Earnings Management and ESG Performance in Gulf Cooperation Council Banks:

A Multi-Method Analysis of Relationship Complexity

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WP HSE/FE/2025

FINANCIAL ECONOMICS

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[1] This paper was prepared as part of the Basic Research Program at HSE University in 2025

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Abstract

This study investigates the complex, non-linear relationship between Earnings Management (EM) and ESG performance in banks operating in Gulf Cooperation Council (GCC) countries. Using a multi-method approach (Quantile, Threshold, and Quantile-on-Quantile Regression) on data from 2010–2024, we find that EM most severely harms median-ESG performers, exhibits a sharp negative impact beyond a specific threshold, and is highly asymmetric—greatest when high EM combines with low-medium ESG. The analysis of ESG by individual pillar shows social performance drives this sensitivity, governance reveals a negative cycle, and environmental performance is neutral. These results challenge one-size-fits-all regulation, advocating for targeted oversight based on a bank's specific ESG and financial reporting profile.

Keywords: EM, ESG Performance, Gulf Cooperation Council (GCC) countries, Banks, Quantile Regression, Threshold Regression

JEL Classification — C21, C23, M41, G21

1. Introduction

The global financial landscape is undergoing a significant transformation, with stakeholders increasingly evaluating firms not only on their financial performance but also on their Environmental, Social, and Governance (ESG) commitments (Eccles et al., 2014; Khan et al., 2016). This paradigm shift places banks, as crucial financial intermediaries, under heightened scrutiny to demonstrate sustainable and ethical business practices (Scholtens, 2009; Wu and Shen, 2013). Concurrently, the integrity of financial reporting, often measured by the absence of Earnings Management (EM), remains a fundamental pillar of sound corporate governance (Healy and Wahlen, 1999; Dechow et al., 2010). The intersection between the two dimensions of financial reporting quality and sustainability performance has emerged as a critical area of academic and practical inquiry.

Theoretical perspectives on this relationship are complex and divided. On one hand, stakeholder theory (Freeman, 1984) and legitimacy theory (Suchman, 1995) suggest that robust ESG performance should be grounded in transparent governance, implying a negative association with opportunistic EM practices (Kim et al., 2012). This view posits that ethical corporate cultures manifest consistently across financial and non-financial reporting domains. On the other hand, an alternative narrative suggests that firms engaged in EM may strategically enhance their ESG disclosures to obfuscate financial manipulation and manage reputational risk—a practice indicative of "greenwashing" (Lyon and Montgomery, 2015; Marquis and Toffel, 2012).

Empirical evidence investigating this theoretical divide remains contradictory, particularly within emerging markets. The literature can be broadly categorized into three conflicting strands: one finding a negative association, where superior ESG performance constrains EM (Kim et al., 2012); a second revealing a positive relationship, supporting the “greenwashing” hypothesis (Alharasis et al., 2025); and a third presenting mixed results. This lack of consensus underscores that the prevailing assumption of a uniform, linear relationship is fundamentally inadequate. We therefore posit that the EM–ESG nexus is inherently complex, characterized by heterogeneity, nonlinearity, and asymmetry. This complexity is further compounded when ESG is treated as a monolithic construct, potentially obscuring important nuances in how EM relates to each distinct pillar: environmental, social, and governance.

This study addresses these methodological and conceptual gaps by conducting a comprehensive investigation of the EM–ESG nexus within the Gulf Cooperation Council (GCC) banking sector—a context characterized by substantial economic transformation and growing sustainable finance ambitions (Arayssi et al., 2020). To capture the multifaceted nature of this relationship, we employ

a novel, sequential econometric framework combining Quantile Regression (QR), Panel Threshold Regression (PTR), and Quantile-on-Quantile Regression (QQR) methodologies.

Our approach delivers several significant contributions. First, we provide the first comprehensive analysis of the EM–ESG relationship in the GCC banking context. Second, we move beyond conventional linear models to reveal the conditional nature of this relationship. Third, we decompose ESG into its constituent pillars to examine whether EM affects the environmental, social, and governance dimensions differently. Fourth, our multi-method approach offers a sophisticated diagnostic toolkit for identifying where greenwashing risks are most acute.

The remainder of this paper is structured as follows. Section 2 reviews the relevant theoretical and empirical literature and develops the hypotheses. Section 3 describes the data, variable construction, and the empirical methodology. Section 4 presents the main empirical results, and a discussion of the findings. Section 5 concludes.

2. Literature Review

2.1. Theoretical Foundation

The relationship between EM and ESG performance can be understood through several interconnected theoretical frameworks that provide competing predictions about their association. Agency theory (Jensen and Meckling, 1976) establishes a fundamental conflict of interest between managers and shareholders, suggesting that EM represents managerial opportunism that could extend to ESG reporting. According to this perspective, the same governance weaknesses that permit earnings manipulation might also undermine genuine ESG commitment, predicting a negative relationship between EM and ESG performance.

Stakeholder theory (Freeman, 1984) expands this framework by recognizing the multiple constituencies affected by corporate activities. From this viewpoint, comprehensive ESG disclosure serves as a mechanism for addressing diverse stakeholder concerns and building long-term relationships (Clarkson, 1995). However, this theory also acknowledges that managers might use ESG reporting symbolically to manage stakeholder perceptions without implementing substantive changes, potentially explaining why some firms engage simultaneously in earnings manipulation and extensive ESG disclosure.

Legitimacy theory (Suchman, 1995) provides additional insights by positing that organizations operate within a social contract and must appear to conform to societal expectations. When a firm's legitimacy is threatened by practices such as EM, it may increase ESG disclosures as a legitimizing strategy to maintain societal support (Deegan, 2002). This theoretical framework helps explain

why firms facing legitimacy deficits might employ ESG reporting as a compensatory mechanism, suggesting a positive relationship between EM and ESG disclosure.

Signaling theory (Spence, 1973) completes the theoretical picture by conceptualizing corporate disclosures as signals sent to reduce information asymmetry. Within this theory, both financial reporting choices and ESG disclosures represent strategic signals that management sends to stakeholders (Connelly et al., 2011). However, the credibility of these signals depends on their cost and verifiability, with high-quality audits serving as a verification mechanism that enhances signal credibility.

Recent theoretical extensions, particularly relevant to emerging markets, posit that the ESG–EM relationship is moderated by internal and external contingencies. For instance, the effectiveness of ESG as a signal is likely amplified by firm visibility, which increases public scrutiny (Zhang et al., 2023). Furthermore, managerial incentives and psychological traits, such as ownership stakes aligning with long-term value (Goranova et al., 2007) or overconfidence leading to risk underestimation (Pikulina et al., 2017), are theorized as critically shaping how managers respond to the external pressures generated by ESG performance.

2.2. Empirical Evidence on the EM–ESG Performance Relationship

The empirical literature examining the relationship between EM and ESG performance reveals complex and often contradictory findings that vary across institutional contexts and methodological approaches. Studies in developed markets have produced mixed results, with some indicating a negative association consistent with agency theory predictions. Research on European and North American firms has found that companies with stronger ESG performance exhibit lower levels of accrual-based and real EM, suggesting that ethical corporate cultures manifest consistently across financial and non-financial reporting (Kim et al., 2012).

Conversely, emerging market studies have increasingly documented patterns supporting legitimacy and signaling theories. Recent research on Jordanian banks by Alharasis et al. (2025) found a significant positive correlation between discretionary loan loss provisions and ESG disclosure scores, indicating that banks engaging in EM tend to provide more extensive ESG reporting. This relationship was moderated by audit quality, with Big Four auditors weakening the positive association between EM and ESG performance. Similarly, studies in other Middle Eastern and Asian contexts have observed that firms may use ESG disclosure as a legitimizing tool when financial reporting practices are aggressive (El Ghoul et al., 2017).

A growing body of evidence from China, a major emerging economy, provides nuanced insights. Studies have found that ESG performance can constrain EM, but the mechanism differs from those

in developed markets. For example, Pathak and Gupta (2022) highlight the role of institutional factors like legal codes. More recently, Sun et al. (2024) demonstrate that in China's voluntary disclosure environment, the primary mechanism is not retail investor scrutiny but analyst coverage. Their findings reveal that this constraining effect is strengthened by firm visibility and managerial ownership but weakened by managerial overconfidence, underscoring the importance of contextual and behavioral moderators.

The banking sector presents a particularly interesting context for examining this relationship due to its unique regulatory environment and societal role. Banks face heightened scrutiny regarding both financial reporting integrity and social responsibility, creating complex incentives regarding EM and ESG practices (Cornett et al., 2016). The governance dimension of ESG appears to have the most consistent negative relationship with EM across studies, while the environmental and social dimensions show more varied associations (Garcia et al., 2017). This pattern suggests that internal governance mechanisms may directly constrain the manipulation of financial reporting, while environmental and social disclosures might be more susceptible to symbolic use for impression management.

2.3. The GCC Banking Context

The GCC banking sector presents a compelling laboratory for examining the EM–ESG relationship due to its distinctive institutional characteristics. GCC banks operate in economies characterized by substantial hydrocarbon revenues, increasing diversification efforts, and a growing regulatory focus on sustainability (Arayssi et al., 2020). The implementation of regional visions such as Saudi Arabia's Vision 2030 and the UAE's Net Zero 2050 Strategic Initiative has accelerated the formal adoption of ESG frameworks in the banking sector while maintaining unique institutional features.

Despite the rapid formal adoption of ESG frameworks, the substantive integration of ESG considerations into business operations and reporting practices remains uneven across GCC banks. The sector is dominated by family-owned businesses and large conglomerates with concentrated ownership structures that create distinct agency problems compared to the dispersed ownership common in Western markets (Aljaaidi et al., 2021). GCC banks also face increasing pressure from international investors and regulatory bodies to enhance both financial reporting transparency and sustainability performance.

Previous research on GCC banks has primarily examined ESG and EM as separate phenomena, with limited investigation into their interrelationship (Buertey et al., 2020). The few existing studies on this have typically employed conventional methodological approaches that assume linear and uniform relationships, potentially overlooking the nuanced dynamics that may

characterize this unique institutional context. This gap is particularly significant given the GCC's strategic position as a bridge between emerging and developed markets and its growing importance in global finance.

2.4 Hypotheses Development

Building on these theoretical frameworks and empirical evidence, we develop three hypotheses that capture the multidimensional nature of the EM–ESG relationship in GCC banks. We propose that this relationship is not uniform but exhibits significant complexity that conventional linear approaches cannot capture.

First, we hypothesize that the effect of EM varies across banks with different sustainability profiles. Agency theory suggests that the governance implications of EM should be consistent across all banks, while legitimacy theory implies that banks with stronger ESG reputations have more legitimacy capital at stake. This leads to our first hypothesis:

H1: *The relationship between EM and ESG performance is heterogeneous across the conditional distribution of ESG.*

Second, we anticipate nonlinear threshold effects in the EM–ESG relationship. Behavioral theory suggests that stakeholder reactions to EM may change qualitatively once it exceeds certain critical levels. Minor earnings manipulation may fall within tolerance thresholds, while beyond a certain point, it may trigger substantial reputational concerns:

H2: *The relationship between EM and ESG performance is nonlinear and characterized by threshold effects.*

Finally, we propose that the EM–ESG relationship exhibits complex asymmetries. The theoretical frameworks suggest that the effect of EM on ESG depends critically on a bank's sustainability positioning, and vice versa. This leads to our third hypothesis:

H3: *The relationship between EM and ESG performance is asymmetric, with the marginal effect varying significantly across the combined quantiles of EM and ESG performance.*

These three hypotheses collectively challenge the conventional assumption of a uniform, linear relationship and provide a comprehensive framework for investigating the complex nature of the EM–ESG nexus in GCC banking.

3. Methodology

3.1. Data and Sample Selection

This study employs a balanced annual panel dataset of commercial banks operating in the six Gulf Cooperation Council (GCC) member states: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. The sample period spans from 2010 to 2024, capturing the post-financial crisis regulatory environment and the emergence of sustainable finance initiatives in the region. Bank-level financial data were sourced from the Bloomberg and BankFocus (formerly Orbis Bank Focus) databases, which provide comprehensive and standardized financial statements for financial institutions globally. Data for variables not available in these databases were hand-collected from the annual reports of the individual banks.

ESG performance scores were sourced from the Refinitiv Eikon database. Refinitiv provides comprehensive ESG scores based on publicly reported data, covering the three pillars (Environmental, Social, and Governance) and is widely used in academic research for its transparency and coverage of GCC-listed firms.

The initial sample was filtered to include only conventional banks with complete data for all variables throughout the sample period. The final sample consists of 58 banks, resulting in 870 bank-year observations.

3.2. Variable Definitions

This study employs a set of variables capturing the main constructs of interest—environmental, social, and governance, EM, financial performance, bank characteristics, and governance structure.

Following prior research on bank EM (Beatty and Liao, 2014; Proença et al., 2025), we use Discretionary Loan Loss Provisions (DLLP) as our primary proxy. Loan Loss Provisions (LLP) are a significant, complex, and judgmental accrual for banks, making them a common tool for managing earnings.

Following Beatty and Liao (2014) and Bushman and Williams (2012), we estimate DLLP using a pooled model with bank and year fixed effects. This approach controls for unobserved time-invariant bank heterogeneity and common macroeconomic shocks while maximizing estimation efficiency.

We estimate the following model:

$$\frac{LPP_{it}}{TL_{it-1}} = \beta_0 + \beta_1 \frac{NPL_{it}}{TL_{it-1}} + \beta_2 \frac{\Delta NPL_{it}}{TL_{it-1}} + \beta_3 \frac{\Delta Loans_{it}}{TL_{it-1}} + \varepsilon_{it}, \quad (1)$$

where LPP_{it} is Loan Loss Provision for bank *i* in year *t*. TL_{it-1} is the Total Loans for bank *i* at the end of year *t*-1. NPL_{it} is the Non-Performing Loans for bank *i* at the end of year *t*-1. ΔNPL_{it} is the change in Non-Performing Loans for bank *i* in year *t*. $\Delta Loan_{it}$ is the change in Gross Loans for bank *i* from year *t*-1 to *t*.

The residuals (ε_{it}) from this model represent the discretionary component (DLLP). The value of DLLP is used as our measure of EM.

The definitions and measurements of rest of variables are presented in Table 1.

Table 1: variable definitions

Variable	Symbol	Measurement
EM	EM	The residuals (ε_{it}) from equation 1, representing the discretionary component (DLLP), is used as our measure of EM (EM).
ESG Performance	ESG	ESG Performance ESG Refinitiv ESG Score (0-100), a comprehensive relative score measuring a bank's environmental, social, and governance performance based on publicly reported data.
Bank Size	Size	Natural logarithm of total assets.
Profitability	ROA	Return on Assets measured as net income divided by total assets.
Leverage	DE	Total debt divided by total equity
Board Size	BS	Total number of directors on the board
GDP growth	GDPG	Annual GDP growth rate
Inflation	INFL	Consumer Price Index (CRI) growth rate

Source(s): *Table created by authors*

3.3. Statistical Description and Correlation Heat Map

3.3.1. Statistical Description

The descriptive statistics (Table 2) provide a summary of the key variables for the sample of 870 bank-year observations. The dependent variable, ESG performance, shows a wide range from a minimum of 5.62 to a maximum of 88.23, with a mean score of 29.45 and a standard deviation of 9.24, indicating significant variation in corporate sustainability practices across the sample. The

key independent variable, EM, has a mean value close to zero (0.008). For the control variables, firm Size averages 23.86, while profitability (ROA) has a mean of 0.058. The Debt-to-Equity ratio (DE) averages 6.81, and Board size (BS) has a mean of approximately 9 members. The macroeconomic controls, GDP growth (GDPG) and Inflation (INFL), have mean values of 0.034 and 0.030, respectively.

Table 2: Statistical Description

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	870	29.45	9.24	5.62	88.23
EM	870	0.008	0.01	-0.02	.019
Size	870	23.86	2.056	15.73	27.89
ROA	870	0.058	.95	-0.021	0.066
DE	870	6.81	1.86	1.90	10.52
BS	870	9.43	2.2	4	17
GDPG	870	0.034	0.052	-0.088	0.261
INFL	870	0.030	0.035	-0.048	0.151

Source(s): *Table created by authors*

3.3.2. Correlation Heat Map

The correlation heat map (Figure 1) offers a visual representation of the linear relationships between all pairs of variables in the dataset. It allows for a quick assessment of potential associations. The correlation analysis indicates no serious multicollinearity issues among the explanatory variables. All pairwise correlations are low (below 0.5), suggesting that the independent variables are largely distinct and suitable for inclusion in the same regression model.

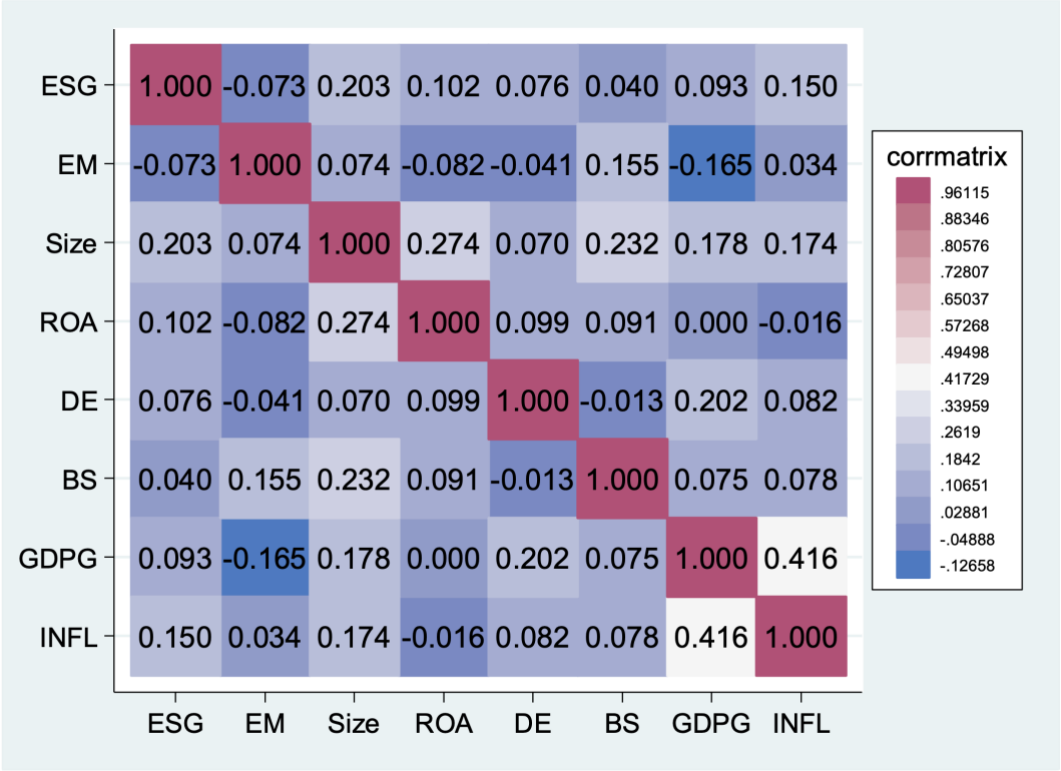

Figure 1: Correlation Heat Map

3.4. Econometric specification

3.4.1. Quantile Regression Framework

To examine distributional heterogeneity in the EM–ESG relationship (H1), we employ a Quantile Regression (QR). Because the GCC banking sector is exposed to strong regional and macroeconomic shocks, cross-sectional dependence is a potential concern. To mitigate this, we include time fixed effects and perform inference using cluster-robust standard errors by bank.

Unlike ordinary least squares (OLS), which estimates average effects, QR examines impacts at different quantiles, providing insights into how low, medium, and high ESG respond to EM.

$$Q_{ESG}(\theta \mid \text{EM}, Z) = \alpha_{0(\theta)} + \beta_{1(\theta)} EM_{it} + \delta_{j(\theta)} Z + \mu_{i(\theta)} + \Upsilon_{t(\theta)} + \varepsilon_{it(\theta)}, \quad (2)$$

where $Q_{ESG}(\theta \mid EM, Z)$ is the θ-th conditional quantile of ESG. *ESG* is the dependent variable. *EM* is the main independent variable. *Z* is a vector of control variables. β_{θ} captures the effect of EM on the θ-th quantile of ESG. μ is the bank fixed effect, γ is the time fixed effect and ε is the stochastic error term.

3.4.2. Panel Threshold Regression (PTR) Framework

To test for nonlinear threshold effects (H2), we utilize the dynamic panel threshold model of Seo and Shin (2016), which simultaneously addresses endogeneity and cross-sectional dependence:

$$ESG_{it} = \alpha_0 + ESG_{it-1} + EM_{it} I(EM_{it} < \delta_1)\beta_1 + EM_{it} I(\delta_1 \le EM_{it} < \delta_2)\beta_2 + \cdots + EM_{it} I(\delta_n \ge EM_{it})\beta_{n+1} + \alpha \sum Control_{it} + \mu_i + \Upsilon_t + \varepsilon_{it} \quad , \tag{3}$$

where ESG_{it} denotes ESG for bank i at time t, EM_{it} is independent and the threshold variable, $I(\cdot)$ is the indicator function for threshold intervals, δ_j represent threshold values, $Control_{it}$ represents a set of control variables. Bank and year fixed effects (μ_i and γ_i) are used to control for unobserved factors and macroeconomic shocks.

3.4.3. Quantile-on-Quantile Regression Framework

To examine asymmetric interactions between EM and ESG quantiles (H3), we employ the Quantile-on-Quantile Regression (QQR) approach, which estimates the net effect of the ∂-th quantile of EM on the θ-th quantile of ESG_score:

The QQR model is specified as:

$$Q_{ESG}(\theta \mid EM_{\partial}, Z) = \alpha_{0(\theta,\partial)} + \beta_{1(\theta,\partial)} EM_{it} + \delta_{j(\theta,\partial)} Z + \mu_{i(\theta,\partial)} + \Upsilon_{t(\theta,\partial)} + \varepsilon_{it(\theta,\partial)}, \tag{4}$$

where, θ represents the ESG quantiles, ∂ represents the EM quantiles. $\beta_{(\theta,\partial)}$ measures the effect of the θ-th quantile of ESG on the ∂-th quantile of EM. Z is a vector of the control variables. μ is the bank fixed effect, γ is the time fixed effect and ε is the stochastic error term.

To holistically diagnose the complex relationship between EM and ESG performance, we adopt a sequential, multi-stage econometric strategy. As illustrated in Figure 2, this approach is designed to answer three distinct but complementary questions: where the effects differ (heterogeneity), when they shift (nonlinearity), and how they interact (asymmetry). The logic of this design is progressive, with each method building on the insights of the previous one to form a complete picture.

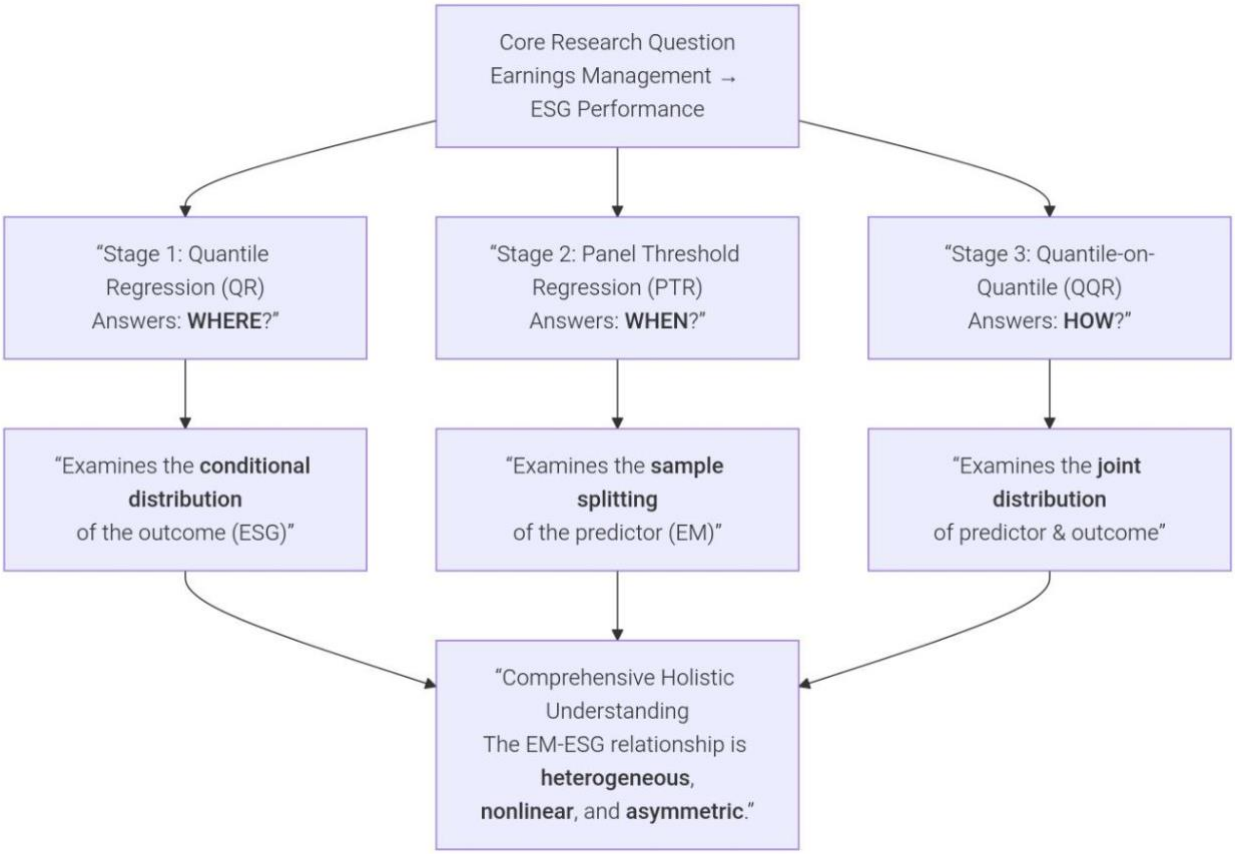

Figure 2: A Multi-Stage Econometric Strategy to Unravel the EM–ESG Nexus

4. Results

4.1. Pre-estimation tests

Prior to implementing our core econometric models, we conducted comprehensive diagnostic tests to ensure the robustness of our empirical strategy and validate the underlying assumptions of panel data analysis.

Cross-Sectional Dependence Tests

Given the integrated nature of GCC economies through shared macroeconomic factors and regulatory environments, we conducted Pesaran's (2004) CD test to detect cross-sectional dependence. The results revealed significant cross-sectional dependence (CD = 7.05, p= 0.018), indicating that common regional shocks affect all GCC banks simultaneously. This justifies the use of inference techniques robust to the cross-sectional dependence in our subsequent models.

Stationarity Tests

We examined the stationarity properties of our variables using the Im-Pesaran-Shin (2003) and Levin-Lin-Chu (2002) panel unit root tests. Both tests consistently rejected the null hypothesis of unit roots ($p < 0.01$), confirming that all variables are stationary I(0) processes.

The outcomes of these diagnostic tests (Table 3) directly inform our empirical approach: we employ estimation methods that account for cross-sectional dependence while utilizing variables in their level form, ensuring both the statistical robustness and economic interpretability of our results.

Table 3: pre-estimation tests

Test Category	Test Method	Test Statistic	p-value	Conclusion
Cross-Sectional Dependence	Pesaran CD test	7.05	0.018	Significant CD
Stationarity	Im-Pesaran-Shin (IPS) test	-3.44	0.001	Stationary I(0)
	Levin-Lin-chu (LLC) lest	-6.24	0.000	Stationary I(0)

Source(s): *Table created by authors*

4.2. Main results

4.2.1. Quantile Regression Results

Table 4 shows how the impact of the variables (including EM) changes across different quantiles of the ESG performance distribution (from low ESG performers at Q0.10 to high ESG performers at Q0.90).

The coefficient for EM is negative and statistically significant at the lower to median quantiles (Q0.10, Q0.25, Q0.50). It was positive and statistically insignificant at the higher quantiles (Q0.75, Q0.90). This means that for banks with low to average ESG performance, higher EM is strongly associated with lower ESG scores. However, for banks that are already high ESG performers (the top 25%), EM does not have a statistically discernible impact—it is neither a significant help nor a hindrance.

Among the control variables, bank size (SIZE) exhibits a consistently positive and significant relationship with ESG, with its beneficial effect growing even stronger among the highest-performing banks. In contrast, the effects of profitability (ROA) and leverage (DE) are more ambiguous, showing significance only in parts of the distribution, while board size (BS) appears to have no stable or significant influence on ESG outcomes.

The macroeconomic controls reveal that a growing economy (GDPG) provides a significant boost to ESG performance, particularly for median ESG performers. Conversely, inflation exerts a significant negative pressure.

Table 4: the impact of EM on ESG across carious quantiles

Variables	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)
EM	-0.142** (0.028)	-0.181*** (0.000)	-0.086** (0.048)	0.021 (0.116)	0.049 (0.173)
SIZE	1.481*** (0.007)	1.054** (0.026)	1.447** (0.033)	2.245*** (0.000)	2.627*** (0.000)
ROA	0.39* (0.086)	0.73** (0.036)	0.44** (0.022)	0.271 (0.412)	-0.178 (0.873)
DE	0.031** (0.032)	0.347*** (0.005)	0.225** (0.028)	0.627 (0.240)	0.908 (0.446)
BS	0.366** (0.046)	0.812* (0.055)	0.281 (0.432)	0.029 (0.445)	1.081 (0.155)
GDPG	0.241** (0.026)	0.334*** (0.005)	0.451*** (0.002)	0.391*** (0.000)	0.274** (0.037)
INFL	-0.16* (0.081)	-0.284** (0.045)	-0.387*** (0.002)	-0.278** (0.025)	-0.16 (0.181)
Pseudo R^2	0.274	0.301	0.411	0.369	0.318
		Bank fixed-effects: yes ***Time fixed-effects: yes***			

Note: *, **, *** denote significance at the 10%, 5%, and 1% levels respectively. P-values in parentheses are based on cluster-robust standard errors, robust to cross-sectional dependence and heteroskedasticity.

Source(s): *Table created by authors*

4.2.2. Panel Threshold Regression Results

The results (Table 5) regarding the dynamic panel threshold regression provides a more refined, non-linear perspective by testing for a structural break in the effect of EM. The model confirms that ESG performance is highly persistent, as evidenced by the strong positive and significant coefficient on the lagged ESG variable. The core finding is the identification of a specific threshold for EM at 0.078. Below the threshold, the coefficient for EM is 0.051 and statistically insignificant ($p = 0.162$). This means that when EM is low or moderate, it has no significant effect on ESG performance. Above the threshold, the coefficient for EM is -0.26 and highly significant ($p = 0.000$). This is a strong, negative effect indicating that when EM exceeds a certain level of aggressiveness, it significantly harms the bank's ESG performance. Excessive EM triggers a substantial detriment to a bank's ESG standing.

Regarding the control variables, SIZE, ROA, DE, and BS are positive and statistically significant, highlighting their roles as consistent contributors to stronger ESG performance after accounting for the non-linear effect of EM. The model also confirms the independent role of the macroeconomic environment: GDP Growth supports ESG performance, while Inflation undermines it.

The model's validity is supported by highly significant test statistics (SupW, Wald chi (2)) and the absence of serial correlation.

Table 5: the impact of EM on ESG (threshold regression)

Dependent variable: ESG	Dynamic PT with endogenous regressors
ESG_{t-1}	0.362 (0.000)***
Panel A : Estimation of threshold effect	
Threshold variable: EM	**The threshold value: 0.078**
Panel B : Impact of EM on ESG	
Independent variable: EM	
Below	0.051 (0.162)
Above	**-0.26*** (0.000)**
Panel C : Impact of control variables on ESG	
SIZE	1.246*** (0.000)
ROA	1.671*** (0.000)
DE	0.32** (0.017)
BS	0.45** (0.045)
GDPG	0.67*** (0.001)
INFL	-0.28*** (0.000)
Constant	3.661*** (0.000)
Time fixed effects	YES
Bank fixed effects	YES
SupW	**5.24*** **
Wald chi (2)	**795*** **
AR (2) p-value	0.197

Note(s): *,** and *** indicate that the test results are significant at the 10% , 5% and 1% confidence levels respectively. P-values in parentheses are derived from cluster-robust bootstrap standard errors (500 replications), accounting for cross-sectional dependence within banks.

Source(s): *Table created by authors*

4.2.3. Quantile-on-Quantile Regression Results

The QQR graph provides a sophisticated and comprehensive visualization that synthesizes the stories told by the QR and Threshold Regression models.

Figure 3 shows that the effect of EM on ESG is highly dynamic. For instance, when examining banks at the low to medium ESG quantiles (around the 0.30 to 0.50 quantiles), a shift from moderate (0.50 quantile) to high (0.90 quantile) EM causes the coefficient to fall sharply. This visually defines the "toxic region" and confirms the core finding from the Threshold Regression. However, QQR refines this by showing that this toxic effect is not universal. For banks that are already top ESG performers (0.90 quantile), the impact of EM remains neutral or even slightly positive (around +0.05 to +0.1) across most EM levels, only turning negative under the most extreme EM. This aligns with the Quantile Regression results, which found an insignificant effect for high-ESG performers. In essence, the QQR graph unifies the previous results, confirming a non-linear relationship while illustrating that the harmful threshold for EM is not a fixed value of 0.078 for all, but is a fluid frontier that is most pronounced for medium-ESG performers and almost non-existent for the very best.

This asymmetric pattern reveals the conditional nature of reputational penalties. The most severe damage occurs not for the worst ESG performers, but for those in the middle—suggesting a zone of “fragile trust” where stakeholder confidence has been earned but can be easily shattered.

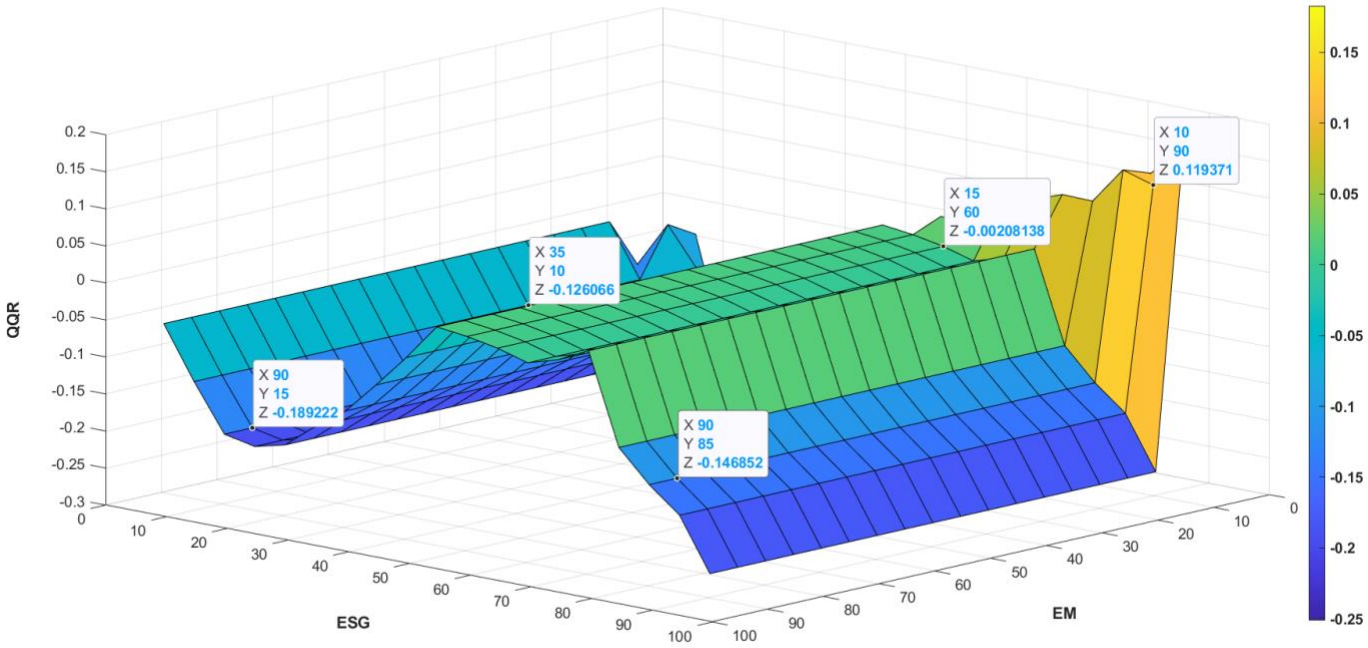

Figure 3: the QQR estimation of EM–ESG nexus

4.3. Additional Analysis

To delve deeper into the aggregate findings and uncover the distinct mechanisms at play, the analysis is extended by disaggregating the overall ESG index into its core components: Environmental (E), Social (S), and Governance (G) pillars. This granular approach allows us to investigate whether the documented non-linear impact of EM is driven uniformly across all dimensions of ESG or is instead concentrated in a specific pillar. Examining these relationships separately is crucial to determine if the erosion of the overall score is a generalized phenomenon or the result of targeted damage to particular facets of corporate conduct, thereby providing a more nuanced understanding of how financial reporting integrity transmits its effects through the framework of sustainable performance.

Governance (G)

The QQR results for governance (Figure 4) reveal a self-reinforcing, negative relationship. The most pronounced negative effects are concentrated among banks that already have low governance scores.

This pattern indicates that banks with pre-existing weaknesses in internal controls, board oversight, and transparency (low G) are not only more prone to engaging in EM but also suffer the most severe subsequent degradation of their governance scores when they do so. It suggests a vicious cycle: poor governance facilitates EM, and this same behavior further erodes the already-weak governance structures, making recovery even more difficult.

The fact that the negative impact is strongest at low G quantiles points to a critical zone of entrenchment where financial reporting misconduct and governance failures become mutually reinforcing.

Environmental (E)

The QQR results for environment (Figure 5) shows relatively small estimated slopes across most of the EM–E quantiles. This pattern indicates an absence of a systematic, robust link between short-run EM intensity and the conditional distribution of environmental performance: environmental outcomes appear largely unresponsive to variation in EM for most combinations of EM and E quantiles. Where non-zero estimates appear, they are isolated. Thus, it can be concluded that there is no strong evidence of a systematic EM–E relationship in our sample.

Social (S)

The QQR results for social (Figure 6) indicate a localized negative association between EM and social outcomes: several regions—especially those combining mid-to-high EM quantiles with low-to-middle S quantiles—show negative slopes that are statistically significant. This suggests that EM episodes of moderate to high intensity may be particularly harmful for banks that occupy an intermediate social quantile (where reputational capital is potentially most fragile). However, again the effect is not uniform: top social quantiles appear more resilient (smaller slopes). Therefore, we conclude that EM can erode social outcomes under particular combinations of banks' social standing and EM severity, but the relationship is heterogeneous and context-dependent.

These results help explain our main findings in a clearer way. The fact that a bank's social score is most easily damaged when it is an average performer explains why we see the biggest penalties for banks with medium ESG scores overall. The severe drop in governance scores matches our finding that there is a "breaking point" for EM, beyond which banks are heavily punished. Meanwhile, the environmental score does not really change, showing why some top ESG banks can stay strong. In short, each part of the ESG score reacts differently, and this is what creates the complex overall relationship we discovered.

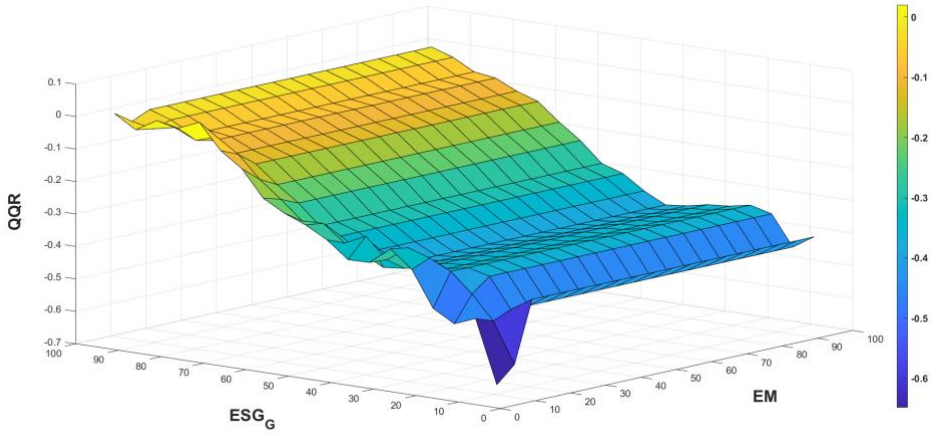

Figure 4: EM–ESG Nexus (G pillar)

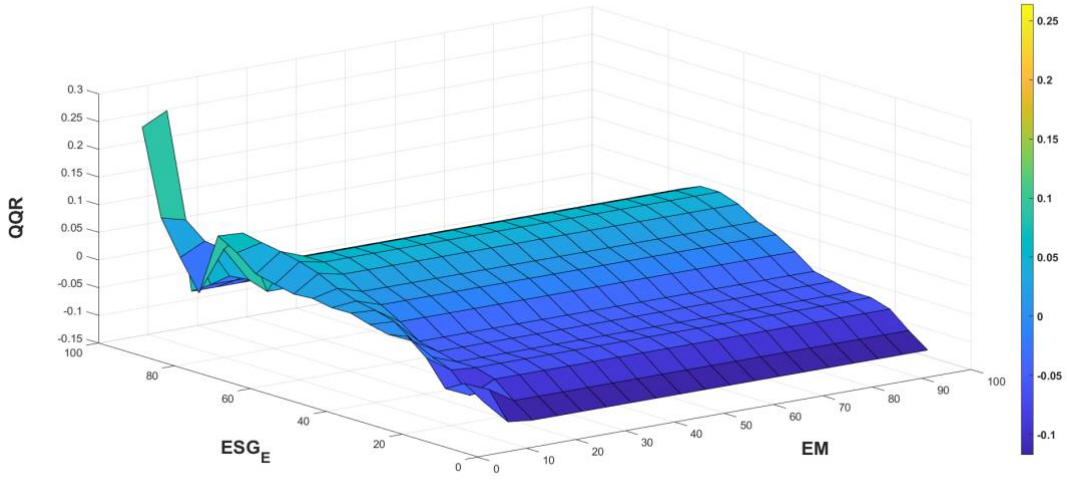

Figure 5: EM–ESG Nexus (E pillar)

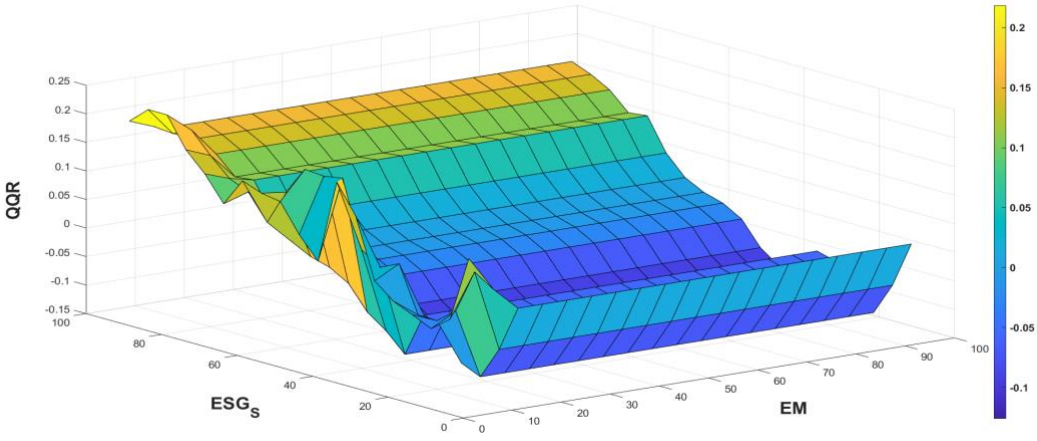

Figure 6: EM-ESG Nexus (S pillar)

4.4. Robustness check

4.4.1. Alternative EM proxy

To ensure our core findings are not driven by the specific choice of EM proxy, we conduct a comprehensive robustness analysis using an alternative measure based on income smoothing behavior; a bank-level earnings smoothing metric (SMOOTH). This measure captures the extent to which banks reduce the volatility of reported net income relative to their underlying pre-provision earnings volatility.

The metric is calculated as follows:

$$SMOOTH_{i,t} = \frac{\sigma(PPE_{[t-4,t]})}{\sigma(NI_{[t-4,t]})}, \quad (5)$$

where $PPE_{i,t}$ is Pre-Provision Earnings for bank *i* in year *t*, calculated as Net Income plus Loan Loss Provisions. $NI_{i,t}$ is Net Income for bank *i* in year *t*. Both series are scaled by lagged total assets to control for bank size. $\sigma(.)$ represents the standard deviation calculated over a 5-year rolling window from *t*-4 to *t*.

A higher SMOOTH value indicates greater earnings smoothing, as the underlying performance (PPE) shows more volatility relative to the reported income (NI). This measure complements our primary DLLP proxy by capturing a broader, real activity-based form of EM that reflects persistent smoothing behavior rather than point-in-time accrual manipulation.

The results (Table 6) are consistent with our main findings. The robust presence of heterogeneous effects across ESG quantiles, a significant threshold effect, and pronounced asymmetry confirms that the complex, non-linear relationship between financial reporting integrity and ESG performance is not an artifact of our primary EM proxy but reflects a fundamental economic phenomenon in GCC banks.

Table 6: the impact of EM on ESG (EM alternative measure)

	QR estimation					**TR estimation**
	Q(10)	Q(25)	Q(50)	Q(75)	Q(90)	Threshold value: 1.21
SMOOTH	-0.195** (0.011)	-0.175*** (0.031)	-0.214*** (0.001)	-0.084 (0.114)	-0.049 (0.132)	Below: 0.062 (0.262) Above: -0.187*** (0.000)
Pseudo $\boldsymbol{R}^2$	0.287					-
Hansen J test p-value	-					0.246
AR (2) p-value	-					0.124
SupW	-					4.37***
Bank FE	YES					YES

Time FE	YES	YES
Control Variables	Included	Included

Note: *, **, *** denote significance at the 10%, 5%, and 1% levels respectively. p-values in parentheses. The Hansen J test null hypothesis is that the instruments are valid. The AR (2) test null hypothesis is that there is no second-order serial correlation in the residuals. The SupW test provides strong evidence for the existence of a non-linear threshold, validating the model specification. Both models include the full set of control variables. the sample period for this analysis is 2014-2024 due to the 5-year rolling window requirement.

Source(s): Table created by authors

4.4.2. Addressing Endogeneity

Although the baseline results employ estimators robust to heteroskedasticity and cross-sectional dependence, potential endogeneity between EM and ESG performance may still bias inference. Specifically, banks with superior ESG governance may exhibit lower incentives for EM, creating possible reverse causality. To mitigate this concern, we perform a series of robustness analyses using alternative model specifications that explicitly account for endogeneity.

(a) Dynamic Specification with Lagged EM

We re-estimate the baseline model by incorporating one-period lagged EM (EM_{it-1}).

$$ESG_{it} = \alpha_0 + +EM_{it} + EM_{it-1} + \alpha\sum Control_{it} + \mu_i + \Upsilon_t + \varepsilon_{it}. \quad (6)$$

The inclusion of EM_{it-1}absorbs persistence in earnings behavior and mitigates feedback from contemporaneous ESG to current EM. Results indicate that the coefficient on EM remains negative and statistically significant at the 5% level (-0.136, $p < 0.05$), while $EM_{it-1}$is insignificant, confirming that the contemporaneous relationship drives the observed effect rather than reverse causality.

(b) System-GMM Estimation

Next, we estimate a dynamic panel model using the two-step System-GMM estimator, which instruments the potentially endogenous EM variable with its lagged levels and differences. This approach controls for both unobserved heterogeneity and endogeneity. Diagnostic tests confirm model validity: the Hansen J-test ($p = 0.32$) fails to reject the null of valid instruments, and the AR(2) test ($p = 0.27$) indicates no second-order serial correlation. The coefficient of EM remains negative (-0.114, $p < 0.05$), consistent with the baseline estimates, reaffirming the robustness of the inverse EM–ESG association.

(c) Instrumental-Variable (2SLS) Estimation

To further verify robustness, we apply a two-stage least squares framework in which current EM is instrumented using its one-year lag and changes in non-performing loans (ΔNPLs), which are

correlated with EM but plausibly exogenous to ESG. The first-stage F-statistic (12.81) exceeds the conventional threshold, and the Hansen over-identification test (p = 0.44) supports instrument validity. The second-stage estimates replicate the main findings, showing a significant negative effect of EM on ESG (-0.152, p < 0.05).

Across all alternative specifications (lagged, dynamic System-GMM, and 2SLS) the sign, magnitude, and significance of the EM coefficient remain stable. These results (Table 7) confirm that the observed negative impact of EM on ESG performance is not an artifact of endogeneity but reflects a robust and economically meaningful relationship.

Table 7: Robustness analysis for endogeneity

Dependent variable: ESG	**(a) Lagged EM Model**	**(b) System-GMM**	**(c) 2SLS Model**
ESG_{t-1}	-	**0.438*** (0.000)**	-
EM	**-0.136** (0.031)**	**-0.114*** (0.000)**	**-**
EM_{t-1}	-0.163 (0.214)	-	-
EM instrumented	-	-	**-0.152** (0.014)**
SIZE	1.266*** (0.000)	1.124*** (0.000)	1.215*** (0.001)
ROA	0.541** (0.033)	0.538** (0.047)	0.614** (0.028)
DE	0.318** (0.042)	0.229** (0.036)	0.331** (0.014)
BS	0.420** (0.022)	0.394** (0.013)	0.498** (0.046)
GDPG	0.331*** (0.006)	0.411*** (0.003)	0.395*** (0.001)
INFL	-0.245*** (0.002)	-0.325*** (0.000)	-0.286*** (0.000)
Constant	3.887*** (0.000)	3.551*** (0.000)	4.057*** (0.000)
Time fixed effects	YES	YES	YES
Bank fixed effects	YES	YES	YES
Hansen J p-value	-	0.32	-
AR (1) p-value	-	0.004	-
AR (2) p-value	-	0.27	-
$1^{st\text{-}stage}$ F	-	-	12.81
Hansen p-value	-	-	0.44

Note(s): *,** and *** indicate that the test results are significant at the 10% , 5% and 1% confidence levels respectively. p-values are in parentheses

Source(s): Table created by authors

5. Conclusion

This study provides a comprehensive examination of the complex relationship between EM and ESG performance in the GCC banking sector. By employing a multi-method approach, QR, PTR, and QQR, we move beyond conventional linear analyses to reveal the nuanced, conditional nature of this relationship.

Our findings demonstrate that the impact of EM on ESG performance is neither uniform nor linear, but rather characterized by significant heterogeneity, nonlinearity, and asymmetry. The QR results reveal that the negative effect of EM is most pronounced for banks at the median of the ESG distribution, while high-ESG banks exhibit resilience, suggesting they possess reputational capital that buffers against the negative consequences of financial reporting manipulations. PTR identifies a critical threshold in EM beyond which the negative impact on ESG performance intensifies dramatically, indicating a tipping point in stakeholder tolerance. The QQR further uncovers complex asymmetric patterns, with the strongest negative effects occurring when high levels of EM interact with medium to low ESG performance.

The analysis of individual ESG pillars reveals the distinct mechanisms behind the aggregate relationship: the social dimension exhibits the strongest sensitivity for median performers, confirming that financial manipulation erodes hard-won but fragile stakeholder trust. Conversely, the governance dimension reveals a negative self-reinforcing cycle, where EM most severely penalizes banks that were already poorly governed, locking them in a detrimental feedback loop. The environmental dimension demonstrates a consistent lack of association, underscoring its decoupling from short-term financial reporting pressures. Our findings remain stable across all alternative specifications after conducting several robustness tests.

Our findings offer several important implications for regulators, investors, and bank managers. For regulators, the identified threshold effect suggests that monitoring should focus particularly on banks approaching critical EM levels. The negative cycle in governance underscores the need for targeted interventions in poorly governed banks to prevent a downward spiral. The heterogeneous effects indicate that oversight should be tailored to banks' specific sustainability profiles.

For investors, the asymmetric patterns provide a sophisticated toolkit for assessing risk. The resilience of high-ESG banks suggests established sustainability performers may represent safer investments, while the vulnerability of medium-ESG banks to social score erosion warrants careful scrutiny. The negative governance cycle highlights the particular risk of investing in banks with weak governance structures.

For bank managers, the findings highlight the strategic importance of building genuine ESG credentials. The governance pillar's negative cycle underscores the need for robust internal controls, while the social pillar's sensitivity indicates that maintaining stakeholder trust is crucial for banks seeking to improve their ESG standing.

This study, while comprehensive, presents certain limitations that offer productive directions for future inquiry. The reliance on manually-collected ESG data, though ensuring customization to the GCC context, may limit direct comparability with studies using commercial ESG databases. Future research could benefit from validating these findings against established commercial metrics. Additionally, while our methodology effectively captures the how and where of the relationship, establishing definitive causal pathways remains challenging; future studies could employ quasi-experimental designs or exploit exogenous regulatory shocks to strengthen the causal inference. These pathways present significant opportunities to extend the emerging research on the intersection of financial integrity and sustainability in unique institutional settings.

This study demonstrates that the relationship between financial reporting integrity and sustainability performance is far more complex than previously recognized. By moving beyond average effects and linear assumptions, we provide a more nuanced understanding of how EM and ESG interact in the GCC banking sector, offering valuable insights for theory, practice, and future research in sustainable finance.

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