

## Article

# Nonlinear Relationship Between Audit Quality and ESG Performance in Insurance Companies: New Evidence from the MENAT Region

Rewayda Tobar <sup>1,2</sup>

<sup>1</sup> Insurance and Risk Management Department, University of Business and Technology, Jeddah 21448, Saudi Arabia; r.tobar@ubt.edu.sa

<sup>2</sup> Insurance and Actuarial Science Department, Faculty of Commerce, Cairo University, Cairo 12613, Egypt

## Abstract

This study examines the nonlinear connection between audit quality and insurance firm ESG performance based on a sample of 31 MENAT-region insurance companies from 2017 to 2022. Based on a fixed-effect model and quadratic regression, the main results support the presence of a curvilinear nexus between audit quality and ESG performance of insurance companies. This correlation shifts from positive to negative when it reaches a level of 51,7%. Given this, insurers and regulatory bodies should adjust audit quality to a balanced point where it optimizes ESG performance without excesses that would be needlessly costly and have reverse effects. Policy wise, proportionate rules should be established for the inclusion of ESG considerations in auditing, to prevent over-regulation and to achieve a balance between control and performance.

**Keywords:** audit quality; ESG performance; SGMM; MENAT region



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## 1. Introduction

In a world demanding social and environmental responsibility, auditing is becoming vital for promoting sustainable practices. Once seen merely as a tool for checking accounts, auditing now plays a strategic role in showcasing the transparency of ESG (environmental, social, and governance) commitments [1]. This shift is especially relevant for high-risk sectors like insurance, where sustainability and reputation are crucial [2]. Auditors' ability to identify discrepancies and provide impartial judgments is increasingly recognized as essential for enhancing ESG performance [3].

In theory, the literature on this subject proposes several analytical frameworks for describing the link between ESG performance and audit quality. According to agency theory, auditing reduces information asymmetries between shareholders and managers by increasing the transparency and credibility of ESG disclosures, which are susceptible to opportunistic behavior [1,4–6]. Stakeholder theory broadens this perspective to encompass all stakeholders with an interest in the company's activities. According to this perspective, rigorous auditing entrenches the legitimacy of ESG actions and serves to meet societal expectations [3,7]. Furthermore, the Resource-Based View theory considers audit quality to be a strategic asset that builds external credibility, thereby reinforcing reputation and overall performance [8,9]. Finally, resource dependence theory argues that auditing helps companies acquire external resources, particularly institutional resources, by complying with the ESG standards required by stakeholders and regulators. All these theories conclude

that a quality audit can drive sustainable performance [10]. Audit quality refers to the degree to which an audit is conducted in accordance with professional standards and effectively enhances the reliability, transparency, and credibility of financial reporting. A high-quality audit provides reasonable assurance that financial statements are free from material misstatements, whether due to fraud or error, and reflect the auditor's competence, independence, and diligence [11].

However, despite such a robust theoretical basis, there is mixed empirical evidence to support the relationship between audit quality and ESG performance. Various studies have indicated a positive relationship between audit quality and ESG performance [1,12–15]. Conversely, other studies have not found any significant impact or diverse impacts in different institutional contexts, industries, or individual ESG dimensions (environmental, social, and governance). Some studies in emerging economies have found that the quality of audits is insufficient to influence ESG practices due to regulatory weakness, political influence, or a lack of awareness of sustainability issues [1,15]. These contrasting empirical findings highlight the need to explore this connection in specific geographical locations that remain under-researched, such as the MENAT region (Middle East, North Africa, and Turkey). Although previous research has explored the effects of audit quality on ESG performance, it has largely overlooked the possibility of a curvilinear relationship. Specifically, no study has examined whether audit quality can have both positive and negative effects depending on its intensity. This gap is particularly relevant in the insurance sector in the MENAT region, where ESG integration is still developing and audit practices vary considerably. By examining this curvilinear relationship, this study fills an important gap in the literature and offers new insights into how audit quality can be optimized to support ESG performance without generating unexpected costs or inefficiencies.

More precisely, this paper seeks to investigate the nonlinear relationship between audit quality and ESG performance in insurance companies operating in the MENAT region. This study makes several major contributions. Firstly, it makes a valuable contribution to the existing literature by exploring a yet largely unknown link in a geographically diverse region characterized by a variety of institutions, regulations, and cultures. Second, the study addresses a global challenge. Secondly, it makes a sector-specific contribution by focusing on the insurance sector, where concerns about resilience, risk management, and sustainability are particularly prevalent. Thirdly, it suggests a multidimensional conceptualization of audit quality and ESG performance by harnessing granular empirical evidence. Finally, and perhaps most importantly, this research creates practical opportunities for decision-makers by demonstrating how improving audit quality can be used as a strategic tool to enhance ESG performance and meet the expectations of regulators and stakeholders.

This paper is structured as follows: Section 2 presents the hypotheses that were formulated based on the literature review. Section 3 describes the research model employed. Section 4 summarizes and reports the key results. Section 5 draws conclusions from the results.

## 2. Literature Review and Hypotheses Development

### 2.1. Literature Review

Audit quality is a significant tool for ensuring the transparency, credibility, and authenticity of a company's ESG behavior. As a governance tool, audit quality reduces information asymmetry and the risk of greenwashing. Rigorous verification improves audit quality, creating more stakeholders and financial market confidence, which often translates into better ESG and financial outcomes [1].

Theoretically, the relationship between audit quality and ESG performance can be extended further by applying literature that examines the impact of governance structures

on company performance. Several conceptual frameworks depict how enhanced audit quality stimulates improved company performance. These frameworks include agency, stakeholder, resource-based view, and resource dependence theories.

According to agency theory, conflicts of interest between managers and shareholders stem from information asymmetries that can encourage opportunism, particularly regarding ESG reporting. High-quality audits act as an external control mechanism that alleviates such asymmetries [4]. It makes the reported ESG information more credible and complete, compelling managers to act in the shareholders' interest. This strict control leads to an improvement in ESG practices and thus improves the firm's overall performance. According to agency theory, auditor quality directly and positively influences ESG performance by aligning the interests of managers and shareholders [6,13].

Similarly, stakeholder theory suggests that a company's long-term success hinges on meeting the needs of all its stakeholders [7]. High-quality audits positively affect this equation by fostering stakeholder trust through the independent verification of ESG information. The increased legitimacy provided by this boost supports reputation and transparency, key drivers in attracting and retaining credible investors, customers, and employees. Therefore, this theory suggests that improving audit quality can enhance ESG performance by strengthening stakeholder relations and maintaining the firm's commitment to sustainability [3,16].

Furthermore, the Resource-Based View asserts that a company's long-term competitive advantage stems from its internal competencies and resources. Strong audit quality is a strategic asset that supports ESG risk management and improves the quality and credibility of financial markets [8,9]. This organizational capacity increases investor confidence and access to responsible capital, thereby improving company performance. Resource-Based View theory provides evidence that audit quality contributes positively because it enhances the internal resources devoted to sustainable management and enables the generation of long-term value [17].

In terms of Resource Dependence Theory, the focus is on minimizing uncertainties regarding access to external resources that are essential for the company's existence [18]. High-quality audits improve the acceptability of ESG data among financiers and partners, making it easier to obtain strategic resources such as green finance or sustainable alliances. According to this theory, the quality of an audit has a positive impact on ESG performance by improving a firm's ability to procure the external capital required for sustainable development [13,19].

While the agency, stakeholder, resource-based view, and resource dependence theories suggest that improving audit quality enhances ESG performance, the trade-off perspective offers an alternative view. While this perspective discusses the costs of auditing and ESG practices, it does not dispute the positive contributions of the other theories but rather discusses the timing of the impacts more precisely. While higher audit quality imposes additional expenses in the short term, it aids long-term ESG performance by building credibility, trust, and access to capital. Therefore, despite sometimes having negative financial impacts in the short term, audit quality remains a key driver of sustainable ESG performance, boosting overall firm value in the long term [20].

There are other theories through which the inverted-U shaped relationship can be apprehended. The inverted-U shaped relationship observed in this study suggests that while audit quality initially supports ESG performance—by enhancing transparency, accountability, and stakeholder trust—its benefits diminish beyond a certain threshold. This can be explained through the lens of institutional overload theory, which posits that excessive governance mechanisms may overwhelm organizational capacity, leading to inefficiencies and reduced strategic focus [21]. Similarly, compliance fatigue may occur when firms face

increasingly complex audit demands, diverting resources away from ESG initiatives and fostering a box-ticking mentality rather than genuine sustainability engagement [22]. These frameworks help clarify why audit quality, when pushed beyond an optimal point, may hinder rather than help ESG performance—supporting the curvilinear pattern identified in our findings. Table 1 summarizes theoretical lenses on ESG assurance.

**Table 1.** Summary of Theoretical Lenses on ESG Assurance.

| Theoretical Lens              | Core Assumption                                                                     | Directional Prediction for ESG Assurance                                                                     |
|-------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Agency Theory                 | Managers may act in self-interest; assurance reduces information asymmetry.         | Positive—Assurance signals credibility and reduces agency costs.                                             |
| Stakeholder Theory            | Firms are accountable to a broad set of stakeholders beyond shareholders.           | Positive—Assurance responds to stakeholder pressure for transparency.                                        |
| Resource-Based View           | Competitive advantage stems from unique, valuable resources.                        | Mixed—Assurance adopted if it enhances strategic positioning.                                                |
| Resource-Dependence Theory    | Firms rely on external resources and must manage dependencies.                      | Positive—Assurance helps maintain legitimacy and access to resources.                                        |
| Institutional Overload Theory | Organizations face pressure from multiple, often conflicting institutional demands. | Negative/Mixed—Excessive ESG assurance requirements may lead to strategic resistance or symbolic compliance. |
| Compliance Fatigue            | Repeated or complex compliance demands can lead to disengagement or minimal effort. | Negative—Firms may avoid or minimize ESG assurance due to resource strain or perceived burden.               |

## 2.2. Hypotheses Development

Research into the direct impact of audit quality on ESG performance is virtually nonexistent. Though some studies have been conducted, they mainly focus on developed economies, leaving a significant gap in the literature on developing economies. More specifically, various studies have demonstrated a positive correlation between audit quality and improved ESG performance, particularly in developed countries with well-established corporate governance [1,12–15]. However, other research has failed to find any significant effects or has discovered differential effects across institutional contexts, activity segments, or individual ESG (environmental, social, and governance) dimensions [1,15].

For instance, Ref. [23] demonstrated that the credibility of firms' sustainability scores is positively and significantly associated with external auditing of ESG reports. By analyzing the changes to ESG scores following scandal disclosures, the study found that firms with audited ESG reports did not experience any meaningful decrease in their scores, unlike firms with no audits, whose scores plummeted. These results demonstrate that third-party auditing provides assurance and enhances the perceived quality of ESG information. Furthermore, Ref. [12] confirm that audit committee activism and independence enhance the quantity and quality of ESG disclosures by Australian energy companies. This research highlights the importance of management control mechanisms in mitigating agency and legitimacy issues. Studying European companies, Ref. [15] found that ESG performance is affected by audit committee attributes. The independence and professionalism of audit committee members are positively associated with ESG scores, whereas the length of time that members have served on the committee has a negative effect. These impacts are more pronounced during the current crisis, underscoring the pivotal role of audit committee quality in fostering sustainable governance amidst adversity. Recently, Ref. [13] suggested that Australian companies with a higher proportion of women on their boards and directors who hold multiple directorships are more likely to appoint a Big Four firm to provide standalone assurance for their ESG reports rather than their financial auditor.

The authors argue that this policy serves to counteract ethical concerns relating to the dual role of auditors of financial and nonfinancial information. The study also finds that board diversity improves the credibility of ESG reports, thus supporting agency, social capital, and resource dependence theories. According to [1], environmental auditing improves the ESG performance of Chinese companies by enhancing environmental accountability, reducing greenwashing, and increasing public monitoring, particularly for state-owned and small companies. Using the same setting, Ref. [24] concluded that the auditor's Confucian culture prompted ESG disclosure, particularly in markets with a strong culture, high social trust, and geographical proximity to the firm.

Other recent studies have examined the impact of ESG on audit quality [6,25–28]. For example, Ref. [6] demonstrate that improved environmental, social, and governance performance enhances companies' contributions to the Sustainable Development Goals examined in OECD countries. This is compounded by the expertise of the audit committee, which increases transparency, restricts information asymmetry, and improves the management of nonfinancial issues. However, Ref. [14] found that auditors rarely mention environmental and social issues in their audits; governance is the sole focus. Enhanced governance, low profitability, and low debt reinforce such inclusion and thereby highlight the need to enhance auditor skills and regulation considering the growing pressures of sustainable reporting in Colombia.

However, a few other studies [3,16,29–31] have assessed the impact of audit quality on the ESG and performance nexus (or other variables). For example, Ref. [16] illustrate that ESG disclosure positively influences the financial performance of Indian firms. Furthermore, audit quality moderates this relationship, with a more pronounced effect for companies audited by the Big Four. This research highlights the importance of audit quality in establishing and enhancing ESG practices. Similarly, Ref. [3] report that audit quality positively moderates the relationship between ESG and the financial performance of firms in the MENAT region. Although the literature has focused on addressing the direct or moderating effects of audit quality on ESG performance, it has not examined the nonlinear effects.

This study proposes that the relationship between audit quality and ESG performance is curvilinear, a specific form of nonlinearity where the direction of the effect changes beyond a certain threshold. This assumption is grounded in the idea that while audit quality enhances ESG performance up to a point—by improving transparency, accountability, and stakeholder trust—excessive audit intensity may lead to diminishing returns. This dual effect suggests an inverted U-shaped relationship, which cannot be captured by linear models. The following hypotheses are therefore formulated:

**Hypothesis 1.** *The relationship between audit quality and ESG performance is curvilinear.*

**Hypothesis 1(a).** *Audit quality enhances the ESG performance of insurance companies in the MENAT region.*

**Hypothesis 1(b).** *Beyond a certain threshold, audit quality reduces the ESG performance of insurance companies in the MENAT region.*

### 3. Research Methodology

#### 3.1. Data

A sample of 31 insurance companies operating in seven countries in the MENAT region, namely Bahrain, Kuwait, Morocco, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates, from 2017 to 2022, is selected. Bank data are obtained from the annual

individual insurance companies' balance sheets published in Refinitiv Eikon's database (<https://eikon.refinitiv.com/>). Also, country-specific data (i.e., macroeconomic variables) are collected from the World Bank database. The sample selection is largely based on the availability of ESG score data. Table 1 summarizes the Breakdown of banks.

The selection of the period from 2017 to 2022, along with the focus on the MENAT region, was driven by a series of strategic factors. Firstly, this timeframe coincided with an increase in the availability of ESG data through Refinitiv Eikon, positioning it as a critical juncture for analysis. This era was characterized not only by economic reforms and sustainability initiatives but also by disruptions such as the COVID-19 pandemic, which altered economic landscapes. Additionally, the MENAT region holds a significant role in the global economy, necessitating that banks contribute meaningfully to the transition toward sustainable economic frameworks. The inherent cultural, economic, and legal diversity present within MENAT nations creates a unique environment to examine how variations in gender diversity influence the relationship between ESG performance and banking institutions, particularly in contexts frequently viewed as contrary to inclusive principles. Lastly, the availability of reliable and standardized data for publicly listed banks further bolsters the validity and precision of this analytical endeavor.

### 3.2. Definition of Variables

#### 3.2.1. Dependent Variables

ESG performance represents the overall score illustrating the degree of a company's commitment to sustainability and responsibility. This score covers a wide range of dimensions, encompassing environmental initiatives focused on reducing carbon emissions to social responsibilities related to diversity policy and management transparency. ESG scores aggregate insurance company-level practices and disclosures across three dimensions: environmental responsibility, social impact, and governance quality. Higher scores indicate stronger commitment to sustainability and responsible business conduct, while lower scores reflect limited engagement. In this study, the ESG score is measured as a continuous variable ranging from 0 to 100 [2].

#### 3.2.2. Independent Variable

To measure the audit quality, a composite indicator is constructed. To do so, three indicators are employed: (i) audit committee size (ACS) measured by the total number of members on the audit committee, (ii) audit committee independent (ACI) measured by the ratio of independent nonexecutive directors in the audit committee to total committee members, and (iii) audit committee meeting (ACM) measured by the number of meetings per year held by the audit committee [29,31]. The choice of these three indicators is grounded in the corporate governance literature, which consistently identifies these dimensions as key determinants of audit committee effectiveness and, by extension, audit quality. A larger audit committee is generally associated with broader expertise and enhanced oversight capacity [32], while a higher proportion of independent directors strengthens objectivity and reduces potential conflicts of interest [33]. Frequent meetings reflect the committee's diligence and engagement in monitoring financial reporting processes [34]. Combining these indicators allows for a multidimensional assessment of audit quality that captures both structural and behavioral aspects of governance.

To do so, the paper follows several previous studies [29,31] using PCA. To test the suitability of the data for factor analysis, after running PCA, Bartlett's sphericity test and the Kaiser–Meyer–Olkin (KMO) test are employed. The results are summarized in Table 2, indicating that the data are suitable for PCA. To simplify the analysis, this index is

normalized using the min-max normalization technique. Note that zero means low AQ and one means high AQ.

**Table 2.** PCA outcomes.

| Panel A. Total variance explained                                 |                             |            |            |            |
|-------------------------------------------------------------------|-----------------------------|------------|------------|------------|
| Component                                                         | Eigenvalue                  | Difference | Proportion | Cumulative |
| Comp1                                                             | 2.398                       | 1.811      | 0.799      | 0.799      |
| Comp2                                                             | 0.586                       | 0.570      | 0.195      | 0.995      |
| Comp3                                                             | 0.016                       |            | 0.005      | 1.000      |
| Panel B. factor loadings                                          |                             |            |            |            |
| ACS                                                               |                             |            |            | 0.939      |
| ACI                                                               |                             |            |            | 0.756      |
| ACM                                                               |                             |            |            | 0.979      |
| Panel C. Bartlett test of sphericity and Kaiser–Meyer–Olkin (KMO) |                             |            |            |            |
|                                                                   | Bartlett test of sphericity |            |            | 0.000      |
| KMO test                                                          |                             |            |            | 0.642      |

The PCA was performed without rotation, as the first principal component sufficiently captured the shared variance among the variables. The eigenvalue of the first component was 2.389, explaining 79.9% of the total variance. The factor loadings were 0.939 for ACS, 0.756 ACI, and 0.63 for ACM, indicating that all three variables contribute meaningfully to the underlying construct. Components 2 and 3 had eigenvalues below 1 and explained only marginal variance (19.5% and 0.5%, respectively), justifying the retention of a single component. This approach is consistent with prior literature that treats audit committee characteristics as interrelated dimensions of audit quality. The resulting index was standardized and used as the main independent variable in the regression analysis.

### 3.2.3. Control Variables

In this study, following previous studies [29,31], several control variables are employed. To control company size, the natural logarithm of total assets is used. To control the extent of indebtedness of insurance companies, the ratio loans to total assets is employed. Finally, two macroeconomic variables are added. First, the GDP growth rate. Second, the inflation rate is measured as the consumer price index, in annual percentage. Table 3 summarizes the definition of variables.

**Table 3.** Definition of variables.

| Variable                    | Acronyms | Definition                                                                                | Source          |
|-----------------------------|----------|-------------------------------------------------------------------------------------------|-----------------|
| ESG performance             | ESG      | Economic, social, and governance score                                                    | Refinitiv Eikon |
| Audit quality               | AC       | Composite indicator using PCA                                                             | Refinitiv Eikon |
| Audit committee size        | ACS      | Total number of members to audit committee                                                | Refinitiv Eikon |
| Audit committee independent | ACI      | Independent nonexecutive directors in the audit committee to total committee member       | Refinitiv Eikon |
| Audit committee meeting     | ACM      | Number of meetings per year held to audit committee                                       | Refinitiv Eikon |
| Loans                       | LOANS    | Total loan to total assets                                                                | Refinitiv Eikon |
| Firm size                   | SIZE     | Natural logarithms of total assets                                                        | Refinitiv Eikon |
| GDP growth                  | GDP      | GDP growth rate (annual %) (gross domestic product growth rate (at constant 2015 prices)) | WDI, Word Bank  |
| Inflation rate              | INF      | Consumer prices index (annual %)                                                          | WDI, Word Bank  |

### 3.3. Empirical Model

To explore the curvilinear correlation between audit quality and ESG performance, the study applies the Feasible Generalized Least Squares (FGLS) method. This estimator is appropriate in the presence of heteroskedasticity and autocorrelation, which are common features of firm-level panel data. Unlike ordinary least squares or fixed-effects estimators, FGLS corrects these violations by incorporating an estimated error structure, thereby producing more efficient and reliable parameter estimates. The use of FGLS is therefore justified to ensure robust inference when examining the determinants of ESG performance. The estimation model can be formulated in the following way:

$$ESG_{cit} = \alpha_i + \beta_1 AQ_{cit} + \beta_2 AQ_{cit}^2 + \beta_3 LOANS_{cit} + \beta_4 ROE_{cit} + \beta_5 SIZE_{cit} + \beta_6 INF_{cit} + \beta_7 GDP_{cit} + \varepsilon_{it} \quad (1)$$

where  $ESG_{cit}$  is the ESG score for country, firm  $i$  at time  $t$ ;  $AQ_{cit}$  is the audit quality;  $AQ_{cit}^2$  is the quadratic term of  $AQ_{cit}$ ;  $LOANS$ ,  $ROE$ ,  $SIZE$ ,  $INF$ , and  $GDP$  are control variables.

## 4. Findings and Discussion

### 4.1. Statistical Analysis

Table 4 summarizes the descriptive statistics of all variables. The average ESG score is 16.14, with a standard deviation of 21.18, indicating substantial variation across firms. While some firms report no ESG activities (minimum = 0), others achieve scores as high as 81.05, suggesting that ESG practices are highly uneven within the sample. In contrast, AQ shows a mean of 0.340 and a standard deviation of 0.399. This indicates that only about one-third of the firms benefit from high audit quality.

**Table 4.** Descriptive Statistics.

| Variable | Obs | Mean   | Std. Dev. | Min    | Max    |
|----------|-----|--------|-----------|--------|--------|
| ESG      | 186 | 16.138 | 21.177    | 0      | 81.047 |
| ESGE     | 186 | 5.784  | 16.008    | 0      | 79.344 |
| ESGS     | 186 | 13.501 | 21.663    | 0      | 89.622 |
| ESGG     | 186 | 22.545 | 27.986    | 0      | 93.301 |
| AQ       | 186 | 0.340  | 0.399     | 0      | 1      |
| ACS      | 186 | 26.613 | 35.639    | 0      | 100    |
| ACI      | 186 | 33.900 | 47.500    | 0      | 100    |
| ACM      | 186 | 33.871 | 41.295    | 0      | 100    |
| LOANS    | 186 | 0.030  | 0.069     | 0      | 0.417  |
| ROE      | 186 | 0.022  | 0.409     | −3.602 | 1.621  |
| SIZE     | 186 | 20.099 | 1.237     | 17.934 | 23.208 |
| GDP      | 186 | 2.201  | 3.827     | −7.178 | 11.439 |
| INF      | 186 | 2.823  | 8.209     | −2.540 | 72.309 |

Table 5 indicates that since none of the correlation coefficients between the exogenous variables exceed 0.80, a multicollinearity problem is unlikely to affect the empirical models in the study.

Furthermore, the outcome for the variance inflation factor (VIF) shows that there is no multicollinearity between the variables and is below 10 (Table 6).

**Table 5.** Correlation matrix.

| Variables | (1)      | (2)      | (3)     | (4)    | (5)    | (6)     | (7)   |
|-----------|----------|----------|---------|--------|--------|---------|-------|
| (1) ESG   | 1.000    |          |         |        |        |         |       |
| (2) AQ    | −0.006 * | 1.000    |         |        |        |         |       |
| (3) LOANS | −0.059 * | −0.175 * | 1.000   |        |        |         |       |
| (4) ROE   | 0.114    | −0.128   | 0.145 * | 1.000  |        |         |       |
| (5) SIZE  | 0.325 *  | 0.071    | −0.088  | 0.135  | 1.000  |         |       |
| (6) GDP   | 0.281 *  | 0.141    | −0.066  | −0.144 | −0.023 | 1.000   |       |
| (7) INF   | 0.374 *  | 0.022    | −0.085  | 0.017  | 0.088  | 0.245 * | 1.000 |

\* presents a significant result at 5% level.

**Table 6.** VIF correlation.

| Variable | VIF  | 1/VIF |
|----------|------|-------|
| GDP      | 1.09 | 0.918 |
| INF      | 1.08 | 0.926 |
| AQ       | 1.05 | 0.948 |
| LOANS    | 1.04 | 0.957 |
| SIZE     | 1.02 | 0.979 |
| Mean VIF | 1.06 |       |

#### 4.2. Main Results

This sub-section presents the results of the nonmonotonic relationship between the audit quality and ESG performance of insurance companies in the MENAT region. The main findings are presented in the following Table 7. Two models indicate that the fixed effect model could be the appropriate estimator for this study because it controls unobserved heterogeneity between units and increases the validity of the findings.

More specifically, Model (1) presents the monotonic (linear) relationship between audit quality and ESG performance, while Model (2) reflects the nonmonotonic link between the two variables. Specifically, the results indicate that in Model 1, the coefficient of the audit quality (AQ) variable has a negative and statistically significant effect on ESG performance. These results are consistent with those obtained by [1,15]. Specifically, the negative impact of audit quality on ESG performance of insurance companies may be since high-quality auditors impose stricter demands of disclosure and compliance. This greater level of stringency generally leads to the removal of tokenistic or “greenwashing” exercises that create artificially inflated ESG ratings. That is, a higher-quality audit reveals real defects in environmental, social, and governance practices, and thus ESG performance seems to fall.

In Model 2, though, it is seen that the nonmonotonic relationship between audit quality and ESG performance has emerged. It transitions from positive to negative. From a statistical view, the coefficient of the variable audit quality (AQ) at first positively and significantly influences ESG performance at 1%. After reaching the inflection point of 0.571, however, it turns negative and significant at 1%, admitting the validity of Hypothesis 1. Certainly, the U-shaped relation test proposed by [35] to detect the presence of a nonmonotonic nexus between audit quality (AQ) and ESG performance is employed (see Table 7). More precisely, such nonlinear interaction between audit quality and ESG performance implies a threshold effect. It is only at the intermediate level that stronger audit quality increases the credibility and transparency of nonfinancial information, which then encourages insurance companies to strengthen their ESG practices in line with stakeholder demands, confirming Hypothesis 1(a). These outcomes are consistent with those obtained by [12–14]. After a point, however, excessively onerous auditor burdens may induce excessively high compliance costs, channeling resources away from ESG investment into rigid regulation

and inhibiting managerial discretion. Thus, the initial beneficial effect is negative, creating a trade-off between increasing control and long-term performance, proving the validity of hypothesis 1(b) (see Figure 1). These results are like those found by [1–15].

**Table 7.** Main results.

| Panel A: FGLS results                      |                       |                         |
|--------------------------------------------|-----------------------|-------------------------|
| Variables                                  | (1)<br>Linear         | (2)<br>Curvilinear      |
| AQ                                         | −0.629 ***<br>(0.015) | 0.786 ***<br>(0.012)    |
| AQ <sup>2</sup>                            |                       | −0.760 ***<br>(0.013)   |
| LOANS                                      | −0.285<br>(0.868)     | 0.355 ***<br>(0.027)    |
| ROE                                        | 0.382 ***<br>(0.014)  | 0.640 ***<br>(0.014)    |
| SIZE                                       | 0.319 ***<br>(0.063)  | 0.120 ***<br>(0.032)    |
| GDP                                        | −0.139<br>(0.432)     | 0.104 ***<br>(0.002)    |
| INF                                        | 0.538 ***<br>(0.158)  | 0.902 ***<br>(0.196)    |
| Constant                                   | −0.610 ***<br>(0.012) | −0.225 ***<br>(0.007)   |
| Observations                               | 186                   | 186                     |
| Number of companies                        | 31                    | 31                      |
| Wald chi2 ( <i>p</i> -value)               | 0.000                 | 0.000                   |
| Hausman test ( <i>p</i> -value)            | 0.140                 | 0.240                   |
| Heteroscedasticity test ( <i>p</i> -value) | 0.000                 | 0.000                   |
| Autocorrelation test ( <i>p</i> -value)    | 0.000                 | 0.000                   |
| Panel B: Test for the U-shaped curve       |                       |                         |
| Group                                      | Lower bound           | Upper bound             |
| Interval                                   | 0                     | 1                       |
| Slope                                      | 8.591 ***<br>(6.431)  | −73.442 ***<br>(−5.441) |
| Overall test                               |                       |                         |
| t-value                                    |                       | 5.44                    |
| p-value                                    |                       | (0.000)                 |

\*\*\* indicates statistical significance at the 1% level. Standard errors are shown in brackets.

Furthermore, control variables significantly influence ESG performance. More precisely, the loans variable has a positive and statistically significant effect on ESG performance at 1% in model (2). This positive effect can be traced back to the discipline and incentive function of debt. Indeed, creditors will demand more transparency, better governance, and good risk management to reduce default probabilities. These constraints drive insurance companies to construct improved environmental, social, and governance processes in a bid to raise their profile, procure improved terms of finance, and reduce their cost of capital. Debt is thus an external mechanism of governance that drives insurers to create more robust ESG strategies.

Similarly, the coefficient of the ROE variable is positive and significant at the 1% level in both models. A high return on equity (ROE) is advantageous to the ESG performance of insurance companies as it measures a higher capacity to generate internal resources.

These resources can be used to finance sustainability activities such as green innovation, employee development, or better governance approaches. In addition, more successful companies try to promote their reputation and meet stakeholder expectations, and this encourages them to spend more money on ESG activities. In this manner, profitability becomes a strategic enabler of sustainable performance.

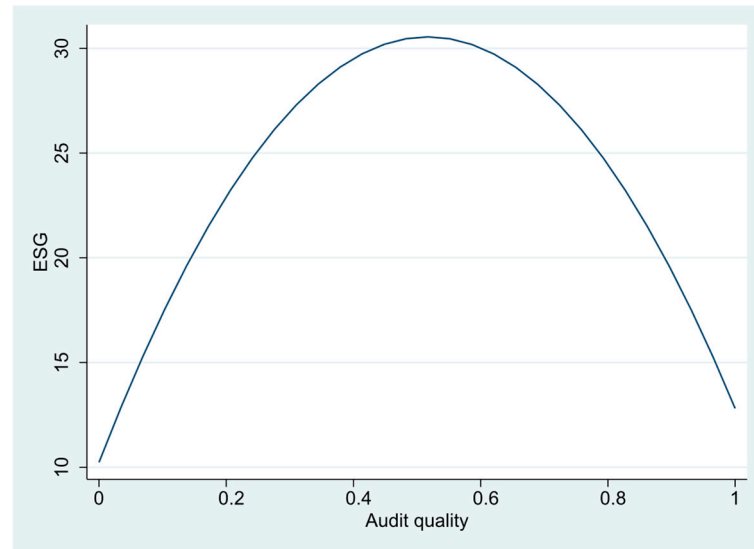


**Figure 1.** The inverted U-shaped curve of the AQ-ESG nexus. The ESG vertical axis is the estimated ESG values as a percentage.

In addition, the coefficient on the size variable is positive and significant at 1% for both models. This indicates that larger companies tend to have greater financial, human, and technological capacities that they can allocate to sustainable activities. They are also under more pressure from regulators, institutional investors, and the media to adopt better environmental, social, and governance practices to sustain their reputation and legitimacy. Thus, size is a simultaneous investment capability strength and pressure factor for quality institutions with positive effects on ESG performance.

Finally, the macroeconomic variables carry positive and statistically significant signs. In fact, the GDP growth variable coefficient has a positive effect on ESG performance. This indicates that an increase in GDP is a sign of a favorable macroeconomic state in which corporations have greater financial resources and investment opportunities. In such a high-growth environment, corporations are more motivated to invest in green activities (social inclusion, emissions cut, green innovation) as they have better leeway to include these costs without compromising profitability. Moreover, a growing economy initiates social and regulatory demands for sustainable behavior, with firms being forced to strengthen their governance and openness. Economic forces, therefore, create a virtuous cycle where economic prosperity and ESG performance evolve concomitantly. In addition,

The positive effect of inflation on the ESG performance of firms under this criterion is that with the general rise in prices, the issues of purchasing power, sustainability, and market stability become more delicate for consumers, investors, and regulators. In this regard, companies are encouraged to strengthen their governance and transparency policies to maintain stakeholders' confidence unbroken. In addition, inflation contributes to energy and raw material costs, which encourages firms to invest in more sustainable and more efficient solutions (green technologies, energy efficiency, responsible management of resources) to reduce their price risk exposure. Concurrently, social pressures linked to

inflation (social responsibility, working conditions, inequality) encourage firms to develop their social and inclusive component, which seems to improve their ESG performance.

#### 4.3. Robustness Checks

##### 4.3.1. Alternative Dependent Variable

Following [1,2,14], I replace the broad ESG dependent variable with its three dimensions: environmental (ESGE), social (ESGS), and governance (ESGG). They are all more precise in explaining some aspects related to a firm's sustainability and responsibility. In this way, we will be able to further examine the nonlinear impact of audit quality on each dimension.

The findings are consistent with those based on previous findings, showing that there is evidence supporting the existence of a nonlinear relationship between audit quality and each component of ESG (Table 8). More specifically, we can point to the presence of a nonlinear relationship between audit quality (AQ) and environmental performance (ESGE). At an economic level, this means that, firstly, high audit quality improves transparency, information reliability, and internal discipline in insurance companies. Credible external auditors raise the credibility of nonfinancial reports and encourage management to invest more in the environment (carbon footprint reduction, green investments, management of climate risk). This positive effect is explained by institutional theory and stakeholder theory, that better governance guarantees legitimacy and compliance with regulatory and social pressures. In this sense, hypothesis H1(a) holds true. Above a certain point, however (equal to 0.632), overly high audit quality may impose excessive costs and compliance burden. In MENAT region insurance companies, this would result in over-constraining, increased risk aversion, and inefficient capital allocation, diverting investment from environmental projects into compliance with auditors' formal requirements. That is, the effect turns negative because of excessive control, placing stringent constraints on strategic flexibility and hindering environmental innovation, thus substantiating the admission of Hypothesis H1(b). Such a relationship describes an inverted U-shaped one where audit quality is best to some extent but then becomes counterintuitive, and therefore, hypothesis H1's validity (see model (1)).

Also, in Model (2), nonmonotone dependence between audit quality and social performance (ESGS) existed. It varies from positive to an optimal threshold value of 0.549 and then becomes negative. In short, initially, high audit quality promotes transparency, standards compliance, and good governance, stimulating insurance companies in the MENAT region to expand their social commitments (working conditions, inclusion, and employee and customer protection). In this sense, auditing is a means of discipline to connect social practices to the expectations of stakeholders and regulators. This result confirms hypothesis H1(a). However, if audit quality is too high, it can generate too much compliance cost and organizational rigidity, limiting firms from investing in social action (wellness programs, training, social inclusion). Furthermore, over-supervision has the potential to have managers focus on strict rule-following rather than effective social action. The result is thus adverse since excessive control reduces flexibility and diverts resources toward projects with social worth. The outcome, therefore, validates hypothesis H1(b). Briefly, the relationship is of an inverted U-shape and nonlinear: audit quality improves social performance initially but becomes counterproductive at some point because of its rigidity and cost, hence acceptance of Hypothesis H1.

Finally, it appears that the impact of audit quality and governance (ESGG) performance (AQ) is not linear. There is an optimal audit quality level, 0.478, below which audit quality improves governance performance, but above which audit quality degrades overall performance. Thus, the validity of Hypothesis H1 is established. In fact, initially, high audit

quality increases financial disclosure, reduces information asymmetries, and increases the monitoring of the management. This increases governance by reducing opportunism and increasing stakeholder trust. Neutral auditors provide credibility, which puts pressure on boards to practice good governance. This supports Hypothesis H1(a). But excessive audit quality, in turn, can lead to excessive bureaucracy, auditor reliance, and compliance costs that are out of proportion. For insurance companies in the MENAT region, this rigidity can compromise the strategic role of boards as well as their ability to make locally appropriate decisions. Governance can accordingly become less effective since focus has shifted away from strategic management and toward formal compliance. Hypothesis H1(b) is thus accepted. Generally, the interaction is of the inverse U-type: audit quality triggers governance up to a point where it is harmful, suppressing flexibility and decision-making effectiveness.

**Table 8.** Changing dependent variables.

| Variables                                  | (1)<br>ESGE           | (2)<br>ESGS           | (3)<br>ESGG           |
|--------------------------------------------|-----------------------|-----------------------|-----------------------|
| AQ                                         | 0.167 ***<br>(0.048)  | 0.258 **<br>(0.011)   | 0.617 ***<br>(0.014)  |
| AQ <sup>2</sup>                            | −0.132 ***<br>(0.005) | −0.235 **<br>(0.112)  | −0.645 ***<br>(0.156) |
| LOANS                                      | 0.136 **<br>(0.057)   | 0.531 **<br>(0.207)   | 0.919 **<br>(0.374)   |
| ROE                                        | 0.466 ***<br>(0.103)  | 0.262<br>(0.202)      | 0.283 ***<br>(0.096)  |
| SIZE                                       | 0.399 **<br>(0.158)   | 0.712 **<br>(0.314)   | 0.193 ***<br>(0.038)  |
| GDP                                        | 0.237 ***<br>(0.0608) | 0.377 **<br>(0.157)   | 0.110 ***<br>(0.021)  |
| INF                                        | 0.401 ***<br>(0.110)  | 0.855 ***<br>(0.213)  | 0.733 ***<br>(0.173)  |
| Constant                                   | −0.385 ***<br>(0.036) | −0.106 ***<br>(0.007) | −0.389 ***<br>(0.084) |
| Observations                               | 186                   | 186                   | 186                   |
| Number of companies                        | 31                    | 31                    | 31                    |
| Wald chi2 ( <i>p</i> -value)               | 0.000                 | 0.000                 | 0.000                 |
| Hausman test ( <i>p</i> -value)            | 0.105                 | 0.092                 | 0.340                 |
| Heteroscedasticity test ( <i>p</i> -value) | 0.000                 | 0.000                 | 0.000                 |
| Autocorrelation test ( <i>p</i> -value)    | 0.002                 | 0.000                 | 0.000                 |
| Inverse U-shape test ( <i>p</i> -value)    | 0.632                 | 0.549                 | 0.478                 |

\*\*\*, and \*\* indicate statistical significance at the 1% and 5% levels, respectively. Standard errors are shown in brackets.

#### 4.3.2. Alternative Independent Variable

To explore further the impact of audit quality on ESG performance, the curvilinear impact of three proxies of audit quality on ESG performance is tested. The three proxies are three, i.e., Audit committee size (ACS), Audit committee independence (ACI), Audit committee meeting (ACM). The results obtained further validate the presence of a nonlinear relationship between the different dimensions of audit quality and ESG performance, further validating hypothesis H1 (Table 9).

**Table 9.** Changing independent variables.

| Variables                                  | (1)<br>ACS            | (2)<br>ACI            | (3)<br>ACM            |
|--------------------------------------------|-----------------------|-----------------------|-----------------------|
| AQ                                         | 0.597 **<br>(0.258)   | 0.047 ***<br>(0.004)  | −0.336 ***<br>(0.096) |
| AQ <sup>2</sup>                            | −0.054 **<br>(0.003)  | −0.057 ***<br>(0.005) | 0.037 ***<br>(0.001)  |
| LOANS                                      | 0.414<br>(0.281)      | 0.358 *<br>(0.197)    | 0.184<br>(0.131)      |
| ROE                                        | 0.488 **<br>(0.194)   | 0.255<br>(0.240)      | 0.348 **<br>(0.174)   |
| SIZE                                       | 0.125 ***<br>(0.031)  | 0.125 ***<br>(0.002)  | 0.490 ***<br>(0.087)  |
| GDP                                        | 0.113 ***<br>(0.019)  | 0.843 ***<br>(0.149)  | 0.135 ***<br>(0.252)  |
| INF                                        | 0.105 ***<br>(0.020)  | 0.872 ***<br>(0.175)  | 0.938 ***<br>(0.190)  |
| Constant                                   | −0.233 ***<br>(0.070) | −0.283 ***<br>(0.052) | −0.904 ***<br>(0.017) |
| Observations                               | 186                   | 186                   | 186                   |
| Number of companies                        | 31                    | 31                    | 31                    |
| Wald chi2 ( <i>p</i> -value)               | 0.000                 | 0.000                 | 0.000                 |
| Hausman test ( <i>p</i> -value)            | 0.105                 | 0.092                 | 0.340                 |
| Heteroscedasticity test ( <i>p</i> -value) | 0.000                 | 0.000                 | 0.000                 |
| Autocorrelation test ( <i>p</i> -value)    | 0.002                 | 0.000                 | 0.000                 |
| Inverse U-shape test ( <i>p</i> -value)    | 0.000                 | 0.000                 | 0.000                 |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are shown in brackets.

#### 4.3.3. Endogeneity

To explore potential endogeneity, the study employs the System Generalized Method of Moments (SGMM) technique [36]. The SGMM approach presents several notable benefits. Foremost among them is its capability to mitigate issues such as omitted variable bias, inaccuracies in measurement, dynamic variations within panels, and potential endogeneity linking independent variables to the error term. This methodological framework is especially pertinent in contexts where the time aspect of a panel is somewhat restricted. Our analysis, for instance, considers a temporal dimension (*T*) of 6, contrasting with a cross-sectional dimension (*N*) of 31. Additionally, the evaluation of second-order autocorrelation, as performed by [37], produced nonsignificant results for the AR model (2), suggesting that autocorrelation is not present. This outcome indicates a well-specified model, implying that a singular offset for the insurance performance variable suffices. Furthermore, the robustness of the GMM approach within the system can be enhanced by suitably conditioning the values at times *t* − 1 and *t* − 2 for the difference equation, along with a single lag in the level equation. The reliability of the instruments utilized is supported by Hansen's *J* statistics, which assesses the limitations on over-identification.

Furthermore, the paper examined the curvilinearity between audit quality and insurance ESG performance in the MENAT region to derive additional insights. Equation (2) of the dynamic model is as follows:

$$ESG_{cit} = \alpha_i + \beta_1 ESG_{cit-1} + \beta_2 AQ_{cit} + \beta_3 AQ_{cit}^2 + \beta_4 LOANS_{cit} + \beta_5 ROE_{cit} + \beta_6 SIZE_{cit} + \beta_7 INF_{cit} + \beta_8 GDP_{cit} + \varepsilon_{it} \quad (2)$$

After solving the endogeneity problem using the system GMM method, the nonlinear nexus between audit quality and ESG performance is still found (Table 10). The positive

and significant coefficient on the lagged ESG performance variable indicates a dynamic persistence in firms' sustainability behavior. This suggests that insurance companies with strong ESG performance in the previous year are likely to sustain or enhance their ESG efforts in the following year. Such persistence may be driven by long-term strategic commitments, reputational considerations, or regulatory expectations. It also reflects the cumulative nature of ESG investment, where past actions create momentum for future performance. However, the optimal level of audit quality has become 0.49. It has slightly decreased by 0.027 compared to the results of the first regression, where its optimal level was estimated at 0.517 (see Table 7, Model 2). This reflects the presence of adjustment costs related to audit quality.

**Table 10.** Endogeneity outcome.

| Variables                      | (1)<br>ESG            |
|--------------------------------|-----------------------|
| ESG <sub>t-1</sub>             | 0.488 ***<br>(0.037)  |
| AQ                             | 0.295 **<br>(0.012)   |
| AQ <sup>2</sup>                | −0.301 ***<br>(0.105) |
| LOANS                          | 0.210<br>(0.880)      |
| ROE                            | 0.400 ***<br>(0.082)  |
| SIZE                           | 0.195 **<br>(0.094)   |
| GDP                            | 0.920 ***<br>(0.0729) |
| INF                            | 0.417 ***<br>(0.0342) |
| Constant                       | −0.328 *<br>(0.018)   |
| Observations                   | 186                   |
| Number of companies            | 31                    |
| Number of instruments          | 25                    |
| AR (1) ( <i>p</i> -value)      | 0.105                 |
| AR (2) ( <i>p</i> -value)      | 0.437                 |
| Hansen test ( <i>p</i> -value) | 0.237                 |
| Endogeneity test               | 0.000                 |
| Inflexion point                | 0.490                 |

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are shown in brackets.

## 5. Conclusions and Implications

### 5.1. Conclusions

This paper aims to investigate the nonmonotonic nexus between audit quality and the ESG performance of listed insurance companies in the MENAT region. The main results show the presence of a nonmonotonic, inverted U-shaped relationship between audit quality and ESG performance. Furthermore, the results show that audit quality has a nonlinear effect on the three dimensions of ESG performance. Generally, these results suggest that there will be some audit quality that is a good thing for integration of and transparency about ESG practices but, at sufficiently high levels, high costs and rigidities can deter investment in sustainable activity.

### 5.2. Implications

These insights carry important policy implications. First, this finding calls for balanced governance strategies. MENAT policymakers (financial supervisory authorities) should avoid imposing overly stringent audit requirements that may burden firms without proportionate ESG benefits. Instead, they could develop tiered audit frameworks that adjust expectations based on firm size, ESG maturity, and risk profile.

Second, insurance companies should aim for an optimal audit structure, ensuring committees are sufficiently independent and active, but not excessively large or bureaucratic. For instance, a firm with a highly independent audit committee that meets quarterly may achieve better ESG outcomes than one with a larger committee meeting monthly but lacking strategic focus. Third, investors and ESG rating agencies should interpret audit quality not as a linear proxy for governance strength, but as a nuanced factor that interacts with sustainability performance.

Third, the proposal for a proportionate audit framework is both relevant and necessary in the evolving landscape of ESG reporting. To make it operational, it seems essential to distinguish between mandatory regulatory assurance—focused on key, standardized ESG metrics—and voluntary assurance, which could apply to more context-specific or qualitative indicators. A tiered approach would allow for a balanced system that ensures credibility and comparability where it matters most, while preserving flexibility and cost-efficiency for firms with varying capacities and reporting needs.

Fourth, considering the region's religious and cultural context, the development of an Islamic ESG assurance framework could offer a more locally grounded alternative to Western models. Such a framework might draw on principles of Shari'ah compliance, maqasid al-Shari'ah (objectives of Islamic law), and concepts like trustworthiness (amanah) and social justice ('adl). Assurance mechanisms could prioritize ethical transparency, avoidance of harm (darar), and stewardship (khalifah) over resources, aligning ESG metrics with values deeply embedded in Islamic finance and governance. This approach could enhance stakeholder trust and foster broader acceptance of ESG practices in Muslim-majority contexts.

Finally, integrating ESG metrics into audit committee evaluations, such as tracking how audit oversight influences carbon disclosures or social impact reporting, could help align financial integrity with broader sustainability goals. In practice, this means that moderation is key: audit quality should be calculated to a level that supports ESG performance without creating inefficiencies.

### 5.3. Limitations and Future Research

There are some limitations to this study that must be mentioned. First, the quality and quantity of ESG data available in the MENAT region remain limited, and this may affect the robustness and precision of empirical results. Second, institutional and regulatory heterogeneity in MENAT can limit the generalizability of findings. Third, ESG scores used in this study are sourced from Refinitiv, a widely recognized global provider of sustainability data. While Refinitiv offers comprehensive ESG metrics, it is important to acknowledge potential limitations in applying these scores to the MENAT region. Specifically, Refinitiv's ESG framework may not fully capture region-specific governance norms or social responsibilities rooted in Islamic finance principles, such as prohibitions on interest (riba), emphasis on social equity, and community-based accountability. These cultural and institutional factors may lead to an understatement of ESG performance for firms that align closely with Islamic ethical standards but do not report according to Western ESG disclosure norms. Future research could explore the development or integration of context-sensitive ESG indicators that better reflect the values and regulatory environments

of MENAT economies. In addition, the “Big Four” indicator is widely recognized as a significant indicator of audit quality. Although this study was unable to include it in the current analysis due to a high rate of missing data, it is recommended for future research to use this variable whenever data availability permits, as it can significantly improve the robustness of audit-related conclusions. Finally, the dynamic and continuous changes in ESG regulation and auditing have not yet been incorporated. Future research would be relevant to examine the role of board-specific characteristics (independence, diversity), contrasting sector-specific influences between banking and insurance, and explore the impact of technological innovations (artificial intelligence or digital audit) on the trade-off between audit quality and ESG performance.

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