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SUSTAINABILITY DISCLOSURE AND ITS IMPACT ON FIRM'S VALUE CREATION FOR ENERGY, MATERIALS AND HEALTHCARE INDUSTRIES

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ABSTRACT

This study investigates the impact of environmental, social, and governance (ESG) disclosure on the value creation of Saudi Arabian companies within the Energy, Materials, and Healthcare industries. Panel data from 100 non-financial firms listed in Saudi Arabia for the period 2015 to 2024 were analyzed. To address potential endogeneity issues, fixed effects and Generalized Method of Moments (GMM) were employed to examine the influence of ESG disclosure on Tobin's Q. The model includes three control variables: firm size, fixed asset ratio, and leverage ratio. The analysis also explores the moderating role of firm size in the relationship between ESG disclosure and firm value creation. The results reveal a positive and statistically significant impact of ESG disclosure on value creation, indicating that greater transparency in sustainability practices contributes to enhanced firm performance. Furthermore, firm size significantly moderates this relationship, suggesting that larger firms derive greater benefits from ESG disclosure in terms of value creation. For robustness, analyses using accounting-based performance measures (ROA and ROE) confirm that ESG disclosure positively influence profitability, with larger firms again benefiting more. These findings align with the predictions of agency, stakeholder, and signalling theories, which emphasize the value-enhancing effects of comprehensive ESG practices. This study adds to the growing body of literature on ESG and corporate performance in emerging markets and offers practical insights for policymakers, investors, and corporate decision-makers seeking to promote sustainable business practices in Saudi Arabia.

KEYWORDS: Energy, Materials, And Healthcare Industries, ESG Disclosure, Moderating Role Of Firm Size, Value Creation.

1. INTRODUCTION

In recent years, Environmental, Social, and Governance (ESG) disclosure has become a key focus within the global financial landscape, as investors and stakeholders increasingly recognize its potential to influence firm value and long-term performance. This trend extends to emerging markets such as Saudi Arabia, where economic diversification and sustainable development are central to the Vision 2030 reform agenda. Despite growing interest, empirical evidence on the relationship between ESG disclosure and value creation in Saudi Arabia remains limited, particularly within major non-financial sectors such as Energy, Materials, and Healthcare.

ESG disclosure entails transparent reporting of a company's environmental, social, and governance practices, providing stakeholders with critical insights beyond conventional financial metrics. While extensive research has explored ESG's impact on firm value globally, results have been mixed and often context-dependent. This underscores the need for focused studies in markets with distinctive economic and regulatory environments like Saudi Arabia, where the capital market is evolving rapidly under new ESG disclosure guidelines.

Moreover, firm size has emerged as an important moderating factor influencing the strength and direction of the ESG-value creation link. Larger firms typically have more resources to invest in sustainability initiatives and face greater stakeholder scrutiny, which may amplify the benefits of ESG disclosure. Conversely, smaller firms may experience resource constraints that limit their ESG engagement, potentially weakening the relationship between ESG disclosure and firm value.

This study contributes to the growing body of literature on environmental, social, and governance (ESG) disclosure by examining its impact on value creation among 100 non-financial Saudi firms in the Energy, Materials, and Healthcare sectors from 2015 to 2024. Unlike earlier Saudi-focused studies, which primarily assessed ESG's relationship with firm performance at a broader market level, this paper provides several novel contributions. First, it concentrates on environmentally intensive and socially strategic industries that are central to Saudi Arabia's Vision 2030 reforms, offering sector-specific insights. Second, the study captures a unique time horizon that spans both pre- and post-COVID-19 periods, enabling an assessment of how the pandemic reshaped the ESG–value creation nexus. Third, methodologically, it applies robust panel data econometric techniques—including Fixed Effects Models (FEM) and dynamic Generalized Method of Moments (GMM)—to address endogeneity and unobserved heterogeneity more rigorously than prior static approaches. Finally, the analysis introduces firm size as a moderating factor, uncovering how organizational characteristics condition the ESG–performance relationship in an emerging economy context.

In light of these contributions, this study seeks to answer two key research questions: (1) Does ESG disclosure positively influence value creation among Saudi non-financial firms? (2) Does firm size moderate the relationship between ESG disclosure and value creation?

2. LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

Several theories explain the relationship between ESG disclosure and corporate performance. Agency theory highlights that ESG disclosure reduces information asymmetry between managers and owners, mitigating agency costs and encouraging managers to act in shareholders' best interests, which can improve firm performance. By increasing transparency, ESG reporting enhances monitoring and aligns managerial actions with long-term value creation.

Signalling theory complements this by suggesting that ESG disclosure serves as a credible signal of a company's commitment to sustainability, shaping stakeholder perceptions and attracting investors. Through voluntary ESG reporting, firms reduce information asymmetry with the market, demonstrating their focus on social responsibility and long-term risk management. This positive signal can enhance reputation, secure financing, and ultimately improve financial performance. Together, these theories suggest that ESG disclosure is both a governance mechanism and a communication tool that fosters trust, supports sustainable practices, and contributes to firm value.

Numerous studies have examined the relationship between ESG disclosure and firm financial performance, revealing mixed results. Many find a positive impact, where robust ESG practices improve profitability, reduce costs, enhance reputation, and increase investor confidence (Albitar et al., 2020; Burki et al., 2024; Chawarura et al., 2025; Firmansyah et al., 2023; Zhao et al., 2018). Positive effects are often linked to better risk management, competitive advantage, and stakeholder trust (Alghafes et al., 2024; Al-Kubaisi & Abu Khalaf, 2025; Burki et al., 2024; Hamdouni, 2025a, 2025b).

However, some research reports negative or

insignificant effects (Constantinescu, 2021). ESG initiatives may impose costs or be viewed as distractions by investors, potentially reducing firm value or increasing volatility. Others find no clear relationship, suggesting the ESG-value link may be indirect or context-dependent (Fernando et al., 2022).

Several studies in Saudi Arabia report a generally positive link between ESG disclosure and value creation (Aladwey & Alsudays, 2024; Alofaysan et al., 2024; Bamahros et al., 2022; Difalla, 2025; Firmansyah et al., 2023; Hamdouni, 2025a; Hussain et al., 2024; Kouaib, 2022).

Accordingly, the first hypothesis is as follows:

H1. There is a positive relationship between ESG disclosure and value creation.

Firm size plays a crucial moderating role in the relationship between ESG disclosure and financial performance, with its effect varying by industry, type of ESG initiative, and corporate strategy. Larger firms often have better ESG performance due to greater resources, allowing them to invest in comprehensive sustainability programs that can enhance financial outcomes (Abdi et al., 2022; Albitar et al., 2020; Carnini Pulino et al., 2022; Chawarura et al., 2025). Their visibility and stakeholder pressure motivate transparency, which can be rewarded by the market (Taliento et al., 2019). Additionally, larger firms benefit from economies of scale, better management, and improved access to stakeholders, which can foster competitive advantages, risk reduction, and reputation building (Ahmad et al., 2021; Darsono et al., 2025). However, firm size does not always yield positive results. Some studies report that increased ESG transparency in larger firms may lead to undervaluation due to heightened scrutiny and perceived risks, negatively affecting market-to-book ratios (Chong & Loh, 2023). Larger firms face significant reputational and financial risks if they fail to meet high governance expectations, which can harm market perceptions.

For smaller firms, ESG disclosure may increase the cost of capital as they lack the resources and economies of scale enjoyed by larger companies (Darsono et al., 2025). Overall, the moderating effect of firm size on the ESG-financial performance relationship is complex and context-dependent. Results are mixed, and different measures of firm size (e.g., assets, market cap, revenue) yield varying outcomes (Chong & Loh, 2023; Rohendi et al., 2024). While firm size is an important factor, it interacts with other variables influencing ESG's impact on financial performance. Hence, the second hypothesis is as follows:

H2. Firm size will moderate the positive effect of ESG disclosure on value creation.

3. RESEARCH METHOD

3.1. Sample and Data

This study examines 100 non-financial companies listed on the Saudi Stock Exchange (Tadawul), operating within the Energy, Materials, and Healthcare industries. The analysis covers a ten-year period from 2015 to 2024. Data was collected from multiple sources, including official company websites, the Tadawul platform for annual, financial, and sustainability reports, and Bloomberg. ESG disclosure scores were sourced from Bloomberg to ensure standardized, consistent, and comparable measures of Environmental, Social, and Governance (ESG) performance across firms. Missing ESG data points were not imputed; only firms with complete ESG disclosure information for all years within the study period were included, ensuring that the analysis is based solely on observed and verified data. Companies classified under the Financials sector were excluded from the sample to avoid sector-specific regulatory influences and to maintain focus on industrial firms, which are subject to different sustainability challenges and disclosure practices. The choice of Energy, Materials, and Healthcare industries reflects their significant environmental and social footprint, regulatory importance, and alignment with Saudi Arabia's Vision 2030 sustainability goals. These industries provide a relevant context for analyzing the relationship between ESG disclosure and firm value creation. The final dataset consists of a balanced panel of 100 firms and 1,000 firm-year observations, providing robust insights into the direct and moderating effects of ESG disclosure and firm size on corporate value.

3.2. Estimation Models

To investigate the relationship between ESG disclosure and firm value creation, this study employs panel data regression techniques suited to longitudinal datasets. To address potential endogeneity issues, fixed effects and Generalized Method of Moments (GMM) were employed to examine the influence of ESG disclosure on Tobin's Q.

Tobin's Q is used as the dependent variable to represent value creation. ESG disclosure serves as the independent variables of interest. To enhance model robustness and account for firm-specific financial characteristics, three control variables are incorporated: firm size, fixed assets ratio, and leverage.

Table 1 shows the measurements of research variables. The regression framework is designed to isolate the direct influence of ESG disclosure on firm value and to test for the presence of a moderating effect from firm size.

$$TOBIN'S\ Q_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 TANG_{i,t} + \beta_4 LEV_{i,t} + \varepsilon_{i,t} \quad (1)$$

To examine the moderating effect proposed in Hypothesis 2, an interaction term between firm size and ESG disclosure was incorporated into the regression model.

The model also controls for fixed assets ratio and leverage to isolate the moderating effect. The regression equation (2) includes this interaction term to evaluate the influence of firm size on the relationship between ESG disclosure and firm value creation.

$$TOBIN'S\ Q_{i,t} = \beta_0 + \beta_1 ESG * SIZE_{i,t} + \beta_2 TANG_{i,t} + \beta_3 LEV_{i,t} + \varepsilon_{i,t} \quad (2)$$

3.3. Additional Analysis

To further ensure the robustness of the model, the Generalized Method of Moments (GMM) is employed.

$$TOBIN'S\ Q_{i,t} = \beta_0 + \beta_1 TBQ_{i,t-1} + \beta_2 ESG_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TANG_{i,t} + \beta_5 LEV_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$TOBIN'S\ Q_{i,t} = \beta_0 + \beta_1 TBQ_{i,t-1} + \beta_2 ESG * SIZE_{i,t} + \beta_3 TANG_{i,t} + \beta_4 LEV_{i,t} + \varepsilon_{i,t} \quad (4)$$

In Models 3 and 4, ESG disclosure is split into two separate variables: a dummy variable (ESG_D) indicating the presence of disclosure and a continuous ESG score (ESG_SCORE) reflecting the quality of disclosure. For robustness, the dependent variable in Models 3 and 4 is also alternately replaced with accounting-based performance measures, ROA and ROE, to verify that the effects of ESG disclosure and performance persist across both market-based and accounting-based indicators of firm performance.

Table 1: Measurement Of Research Variables.

Dependent Variable		
Value creation	**Tobin's q ratio TOBIN'S Q**	**TOBIN'S Q** $= \frac{\text{Market value of equity + Debt}}{\text{Total assets}}$
	ROA	**ROA** $= \frac{\text{Net Income}}{\text{Total assets}}$
	ROE	**ROE** $= \frac{\text{Net Income}}{\text{Shareholders' Equity}}$
Independent Variables		
ESG disclosure	**ESG**	**The dummy variable equals 1 if the firm has ESG disclosure and 0 if not. ESG_D (in equations 1 and 2)**
		A continuous score (0–100) representing the firm's ESG performance, sourced from Bloomberg ESG_SCORE (in equations 3 and 4)
The moderating role of firm size	**ESG*SIZE**	**SIZE is multiplied by ESG.**
Control variables		
Firm size	**SIZE**	**Size = The logarithm of total assets.**
Fixed Assets	**TANG**	**TANG** $= \frac{\text{Fixed assets}}{\text{Total assets}}$
Financial leverage	**LEV**	**LEV** $= \frac{\text{Book value of total debt}}{\text{Book value of total assets}}$

3.4. Descriptive Statistics

Table 2 presents the descriptive statistics for the main variables used in the analysis, including market-based firm value (TOBIN'S Q), ESG disclosure measures (ESG_D and ESG_SCORE), their interactions with firm size, and control variables (SIZE, TANG, LEV). The statistics reported include the mean, median, maximum, minimum, and standard deviation for the sample of 100 Saudi non-financial firms over the period 2015–2024. The average Tobin's Q (TOBIN'S Q) is 1.71, with a median of 1.72, indicating that firm valuations generally exceed their asset values. TOBIN'S Q ranges from -0.24 to 4.01, showing variability in firm performance. The ESG disclosure dummy variable (ESG_D) has a mean of 0.64, indicating that approximately 64% of firms disclose ESG information. The ESG score (ESG_SCORE), which measures ESG performance on a continuous scale, averages 50.22 with a standard deviation of 14.53, reflecting moderate variability across firms.

Firm size, measured as the natural logarithm of total assets (SIZE), averages 8.29, indicating that the sample mainly consists of medium to large firms. The fixed assets ratio (TANG) averages 0.50, consistent with the capital-intensive nature of the industries studied. Financial leverage (LEV), defined as total debt divided by total assets, averages 0.52, suggesting a moderate level of leverage.

The interaction terms ESG_D*SIZE and ESG_SCORE*SIZE have means of 5.29 and 416.72, respectively. These values suggest that firm size may have a meaningful moderating effect on the relationship between ESG disclosure or performance and firm value.

Table 2: Descriptive Data.

	Mean	Median	Maximum	Minimum	Std. Dev.
TOBIN'S Q	1.71	1.72	4.01	-0.24	0.59
ESG_D	0.64	1	1	0	0.48
ESG_SCORE	50.22	50.1	97.07	4.71	14.53
ESG_D*SIZE	5.29	7.54	11.83	0	4.05
ESG_SCORE*SIZE	416.72	416.75	894.98	31.18	130.5
SIZE	8.29	8.27	11.83	5.61	0.93
TANG	0.5	0.49	0.9	0.1	0.23
LEV	0.52	0.52	0.95	0.1	0.25

3.5. Correlation Analysis

Table 3 presents the Pearson correlation coefficients among the variables used in this study, including market-based firm value (TOBIN'S Q), ESG disclosure measures (ESG_D and ESG_SCORE), their interactions with firm size, and control variables (SIZE, TANG, LEV). Significance levels are indicated by $p < 0.10$ (), $p < 0.05$ (), and $p < 0.01$ (), highlighting the strength and direction of the relationships.

The dependent variable, Tobin's Q (TOBIN'S Q), shows positive and statistically significant correlations with both ESG disclosure measures—ESG_D ($r = 0.12$, $p < 0.10$) and ESG_SCORE ($r = 0.15$, $p < 0.05$). This suggests that firms with ESG disclosures, whether measured as a binary indicator or as a continuous score, tend to exhibit higher firm value. The interaction terms ESG_D*SIZE and ESG_SCORE*SIZE are also positively correlated with TOBIN'S Q ($r = 0.11$ and 0.14, respectively), reinforcing the idea that firm size may enhance the impact of ESG on value creation. Moreover, firm size (SIZE) alone shows a moderate and significant correlation with TOBIN'S Q ($r = 0.21$, $p < 0.05$), implying that larger firms are more likely to achieve higher market-based valuation.

Among the independent and control variables, ESG_SCORE correlates strongly with its interaction term ESG_SCORE*SIZE ($r = 0.99$, $p < 0.01$), and ESG_D correlates with ESG_D*SIZE ($r = 0.99$, $p < 0.01$), which is expected due to the mathematical construction of interaction terms. However, as these interaction variables are never included in the same model alongside their corresponding ESG measure, no multicollinearity issue is introduced in the empirical design. The correlation between SIZE and LEV is moderate ($r = 0.28$) and below critical thresholds, indicating that collinearity among control variables is not a concern. Additionally, TANG and LEV maintain low correlations with TOBIN'S Q and other variables, ensuring the robustness of the regression estimations.

Table 4 reports the VIF and tolerance statistics for multicollinearity assessment in Equation 1 under Pooled OLS, Fixed Effects, and Random Effects models. Variables include ESG_D, SIZE, TANG, and DEBT. Across the pooled OLS, fixed effects, and random effects models, all variables display VIF values well below the common threshold of 5, indicating no serious multicollinearity issues. Specifically, the VIF values for ESG_D, SIZE, TANG, and LEV range between 1.004 and 1.495. This suggests that the independent variables in Equation 1 are not highly correlated and can be reliably used in regression analysis without risking inflated standard errors or unstable coefficient estimates.

Table 5 provides the VIF and tolerance statistics for multicollinearity assessment in Equation 2 across Pooled OLS, Fixed Effects, and Random Effects models. Variables include the interaction term ESG_D*SIZE, TANG, and DEBT. Equation 2 includes the interaction term ESG_D*SIZE to test the moderating effect of firm size on the ESG–value creation relationship. The interaction term demonstrates moderate VIF values across all estimation methods (ranging from 1.494 to 1.626), which remain well within acceptable limits. Similarly, control variables TANG and LEV show VIF values below 1.3. These results confirm that the inclusion of the interaction term does not introduce problematic multicollinearity and supports the validity of interpreting the moderating role of firm size.

Together, Tables 4 and 5 affirm that both regression models are statistically robust in terms of multicollinearity, allowing for confident interpretation of the estimated effects.

Table 3: Correlation Matrix.

	1	2	3	4	5	6	7	8
(1) TOBIN'S Q	1							
(2) ESG_D	0.12*	1						
(3) ESG_SCORE	0.15**	0.35**	1					
(4) ESG_D×SIZE	0.11*	0.99***	0.40**	1				
(5) ESG_SCORE×SIZE	0.14**	0.41**	0.99***	0.43**	1			
(6) SIZE	0.21**	0.09	0.18*	0.22**	0.25**	1		
(7) TANG	0.10*	-0.04	0.01	0.02	0.04	0.26**	1	
(8) LEV	-0.03	0.01	0.02	0.03	0.05	0.28**	0.25***	1

Notes: *** p < 0.01, ** p < 0.05, and * p < 0.10.

Table 4: VIF Test (Equation 1).

	Collinearity Statistics					
	Pooled OLS		**Fixed Effects**		**Random Effect**	
Model 1	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
ESG_D	0.682	1.466	0.735	1.36	0.701	1.427
SIZE	0.521	1.919	0.61	1.639	0.548	1.824
TANG	0.812	1.231	0.856	1.168	0.834	1.199
DEBT	0.773	1.293	0.801	1.248	0.788	1.268

Table 5: VIF test (Equation 2).

	Collinearity Statistics					
	Pooled OLS		**Fixed Effects**		**Random Effect**	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
ESG_D*SIZE	0.615	1.626	0.669	1.494	0.641	1.561
TANG	0.811	1.233	0.858	1.166	0.829	1.206
DEBT	0.76	1.316	0.793	1.261	0.778	1.285

3.6. Slope Heterogeneity Test (Chow Test and Pesaran-Yamagata Test)

Tables 6 and 7 provide evidence supporting the presence of slope heterogeneity across firms in both model specifications. Specifically, the Chow test results in Table 6 show statistically significant test statistics and p-values below 0.01 for both Equation 1 and Equation 2, indicating that the null hypothesis of homogeneity is rejected. Similarly, Table 7 reports significant Pesaran–Yamagata test statistics with p-values less than 0.01, further confirming the presence of heterogeneity in slope coefficients. These findings justify the use of fixed effects estimation to account for firm-specific variations in the analysis.

Table 6: Slope Heterogeneity Test (Chow Test).

Chow Test			
	The Chow test statistic	**p-Value**	**Conclusion**
Equation 1	10.8421	0.0001***	Reject H0: There is evidence of slope heterogeneity
Equation 2	6.5193	0.0004***	Reject H0: There is evidence of slope heterogeneity

Notes: *** p < 0.01, ** p < 0.05, and * p < 0.10.

Table 7: Slope Heterogeneity Test (Pesaran-Yamagata Test).

Pesaran-Yamagata Test			
	Test Statistic	**p-Value**	**Conclusion**
Equation 1	12.8473	0.0004***	Reject H0: There is evidence of slope heterogeneity
Equation 2	7.5216	0.0019***	Reject H0: There is evidence of slope heterogeneity

Notes: *** p < 0.01, ** p < 0.05, and * p < 0.10.

3.7. Selection of the Best Model

Table 8 presents the results of the model selection tests for both equations. The Breusch–Pagan LM test and the Chow test yield p-values less than 0.01 for both equations, indicating significant differences in variances and supporting the use of panel data models over pooled OLS. Furthermore, the Hausman test results for both models are significant at the 5% level, suggesting that the Fixed Effect Model (FEM) is

more appropriate than the Random Effect Model. Therefore, FEM is selected as the best-fitting model for both equations.

Table 8: Best Model Test Results.

	Breusch-Pagan LM Test	Chow Test	Hausman Test	Conclusion
	p-Value	p-Value	p-Value	
Equation 1	0.0003***	0.0000***	0.0427**	Fixed Effect Model (FEM)
Equation 2	0.0001***	0.0000***	0.0175**	Fixed Effect Model (FEM)

Notes: *** p < 0.01, ** p < 0.05, and * p < 0.10.

4. REGRESSION RESULTS

4.1. Effects of Esg Disclosure on Value Creation and the Moderating Role of Firm Size on the Relationship between Esg Disclosure and Firm Value Creation

The regression results presented in Table 9 provide empirical support for the hypothesized relationships between ESG disclosure and firm value creation, as measured by Tobin's Q. In Equation 1, the coefficient of the ESG disclosure dummy (ESG_D) is positive and statistically significant at the 1% level, suggesting that firms engaging in ESG disclosure experience higher market valuation. Additionally, firm size (SIZE) and asset tangibility (TANG) are both positively and significantly associated with Tobin's Q, indicating that larger firms and those with more tangible assets tend to create more value. Conversely, financial leverage (LEV) shows a negative and significant effect, implying that higher debt levels reduce firm valuation. The model also demonstrates strong explanatory power, with an R-squared of 0.642.

In Equation 2, the interaction term between ESG disclosure and firm size (ESG_D*SIZE) is positive and statistically significant, affirming the moderating role of size in enhancing the impact of ESG disclosure on firm value. The coefficients for TANG and LEV remain consistent in sign and significance with Equation 1, reinforcing the robustness of the results. This second model also shows a good fit, with an R-squared of 0.631. Overall, these findings suggest that ESG disclosure positively influences firm value, and this effect is amplified in larger firms, highlighting the strategic importance of sustainability practices, particularly for sizable companies operating in high-impact industries.

Table 9: Regression results for equations 1 and 2 (Fixed Effects Model).

	Equation 1	Equation 2
Variable	Coefficient	Coefficient
ESG_D	0.182***	-
ESG_D*SIZE	-	0.025***
SIZE	0.137***	-
TANG	0.091***	0.083***
LEV	-0.108***	-0.096***
C	0.421***	0.447***
R-squared	0.642	0.631
Adjusted R-squared	0.617	0.605
F-statistic	25.38***	23.91***
Prob(F-statistic)	0	0

Notes: *** p < 0.01, ** p < 0.05, and * p < 0.10.

4.2. Robustness Check

As an additional robustness check, the Generalized Method of Moments (GMM) was employed.

Table 10 presents the results of the system GMM estimations for four model specifications examining the impact of ESG performance and firm characteristics on Tobin's Q (TOBIN'S Q). In all models, the coefficient of the lagged dependent variable (TOBIN'S Q) is positive and highly significant at the 1% level, confirming the dynamic nature of firm performance.

In Equation 3-1, ESG disclosure (ESG_D) has a positive and statistically significant effect on firm performance (coef. = 0.148, ***), suggesting that firms with higher levels of ESG disclosure tend to experience improved market valuation. Similarly, Equation 3-2 shows that the composite ESG score (ESG_SCORE) also has a positive and significant relationship with TOBIN'S Q (coef. = 0.112, **), reinforcing the argument that broader ESG performance contributes positively to firm value.

Equations 4-1 and 4-2 incorporate interaction terms to test for moderating effects of firm size. In Equation 4-1, the interaction between ESG disclosure and firm size (ESG_D*SIZE) is positive and

significant (coef. = 0.095, **), indicating that the effect of ESG disclosure on TOBIN'S Q is stronger in larger firms.

A similar pattern is observed in Equation 4-2, where the interaction between ESG score and size (ESG_SCORE*SIZE) is also significant and positive (coef. = 0.081, **), suggesting that ESG performance has a more pronounced value impact in firms with greater scale.

Across all models, firm size (SIZE) is consistently positive and highly significant, confirming that larger firms are generally associated with higher TOBIN'S Q values. Asset tangibility (TANG) also shows a positive influence, albeit at a lower significance level, while leverage (LEV) has a negative and significant impact on TOBIN'S Q, indicating that higher debt levels may reduce firm valuation.

The diagnostic statistics show acceptable instrument validity. The AR(1) p-values are below 0.05, indicating first-order serial correlation (as expected), while AR(2) p-values are above 0.10 in all models, suggesting no problematic second-order serial correlation. The Hansen J test p-values range from 0.198 to 0.229, implying that the overidentifying restrictions are valid and the instruments used in the GMM estimation are appropriate.

Overall, the GMM results presented in Table 10 are consistent with the findings from the Fixed Effects Model (FEM) estimations. Both approaches demonstrate that ESG disclosure and overall ESG performance have a positive and statistically significant impact on firm value, as measured by Tobin's Q.

Additionally, the interaction effects between ESG variables and firm size further confirm that the value relevance of ESG practices is more pronounced in larger firms—an observation also supported in the FEM results.

The consistency across both estimation techniques reinforces the robustness of the findings and provides strong empirical support for the positive role of ESG engagement in enhancing value creation.

Table 10: GMM Regression Results for Equations 3 and 4 (GMM) Using TOBIN'S Q as Dependant Variable.

	Equation 3-1 TOBIN'S Q	**Equation 3-2 TOBIN'S Q**	**Equation 4-1 TOBIN'S Q**	**Equation 4-2 TOBIN'S Q**
Variable	Coef.	Coef.	Coef.	Coef.
Lagged DV	0.438***	0.407***	0.392***	0.415***
ESG_D	0.148***	-	-	-
ESG_SCORE	-	0.112**	-	-
ESG_D*SIZE	-	-	0.095**	-
ESG_SCORE*SIZE	-	-	-	0.081**
SIZE	0.354***	0.215**	0.328***	0.301***
TANG	0.278**	0.167*	0.239**	0.263**
LEV	-0.198***	-0.124**	-0.176***	-0.187***
C	4.412***	3.144***	3.801***	4.055***
AR(1) p-value	0.01	0.013	0.012	0.011
AR(2) p-value	0.342	0.36	0.379	0.358
Hansen J test p-value	0.229	0.205	0.213	0.198

For robustness, supplementary analyses were conducted using ROA and ROE as alternative measures of firm performance. The results (Table 11) confirm the main findings: both ESG disclosure and ESG performance positively and significantly affect profitability, and firm size strengthens this relationship.

Control variables behave consistently, with SIZE and TANG positively associated with profitability, while LEV has a negative effect. Diagnostic tests indicate valid instruments and no second-order autocorrelation, supporting the reliability of the system GMM estimations. These robustness checks reinforce the conclusion that ESG practices enhance firm performance, particularly in larger firms, highlighting the strategic and economic benefits of sustainable business engagement. The diagnostic tests for the system GMM estimations indicate that the models are well-specified.

Specifically, AR(1) p-values are below 0.05 while AR(2) p-values exceed 0.05, suggesting that first-order autocorrelation is present, but second-order autocorrelation is absent, which is acceptable for dynamic panel models.

Additionally, Hansen J test p-values are greater than 0.05, confirming that the instruments used in the GMM regressions are valid and not overidentified. These results support the reliability of the estimated coefficients and the robustness of the findings.

Table 11: GMM Regression Results for Equations 3 And 4 (GMM) Using ROA And ROE As Dependant Variables.

	Equation 3-1 ROA	Equation 3-2 ROA	Equation 4-1 ROA	Equation 4-2 ROA	Equation 3-1 ROE	Equation 3-2 ROE	Equation 4-1 ROE	Equation 4-2 ROE
Variable	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Lagged DV	0.327***	0.301***	0.289***	0.314***	0.352***	0.338***	0.321***	0.335***
ESG_D	0.092**	–	–	–	0.118**	–	–	–
ESG_SCORE	–	0.078**	–	–	–	0.095**	–	–
ESG_D*SIZE	–	–	0.067**	–	–	–	0.082**	–
ESG_SCORE*SIZE	–	–	–	0.059**	–	–	–	0.073**
SIZE	0.212**	0.198**	0.207**	0.193**	0.241**	0.225**	0.236**	0.228**
TANG	0.156*	0.132*	0.145*	0.138*	0.174*	0.147*	0.162*	0.153*
LEV	-0.124**	-0.098**	-0.116**	-0.109**	-0.137**	-0.112**	-0.128**	-0.121**
C	2.715***	2.432***	2.581***	2.498***	3.104***	2.861***	2.972***	2.933***
AR(1) p-value	0.012	0.014	0.013	0.012	0.011	0.013	0.012	0.011
AR(2) p-value	0.361	0.354	0.372	0.359	0.348	0.366	0.371	0.352
Hansen J test p-value	0.217	0.209	0.214	0.201	0.223	0.218	0.227	0.212

The results across Tables 9, 10, and 11 consistently demonstrate the positive impact of ESG practices on firm performance and value. In Table 9, the Fixed Effects Model shows that ESG disclosure and overall ESG performance significantly enhance firm value, measured by Tobin's Q. These findings are reinforced in Table 10 using system GMM, which accounts for endogeneity and dynamic effects, confirming that ESG engagement positively influences Tobin's Q and that larger firms benefit more from ESG initiatives, as indicated by significant interaction terms with firm size. Supplementary analyses in Table 11 extend this robustness check to accounting-based measures, ROA and ROE, revealing similar positive and significant effects of ESG variables, with firm size again strengthening the relationship. Control variables (SIZE, TANG, and LEV) exhibit consistent effects across all models. The alignment of results across different estimation techniques and performance measures underscores the robustness of the findings and provides strong empirical support for the strategic and economic benefits of ESG engagement, particularly for larger firms.

5. DISCUSSION

The empirical findings from both the FEM and GMM estimations confirm a positive and significant relationship between ESG disclosure and firm value, thus supporting H1 and aligning with a substantial body of literature (Ahmad et al., 2021; Carnini Pulino et al., 2022; Feng & Wu, 2023; Gholami et al., 2022; Hamdouni, 2025a, 2025b, 2025c; Li et al., 2018; Mohammad & Wasiuzzaman, 2021; Rohendi et al., 2024; Ruan & Liu, 2021; Srour, 2022). Also, this finding contradicts existing literature suggesting the negative effects of ESG Disclosure on Value Creation (Abdi et al., 2022; Chong & Loh, 2023; Feng & Wu, 2023; Fuadah et al., 2022; Khandelwal et al., 2023; Palupi, 2023; Rohendi et al., 2024).

From the perspective of agency theory, ESG disclosure reduces information asymmetry between managers and stakeholders by increasing transparency and accountability, thereby lowering agency costs and aligning managerial actions with shareholder interests. Similarly, signalling theory posits that ESG disclosure serves as a credible signal of a firm's commitment to ethical and responsible behaviour, which enhances investor confidence and corporate reputation, ultimately contributing to value creation. Several studies have explored the interplay between ESG disclosure and corporate governance mechanisms in Saudi Arabia. While most report a generally positive relationship between ESG disclosure and various aspects of firm performance and value creation (Alofaysan et al., 2024; Bamahros et al., 2022; Hussain et al., 2024; Kouaib, 2022), our research findings provide a more nuanced understanding. Specifically, our results confirm the positive impact of ESG disclosure on firm value but also reveal that this relationship is significantly moderated by firm size. Larger firms tend to derive greater value from ESG activities, suggesting that corporate governance mechanisms and firm scale jointly influence how ESG disclosure translates into financial performance within the Saudi market context.

The results further confirm H2, demonstrating that firm size positively moderates the ESG–value relationship. Larger firms are better positioned to benefit from ESG disclosure due to their greater visibility, regulatory pressure, and resource availability, allowing them to implement more impactful ESG initiatives and gain stronger market

recognition (Abdi et al., 2022; Feng & Wu, 2023). This is consistent with studies showing that larger firms can convert ESG efforts into competitive advantage, reduce financing costs, and improve operational performance (Fatemi et al., 2018; Rohendi et al., 2024). Therefore, the empirical results not only reinforce the value-enhancing role of ESG but also highlight the strategic importance of firm size in maximizing ESG's impact, supporting both theoretical and empirical insights from the existing literature.

The findings indicate that ESG disclosure and performance positively affect firm value and profitability. Firm size strengthens these effects, suggesting that larger firms benefit more from ESG engagement due to greater resources, visibility, and stakeholder influence. For managers, these results highlight the importance of integrating comprehensive ESG practices into corporate strategy to enhance both operational efficiency and financial performance. Regulators and policymakers may consider promoting standardized ESG reporting frameworks to increase transparency and facilitate informed decision-making in capital markets. For investors, the significant positive association between ESG metrics and market-based (Tobin's Q) as well as accounting-based (ROA and ROE) measures underscores the value of incorporating ESG criteria into investment analysis. Overall, the study demonstrates that ESG engagement is not only ethically desirable but also economically advantageous, providing guidance for strategic, regulatory, and investment decisions in Saudi Arabia.

6. CONCLUSION AND RECOMMENDATIONS

ESG has become an increasingly important priority in Saudi Arabia, especially within the framework of Vision 2030 and the country's efforts to diversify and modernize its economy beyond oil dependency. This study examines 100 non-financial companies listed on the Saudi Stock Exchange (Tadawul), operating within the Energy, Materials, and Healthcare industries from 2015 to 2024, focusing on the impact of ESG disclosure on value creation and the moderating role of firm size. The findings reveal a positive and significant effect of both ESG disclosure and the interaction between ESG and firm size on firm value, indicating that larger firms benefit more substantially from ESG initiatives. These results underscore the importance of firm size in strengthening the value relevance of ESG activities within the Saudi market context.

However, this research faces some limitations. The sample size, though focused, may restrict the generalizability of the findings to other sectors or countries. Moreover, while key control variables such as tangibility and leverage were included, other potentially influential factors were not considered, which future studies could address. Expanding the scope of ESG components and exploring additional moderating variables would also enrich understanding.

Despite these constraints, the study offers valuable insights for investors, corporate managers, and policymakers aiming to enhance sustainable business practices in Saudi Arabia. It suggests the need for more tailored ESG disclosure guidelines that reflect firm characteristics like size and sector-specific dynamics. Policymakers and regulatory bodies are encouraged to develop clearer and more precise ESG frameworks to improve transparency and support informed decision-making. Overall, this research contributes to the growing literature on ESG in emerging markets and highlights the complex interplay between firm size and sustainability performance in driving value creation.

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