance amplifies the advantages associated with responsible corporate practices.

Table 4. Threshold effects of corporate governance effectiveness in the relationship between ESG disclosure and firm value creation

	TQ		
Variables	Coefficient	Standard Error	p value
ESG (CGE ≤ 9.683)	5.372***	0.652	0.000
ESG (CGE > 9.683)	9.283***	1.088	0.000
Constant Term	–19.533	18.655	0.296
Other Controlled Variables	Controlled		
F value		21.65***	

*** Denotes significance at 1%.

The results of the dynamic panel single threshold model in Table 4 revealed non-linear effects of *ESG* disclosure on firm value with the effectiveness of corporate governance (*CGE*) as the threshold variable. The correlation between *ESG* disclosure and firm value was observed to be positive at both low and high levels of corporate governance effectiveness with a significant impact of ESG disclosure on firm value creation (*TQ*). The results show two distinct threshold effects based on *CGE*. For firms with a corporate governance effectiveness score of 9.683 or lower, the coefficient of *ESG* disclosure is 5.372, which is statistically significant at the 1% level. This suggests that among firms with lower governance practices, *ESG* disclosures positively contribute to firm value creation, although the marginal impact is comparatively less than that observed in firms with higher governance scores.

Furthermore, at higher levels, where *CGE* exceeds the threshold value of 9.683, the effect of *ESG* disclosure on firm value becomes even more pronounced, with a coefficient of 9.283, also significant at the 1% level. This indicates that firms with effective corporate governance not only gain a higher value from their *ESG* activities, but their value creation is more substantial compared to those with lower governance effectiveness. This threshold effect emphasizes the importance of an effective corporate governance as a facilitator that enhances the positive implications of *ESG* initiatives. Therefore, firms operating in environments with robust governance frameworks appear better positioned to leverage *ESG* disclosure for maximizing their firm value [1; 45]. The second hypothesis (H_2) is thus confirmed by the findings that suggest that the effectiveness of corporate governance amplifies the value relevance benefits associated with *ESG* disclosure. For firms below the governance effectiveness threshold, it may be essential to bolster governance practices to fully capture the advantages of *ESG* initiatives. Conversely, firms with higher governance standards are already harnessing substantial value from their *ESG* disclosures, indicating that investing in effective governance structures can yield significant returns in terms of firm value. The significant *F* value of 21.65 further supports the overall validity of the regression, reinforcing the robustness of these threshold effects.

Threshold Effects Using Financial Flexibility as a Threshold

In order to test the threshold impact of the financial flexibility level, Model 4 and Model 6 were estimated with financial flexibility as the threshold variable, with the threshold value and 95% confidence intervals. The threshold effect significance tests are thus shown in Table 5. The results of the threshold regression analysis clearly indicate a significant non-linear relationship between the level of financial flexibility (FINFL) and the impact of ESG disclosure on firm value, especially at specific threshold levels

In both Model (3) and Model (5), the results revealed that the threshold effects are both significant at the 5% level, highlighting the notion that financial flexibility plays a critical role in mediating the relationship between *ESG* and firm value. The study, however, opted for the double threshold model as this choice lies in the statistical significance and robustness of the results presented. The double threshold shows a lower p-value (0.007) compared to the single threshold (0.040), indicating stronger evidence against the null hypothesis. Moreover, the *F*-value of 57.47 suggests a more pronounced effect of financial flexibility on the relationship between *ESG* disclosures and firm value across two distinct thresholds, signifying potentially effective interactions that a single threshold may not capture.

Having identified the thresholds, the results indicate that when financial flexibility is low (below 0.20), the impact of *ESG* disclosure on creating firm value is minimal. Conversely, as financial flexibility increases (beyond the first threshold of 0.20), the effect becomes more substantial. This implies that financially flexible firms seem to be better positioned to leverage *ESG* disclosures for value creation, supporting the idea that the ability to allocate resources effectively plays a crucial role in maximizing returns on sustainability initiatives.

Specifically, the threshold regression results in Table 6 illustrate significant insights into the relationship between *ESG* disclosure and firm value creation, particularly through the lens of financial flexibility (*FINFL*). The results indicate that firms with lower financial flexibility (*FINFL* ≤ 0.20)

Table 5. Threshold value and threshold effect test of financial flexibility

Threshold Variable	No. of Thresholds	Threshold Value	F Value	p Value	95% Confidence Intervals	1%	5%	10%
FINFL	Single **	2.51	47.05	0.040	[0.942 3.709]	62.354	44.0045	35.8697
	Double**	0.20	57.47	0.007	[0.565 3.659]	54.304	44.3028	34.1679

The bootstrap value is 300. ** Represents a 5% significance level.

Table 6. Threshold effects of financial flexibility in the relationship between ESG disclosure and firm value creation

Variables		*TQ*	
	Coefficient	Standard Error	p value
ESG (FINFL ≤ 0.20)	2.325***	3.30	0.001
ESG (FINFL > 0.20)	2.112***	0.788	0.008
Constant Term	-4.285***	0.887	0.000
Other Controlled Variables		Controlled	
F value		38.08***	

*** Denotes significance at 1%.

experience a coefficient of 2.325 for *ESG* disclosure, which is statistically significant at the 1% level. This suggests that firms with lower financial flexibility derive substantial benefits from *ESG* disclosure, potentially due to enhanced reputational advantages or improved stakeholder relations [15; 20]. In times of financial constraints, robust *ESG* practices may serve as a differentiator that attracts investment and loyalty, indicating that both investors and stakeholders place a high value on firms' sustainability efforts in challenging economic contexts.

Conversely, the impact of *ESG* disclosure is slightly attenuated for firms with higher financial flexibility (*FINFL* > 0.20). When financial flexibility exceeds 0.20, the coefficient for ESG disclosure on firm value creation slightly decreases to 2.112 yet remains significant at the 1% level. This decline indicates that while firms with high financial flexibility still reap rewards from their *ESG* initiatives, the marginal benefit is not as pronounced as in lower-flexibility scenarios. This aligns with the findings of Yunica and Rokhim [10] and Akbar and Setiana [52], who argue that firms with greater financial resources may use those resources more effectively in other areas than their *ESG* initiatives, leading to a decreased incremental value effect derived from *ESG* disclosures. This phenomenon could likewise imply that financially flexible firms often prioritize other value-creating strategies that directly enhance profitability (or might not feel as pressed to enhance their image through robust ESG practices) over *ESG* [54]. The diminishing returns observed in the upper threshold may suggest that as firms become less financially constrained, they ultimately divert their investment strategies from *ESG*-focused initiatives. This result thus fails to confirm the third hypothesis of the study (H_3), as the finding reveals that in the higher thresholds, firms with higher financial capabilities could potentially face diminishing returns on *ESG* investments, while in lower thresholds of financial flexibility, stringent *ESG* practices may serve as a vital mechanism for added value.

Conclusion

This study investigated the dynamic panel threshold effects of *ESG* disclosure on firm value, considering the threshold roles of corporate governance effectiveness and financial flexibility within the context of firms listed on the Nigerian Exchange Group (NGX) from 2016 to 2022. The empirical findings robustly indicate a significant positive relationship between *ESG* disclosure and firm value creation. This finding emphasizes the increasing importance of *ESG* practices in shaping a firm's competitive advantage and long-term sustainability. Further analysis using a threshold model elucidated the contingent nature of *ESG* impacts. Specifically, while firms with lower corporate governance effectiveness experience positive contributions from *ESG* disclosure, the marginal impact is significantly lower than that of firms with higher governance scores. This finding substantiates the essential role of corporate governance as a facilitator of effective *ESG* implementation. Consequently, this reveals that corporate governance practices not only influence firm operations but also modulate the benefits derived from *ESG* engagement. Moreover, the study demonstrated that the impact of ESG disclosure is contingent on the level of financial flexibility. While lower levels of financial flexibility translate to minimal value creation from *ESG* efforts, a notable enhancement in firm value is observed as financial flexibility increases. This highlights the importance of financial health as a critical enabler for firms to leverage *ESG* disclosures effectively.

The findings of this research provide actionable insights for corporate leaders and policymakers like the NGX, and the Financial Reporting Council of Nigeria (FRCN), suggesting that enhancing corporate governance mechanisms and improving financial flexibility are essential for maximizing the benefits of *ESG* disclosure. Firms should prioritize investments in governance structures to ensure they can fully capture the positive impacts of *ESG* initiatives. Additionally, strategies aimed at strengthening financial positions can empower firms to undertake better *ESG* practices, thus enhancing overall firm value. Theoretically, this study enriches the literature on *ESG* disclosure by illustrating the in-depth relationships between corporate governance, financial flexibility, and firm value. It adds to existing frameworks by demonstrating that *ESG* practices do not uniformly impact firm value, thus necessitating a contextual analysis that examines governance and financial dynamics. The integration of dynamic panel threshold models introduces a sophisticated methodological approach, offering a robust avenue for future research in this domain. It is important to acknowledge the study's limitations, starting from the *ESG* measurement 0/1 coding, which reduces granularity and may introduce measurement error by equating partial and full disclosures. This was necessitated by the heterogeneous reporting formats across firms and years. Future work should implement graded scoring or automated text analysis. In addition, the additive measurement of *FINFL* is pragmatic, and the equal CGE weighting, while adopted for transparency and comparability; index creation using the principal component analysis or factor analysis are recommended in future studies. Lastly, this study is limited by its focus on firms listed solely on the NGX, which may limit the generalizability of the findings to other geopolitical contexts. Future research could explore similar dynamics in different markets to validate and extend these results.

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Appendix

Appendix A: 26-item ESG Disclosure Checklist

S/N	Aspect	Indicators
		Environment
1	Environment	Existence of environmental policy
2	Environment	Quantified emissions (Co2, other GHGs)
3	Environment	Energy consumption and energy efficiency measures
4	Environment	Water usage and water management
5	Environment	Waste management and recycling practices
6	Environment	Pollution control measures and compliance
7	Environment	Environmental impacts in the supply chain and actions taken
8	Environment	Biodiversity and land-use disclosures
		Social
9	Social	Labour practices and workforce composition
10	Social	Employee health and safety statistics/policies
11	Social	Training and development programs
12	Social	Diversity and equal opportunity policies
13	Social	Community engagement and social investment
14	Social	Freedom of Association and Collective Bargaining
15	Social	Human rights policies
		Governance
16	Governance	Board composition and independence
17	Governance	Board committees (audit, remuneration, nomination)
18	Governance	Executive remuneration disclosure
19	Governance	Ownership structure and major shareholders
20	Governance	Minority shareholder rights/protections
21	Governance	Minority shareholder rights/protections
22	Governance	Risk management framework disclosure
23	Governance	Audit quality and external auditor disclosures
24	Governance	Internal control disclosures
25	Governance	Disclosure on related-party transactions
26	Governance	Sustainability/ESG governance (committee or oversight)

Appendix B: Elements of Corporate Governance Effectiveness Index

S/N	Dimension	Elements
		Board structure
1	Board structure	Chair/CEO separation
2	Board structure	Proportion of independent directors
3	Board structure	Board size within recommended range
4	Board structure	Presence of non-executive directors
		Board procedure
5	Board procedure	Board meeting frequency disclosed
6	Board procedure	Existence of board evaluation process
7	Board procedure	Board committees in place and terms of reference
		Disclosure
8	Disclosure	Timely publication of annual reports
9	Disclosure	Sustainability/ESG report publication
10	Disclosure	Disclosure of related-party transactions
		Ownership structure
11	Ownership structure	Concentration of ownership disclosed
12	Ownership structure	Existence of institutional shareholders
13	Ownership structure	Disclosure of significant shareholdings
		Shareholder Rights
14	Shareholder Rights	Mechanisms for minority shareholder protection
15	Shareholder Rights	Policies for equitable treatment of shareholders
16	Shareholder Rights	Shareholders having access to the meeting minutes of the general assembly
17	Shareholder Rights	Existing shareholders have a priority to subscribe to any new share issuance
18	Shareholder Rights	Specific provisions for shareholders to effectively vote and participate in the general meetings

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