Influence of ESG Practices on Audit Fees in Brazilian Public Companies: An Empirical Analysis

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Abstract

This study explores the impact of Environmental, Social, and Governance (ESG) practices on audit fees among Brazilian companies listed on B3 from 2018 to 2022. Using a linear regression model applied to panel data from 400 observations across 80 firms, the research investigates the distinct effects of each ESG dimension on audit costs. The findings reveal that robust environmental practices significantly reduce audit fees, supporting the hypothesis that strong environmental performance mitigates perceived audit risk. In contrast, social practices do not exhibit a substantial effect on audit costs, indicating that while they enhance corporate responsibility, they may not influence auditors' risk assessments. However, enhanced corporate governance is linked to higher audit fees, likely due to the increased complexity and thoroughness required in auditing companies with stringent governance frameworks. Additionally, the study confirms that traditional factors such as company size and affiliation with Big Four audit firms are significant determinants of audit fees. These insights offer practical guidance for managers and regulators, emphasizing the role of environmental sustainability in reducing audit costs while advocating for a balanced integration of governance and social responsibility policies.

Keywords: Audit Fees; ESG; Environmental Practices; Corporate Governance; Panel Data Analysis.

1 Introduction

In recent years, Environmental, Social, and Governance (ESG) practices have become increasingly influential in shaping how companies manage their operations and how they are perceived in the market. These practices are now central to corporate responsibility, impacting both the reputation of companies and the costs associated with their audits. In Brazil, where regulatory demands for transparency and governance are becoming more stringent, the integration of ESG practices is particularly significant and can have a profound impact on audit fees.

Audit fees in Brazil are reflective of the complexities inherent in business operations and the growing requirements for regulatory compliance. Emerging research suggests that companies with robust ESG practices may experience varying audit costs depending on the specific ESG dimension under consideration. In this context, environmental, social, and governance factors are directly linked to audit fees, influencing auditors' perceptions of risk and complexity.

Despite the expanding body of literature on ESG, there remains a notable gap regarding its impact on audit fees, especially within the Brazilian context. This study aims to address this gap by examining the individual effects of the environmental (E), social (S), and governance (G) dimensions on audit fees in Brazil. By doing so, the research provides a novel perspective on operational risk management, exploring how each ESG component contributes to audit costs.

Beyond ESG practices, this paper also investigates the relationship between audit fees and other traditional variables, such as consulting fees (NAF), affiliation with one of the Big Four audit firms (BIG4), company size (SIZ), auditor tenure (TEN), delay in financial disclosure (REPLAG), the number of business segments (SEG), and corporate governance (CG). The integration of these variables alongside ESG practices enables a more comprehensive analysis of the factors influencing audit fees in Brazil, offering valuable insights for managers, regulators, and policymakers.

Given the existing gap in Brazilian literature and the practical importance of understanding the relationship between ESG practices and audit fees, this research seeks to contribute to a deeper comprehension of the determinants of audit costs. The findings are expected to aid managers in developing strategies that incorporate sustainable practices and effective cost management, thereby enhancing transparency and operational efficiency.

This study investigates 80 companies listed on B3 between 2018 and 2022, analyzing how robust ESG practices impact audit fees. It also considers traditional variables to offer a holistic view of the dynamics influencing audit costs within the Brazilian context. The article is structured logically, beginning with a literature review that highlights the importance of ESG practices and the complexity of Brazil’s regulatory environment. The methodology section follows, detailing the data collection and analysis procedures, with an emphasis on the use of linear regression models to explore variable relationships. The results are then presented and discussed, demonstrating how different ESG dimensions and traditional variables affect audit fees. The conclusion underscores the study's significance in enriching academic debate and offering strategic insights for business stakeholders. This research not only fills a crucial gap in Brazilian literature but also provides a robust foundation for strategic decision-making that promotes sustainability, regulatory compliance, and operational efficiency.

2 Literature Review

This section delves into the theoretical underpinnings that connect audit fees with financial variables and sustainable business practices, particularly focusing on the concept of ESG (Environmental, Social, Governance). The primary goal is to establish a strong research hypothesis by identifying the key factors that influence audit costs and emphasizing the potential role of ESG practices as determinants of these fees.

2.1 Remuneration of the Auditors

Auditing, as described by Kajola et al. (2022) and Masood (2023), involves a critical

examination of financial documents by independent auditors to ensure the accuracy of financial statements. Yilmazcan (2023) emphasizes that auditing assesses the compliance of business transactions and the auditors' ability to detect accounting errors, a view supported by DeAngelo (1981) and Putri and Bergmans (2021). Despite its importance, the concept of audit quality remains imprecise, as noted by Soyemi (2021). Mansur (2022) observes that audit quality is influenced by factors such as the auditor's workload and the quality of the accounting information, as demonstrated by Kim et al. (2024).

According to Deyganto (2021), auditor independence is vital to maintaining audit quality and must exist both in fact and in appearance to ensure the objectivity of the audit. Malek and Saidin (2013) argue that this independence is essential for the accuracy of financial statements and has long been a regulatory concern. Fernandez (2024) stresses that audit quality is crucial for the reliability of economic data, which directly impacts confidence in the information. Castro, Peleias, and Silva (2015) highlight the interdependence between independence, perception, and trust in the audit process. Additionally, Alander (2023) suggests that examining organizational and operational independence can deepen our understanding of these dynamics. Vu (2023) contends that maintaining high-quality auditing standards bolsters confidence in the profession and helps prevent financial issues. Cărăușu (2022) further notes that auditor independence enhances company performance and the quality of financial reporting.

Researchers like Saglar (2023) and Nguyen and Kend (2023) have also investigated the effects of audit quality on companies and auditor fees, particularly highlighting the concerns of auditors outside the Big Four regarding fee structures. Fernandez (2024) emphasizes that auditor remuneration influences audit quality, as noted by Tania and Tarmizi (2023). Malek and Saidin (2013) identify various factors affecting auditor remuneration, including concerns over anti-competitive pricing practices. Hallak and Silva (2012) underscore the impact of remuneration on the quality of audit services, stressing the need for independence and trust in the process to ensure accurate and reliable outcomes. This reinforces the crucial role of independent auditors in safeguarding the integrity of audit results.

2.2 Determinants of Auditor Remuneration

The audit of financial statements culminates in an opinion formed based on evidence that considers results, risks, and material misstatements, as discussed by Ardianingsih and Setiawan (2022). The fees charged by auditors are influenced by factors such as costs, the scope of the audit, and the size of the company, as highlighted by these authors. Since Simunic's (1980) pioneering model for audit fee pricing, subsequent research, such as that by Moutinho et al. (2012), has further developed this understanding. The current study follows the approach of Vasconcelos, Alves, and Oliveira (2018), modeling fees based on variables like association with the Big Four, company size, and corporate governance. Affiliation with one of the Big Four audit firms often suggests an audit conducted by highly qualified professionals, as emphasized by Beatty (1989) and Lawal (2022). The fees charged by audit firms are closely linked to the size of the client company, as observed by Akinyomi (2022) and Hallak and Silva (2012). Larger companies typically incur higher audit fees due to the complexity and time required for thorough audits, as noted by Palmrose (1986). The amount of the fee is determined by factors such as the complexity of the services provided and the time needed to complete them, as highlighted by Olowookere (2022) and Saleh (2023).

The concept of "audit rotation" arises in discussions about auditor quality and independence, with companies using rotation as a risk mitigation strategy, as pointed out by Larbi (2024). The period between the fiscal year-end and the announcement of results can affect workload, often reducing the time available for auditors, as noted by Kim (2024). Flexible staffing arrangements during peak periods can compromise audit quality, according to Kim (2024). Furthermore, the disclosure of performance information may necessitate additional quality assurances, as highlighted by Scott (2024). Castro, Peleias, and Silva (2015) emphasize the importance of time as a critical element impacting auditor remuneration. The number of business segments significantly affects auditor fees, as noted by Moraes and Martinez (2024). Companies with multiple segments tend to have more complex operations, requiring detailed analysis and resulting in higher fees. This complexity is influenced by factors such as the company's size and the audit firm's characteristics, as highlighted by Larbi (2024) and Shakhatreh and Alsmadi (2021). Corporate governance also plays a crucial role in audits, aiming to enhance company value and performance, as emphasized by Moraes and Martinez (2014). Bortolon, Sarlo Neto, and Santos (2013) suggest that strong governance practices can optimize audit costs, even as they reduce risk in external audits. However, Vasconcelos, Alves, and Oliveira (2018) show that the relationship between governance and audit fees is not always straightforward. Larbi (2024) observes that better governance is often associated with more extensive external audits and, consequently, higher fees.

2.3 ESG as a Determining Factor in Audit Fees

The literature on sustainable business practices has grown substantially in recent decades, with the concept of ESG (Environmental, Social, Governance) emerging as a central pillar in the analysis of corporate responsibility. ESG encompasses three core dimensions of company evaluation: environmental impact, social responsibility, and corporate governance practices (Figueira, 2023). These dimensions are widely acknowledged as influencing not only the reputation of companies but also their financial operations, as demonstrated by several studies (Liu, 2024; Moussa, 2024; Ridwansyah & Setijaningsih, 2024; Valls Martínez, Santos-Jaén, & Martín de Almagro Vázquez, 2024; Zheng, Peng, & Wu, 2024; Zahid et al., 2022). The environmental pillar (E) includes aspects such as waste management, energy efficiency, and carbon emission reductions. The social dimension (S) pertains to the impact of companies on their communities, working conditions, and diversity and inclusion policies. Corporate governance (G) involves factors like transparency, board structure, and shareholder rights (Toledo et al., 2023).

Despite the acknowledged significance of ESG, there remains a gap in the literature regarding the impact of these practices on audit fees in the Brazilian context. This study aims to address this gap by analyzing the E, S, and G variables as individual determinants of audit fees in Brazil, investigating how each ESG dimension can directly influence audit costs.

This research provides a new perspective on how sustainable governance practices can serve as instruments of corporate responsibility and as factors influencing the remuneration of independent auditors. By examining the E, S, and G variables independently, the study seeks to identify which dimensions have the most significant impact on audit fees, offering valuable insights for managers, regulators, and academics interested in the intersection of sustainability and audit cost management.

2.3.1 Formulation of the Hypotheses: Investigating the Effects of ESG Practices on Audit Fees

This study underscores the need to explore the effects of ESG practices (environmental, social, and governance) on audit fees, as existing research on this specific relationship is scarce, making this analysis particularly novel. To guide the research, three main hypotheses are proposed:

- **Hypothesis 1 (H1): Environmental Practices (E) and Audit Fees** - This hypothesis suggests that companies adopting more robust environmental practices tend to incur lower audit fees. Effective environmental practices reduce environmental risk, leading auditors to perceive a lower exposure to significant risks. Consequently, this perception results in less extensive audit work, which in turn can reduce audit fees. Furthermore, efficient management of environmental risks often leads to more transparent and controlled internal processes, thereby facilitating the audit process and potentially lowering costs.
- **Hypothesis 2 (H2): Social Practices (S) and Audit Fees (LNAUDITFEES)** - This hypothesis posits that the strength of a company's social practices does not significantly influence audit fees. Unlike environmental or governance practices, social practices, despite being crucial for corporate reputation and responsibility, may not directly impact the processes and risks that auditors assess in financial audits. As a result, social practices may have a limited effect on audit costs.
- **Hypothesis 3 (H3): Governance Practices (G) and Audit Fees** - This hypothesis proposes that stronger governance practices are associated with higher audit fees. The adoption of robust governance practices generally increases the complexity of business processes, necessitating more detailed and comprehensive audits, which can drive up costs. Companies with stringent governance practices might also be more inclined to invest in high-quality audit services to ensure the transparency and reliability demanded by investors and the market.

Given the gaps in the literature and the practical importance of understanding the relationship between ESG practices and audit fees, this research aims to provide a comprehensive analysis of the determinants of these fees. The anticipated results will offer valuable insights for managers, regulators, and policymakers, helping them to manage audit costs more effectively while promoting transparency, sustainability, and operational efficiency in the business environment.

3 Methodology

3.1 Method

This study employs a quantitative descriptive approach, as defined by Barros and Lehfeld (2000, p. 70), supplemented by panel data analysis. By utilizing numerical data and statistical methods, this approach is well-suited for testing hypotheses and exploring causal relationships between variables. Panel data analysis enables the investigation of the relationship between audit fees and their determinants over time and across different companies. This methodology allowed for a detailed examination of the characteristics and patterns within the data, facilitating the analysis of the relationship between the remuneration of independent auditors and various factors in companies listed on B3.

To underpin the study, a comprehensive literature review was conducted, drawing on the works of Moussa (2024), Valls Martínez, Santos-Jaén, and Martín de Almagro Vázquez (2024), Zheng, Peng, and Wu (2024), Ridwansyah and Setijaningsih (2024), Liu (2024), and

Zahid, Khan, Anwar, and Maqsood (2022). The objective of this review was to identify relevant studies on audit fees and the extent of companies' environmental, social, and governance (ESG) practices. This review informed the

3.2 Data Collection Procedures

The study initially considered 386 companies listed on B3 between 2018 and 2022. After excluding 90 companies due to the absence of relevant data and removing an additional 63 companies, the sample was narrowed down to 233. Subsequently, 136 companies were excluded due to a lack of disclosed ESG data, and 17 were excluded due to incomplete ESG information. The final sample consisted of 80 companies with complete data on audit fees and ESG practices. As detailed in Table 1, the quantitative analysis was based on 400 observations, with data sourced from the Comdinheiro and Refinitiv Eikon platforms.

Table 1: Sample Selection: B3 Listed Companies

Sub-sector	Company	Observations
Agribusiness	1	5
Water and Sanitation	3	15
Processed foods	7	35
Consumer Goods and Retail	3	15
Biofuels, Gas and Oil	4	20
Pulp, Paper, and Wood	2	10
Trade	4	20
Construction and Real Estate	7	35
Energy and Basic Services	11	55
Holding	4	20
Industry - Road Equipment	4	20
IT	1	5
Metallurgy and Steel	4	20
Mining	1	5
Participation	1	5
Petrochemical	1	5
Health	5	25
Services	4	20
Educational Services	3	15
Fabrics, Clothing and Footwear	2	10
Telephony and Communications	2	10
Transport	6	30
Total	**80**	**400**

Source: B3

Information on the remuneration of independent auditors was extracted from the CVM reference forms, detailing the fees paid for accounting audit services. Data collection focused on accounting audit fees paid by independent auditors, ensuring the consistency of the information. The Comdinheiro platform provided financial data on the companies, while

Refinitiv Eikon collected information on ESG practices. This data, covering 80 companies from 2018 to 2022, was organized in a dashboard format for longitudinal monitoring over time and was fundamental for structuring the variables in this study.

3.3 Data Analysis Procedures

The study used a quantitative approach, organizing the data in an electronic database and conducting descriptive and correlation analyses to explore the relationship between variables. A multiple linear regression model was then applied to identify the main factors associated with the dependent variable, with statistical significance levels of 10% (*), 5% (**), and 1% (***).

3.4 Variables

This section defines the variables, primarily derived from financial data sourced from the Comdinheiro and Refinitiv Eikon platforms. The aim is to investigate the relationship between audit fees and the environmental, social, and governance (ESG) practices of companies listed on B3. Below are the variables used in the analysis:

- ***LNAuditFees* (LNAF):** Represents the natural logarithm of audit fees.
- ***Environmental Score* (E):** Measures the company's environmental practices, including waste management, energy efficiency, and carbon emissions.
- ***Social Score* (S):** Assesses social practices such as community involvement, social responsibility, working conditions, and diversity.
- ***Governance Score* (G):** Reflects the quality of corporate governance, taking into account factors like transparency, board structure, and shareholder rights.
- ***LNNAF* (NAF):** Represents the natural logarithm of consultancy fees.
- ***BIG4* (BIG4):** A dummy variable that takes the value of 1 if the company is audited by one of the four largest auditing firms globally, known as the Big Four (PricewaterhouseCoopers, Deloitte, Ernst & Young, and KPMG), and 0 otherwise.
- ***SIZE* (SIZE):** A variable represented by the natural logarithm of the company's total assets.
- ***TENURE* (TEN):** Indicates the length of time the auditor has been involved in auditing the company.
- ***REPLAG* (REPLAG):** The number of days between the end of the fiscal year and the announcement of the company's financial results.
- ***SEGMENT*:** Represents the number of different business segments the company operates.
- ***CG* (CG):** A dummy variable that takes the value of 1 if the company is listed in one of the BM&FBovespa corporate governance segments and 0 otherwise.

3.5 Econometric Model

3.5.1 *Effects of ESG Practices on Audit Fees*

To test the hypothesis, the following equation was estimated using panel data:

$$LNAF(it) = \beta 0 + \beta 1E(it) + \beta 2S(it) + \beta 3G(it) + \beta 4NAF(it) + \beta 5BIG4 + \beta 6SIZE(it) + \beta 7TEN(it) + \beta 8REPLAG(it) + \beta 9SEG(it) + \beta 10GC(it) + \epsilon(it) \quad (1)$$

The estimation method employed in this study was the Least Squares (LS) method, with an Autoregressive (AR) component where appropriate, to examine the relationship between audit fees and companies' ESG practices. The variable for company size (SIZE) was transformed using the natural logarithm to better fit the model. The research aims to determine whether companies with stronger ESG practices incur different audit fees. The hypothesis is considered confirmed when the statistical analysis reveals a significant relationship, indicated by a p-value of less than 0.10, suggesting that the independent variables have a meaningful impact on audit fees.

4 Analysis of Results

The results of this study are presented in multiple stages, beginning with a descriptive statistical analysis, followed by an analysis of means and correlations between variables, as illustrated in Tables 2, 3, and 4. Additionally, a quantile regression analysis, shown in Table 5, was conducted to highlight significant relationships and demonstrate how different quantiles influence audit fees. This approach provides a more nuanced understanding of the variations in the results.

4.1 Results

4.1.1 *Descriptive Statistics*

To conduct the econometric analysis specified in the model developed for this study, 400 observations were collected. The descriptive statistics for the variables included in Equation 1 are presented in Table 2.

Table 2: Descriptive Statistics

Variables	Minimum	1st Quartile	Median	Average	3rd Quartile	Maximum	Standard Deviation
LNAF.	3.784	6.731	7.512	7.625	8.497	10.594	1.238
E	0.000	8.336	15.000	15.370	21.390	41.040	9.663
S	0.359	15.936	22.229	21.907	27.620	47.348	9.616
G	1.149	9.079	14.302	14.674	19.233	41.207	6.827
NAF.	0.000	0.000	4.672	3.616	6.404	9.785	3.244
BIG4	0.000	1.000	1.000	0.882	1.000	1.000	0.322
SIZE.	6.512	8.313	9.737	9.775	10.638	13.802	1.274
TEN.	1.000	2.000	3.000	2.995	4.000	14.000	1.833
REPLAG.	36.000	53.000	67.000	66.587	78.000	316.000	21.979
MON.	1.000	2.000	6.500	9.450	15.000	65.000	10.281
GC	0.000	0.000	0.000	0.222	0.000	1.000	0.416

LNAuditFees (LNAF) represents the natural logarithm of audit fees, while Environmental Score (E), Social Score (S), and Governance Score (G) measure a company's practices in environmental, social, and governance areas, respectively. LNNAF (NAF) denotes the natural logarithm of consulting fees. BIG4 is a dummy variable indicating whether a company is audited by one of the Big Four firms (1) or not (0). SIZE represents the natural logarithm of the company's total assets, TENURE (TEN) reflects the auditor's duration with the company, and REPLAG (REPLAG) is the number of days between the fiscal year-end and the financial results announcement. SEGMENT (SEG) indicates the number of business segments the company operates, and GC (GC) is a dummy variable showing whether the company is listed in one of BM&FBovespa's corporate governance segments (1) or not (0).

Source: Prepared by the authors

Table 2 shows the descriptive statistics of the study's main variables, highlighting the

behavior of companies in the market. The LNAuditFees (LNAF) variable, with a mean of 7.625 and standard deviation of 1.238, reflects significant variations in audit costs influenced by factors such as company size and governance practices. In the context of ESG, the Environmental Score (E) has a mean of 15.370 and a standard deviation of 9.663, indicating diversity in environmental policies impacting global competitiveness. The Social Score (S) and Governance Score (G) also show variations influencing corporate reputation and investor confidence. Other variables, such as LNNAF (consultancy fees), Size (company size), TENURE (length of relationship with auditor), REPLAG (efficiency in disclosing results), and SEGMENT (operational complexity), also show important relationships with audit costs and market performance. These statistics underline the importance of ESG practices, governance, and company size in effectively managing operating costs and long-term sustainability.

4.1.2 *Univariate Analysis of Differences of Means*

Below, we present the results of a univariate test of the difference in means between quartiles (Q1 and Q4) of our study for the variables "AudiFees," "**E** (Environmental Score)," **S** (Social Score) and **G** (Governance Score). This analysis aims to discover the average distributions of the variables across the quartiles and to find trends or patterns in our data.

Table 3: Univariate Difference of Means Test

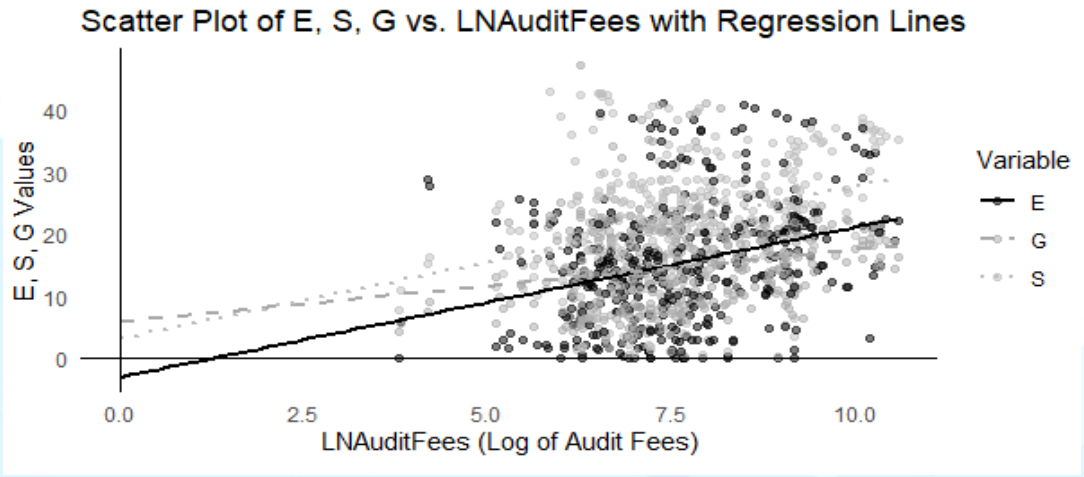
Variables	Q1 (25%)	Q2 (50%)	Q3 (75%)	Q4 (100%)
AuditFees	6.731	7.512	8.497	10.594
Environmental Average	12.609	12.998	15.762	20.111
Social Average	20.389	18.946	21.742	26.552
Governance Average	13.111	13.809	15.695	16.081

Source: Prepared by the authors

The analysis of the Univariate Difference of Means Test in Table 3 reveals significant variations between the quartiles of the variables AuditFees, Environmental Score (E), Social Score (S), and Governance Score (G). For example, audit fees increase from an average of 6,731 in the first quartile (Q1) to 10,594 in the fourth quartile (Q4), suggesting greater complexity and demand in audits of companies with better ESG practices. Companies with higher environmental scores (E) range from an average of 12,609 in Q1 to 20,111 in Q4, and social scores (S) range from 18,946 in Q2 to 26,552 in Q4, indicating that these companies tend to incur higher audit costs. Governance (G), on the other hand, shows a more modest increase, stabilizing at around 16,081 in Q4. The Welch Two Sample t-test confirms significant differences between the quartiles, suggesting that companies with more robust ESG practices face higher audit costs. These results highlight the complexity of the relationship between ESG and audit fees, reinforcing the need for sophisticated strategies to cope with market pressures and ensure long-term sustainability.

4.1.*3 Scatter Plot Analysis*

The scatter plot illustrates the interaction between audit fees (LNAuditFees) and companies' environmental, social, and governance (ESG) practices, complemented by regression lines. The analysis suggests that variations in ESG indices show different behaviors as audit fees increase, with slopes in the trend lines. This indicates that companies with varying ESG practices respond differently to audit costs.



Source: Prepared by the authors

The scattered points around the regression lines suggest the existence of other factors that influence this dynamic, in addition to ESG practices and audit fees. Such variations may result from industry-specific factors, regulatory policies, or corporate governance practices not captured by the initial analysis. Observing these trends provides an important basis for future research, encouraging a more detailed analysis of how different dimensions of ESG can impact audit costs in the current market context.

4.1.4 *Variable Correlation Matrix*

In analyzing the correlation matrix of the variables, we compared the Pearson and Spearman coefficients. The robustness of the Shapiro-Wilk test in evaluating Spearman's correlation eliminated the need for data to be normal, considering atypical values. We observed some notable relationships between the variables related to audit fees (LNAuditFees) and ESG practices (environmental, social, and governance), as well as other financial variables of the companies.

Table 4: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) LNAF.		0.317	0.335	0.238	0.362	0.157	0.609	0.130	-0.035	0.200	0.197
(2) E	0.309		0.555	0.203	0.226	0.002	0.631	0.101	-0.132	0.010	0.250
(3) S	0.316	0.505		0.583	0.259	0.130	0.456	-0.022	-0.270	0.104	-0.032
(4) G	0.210	0.129	0.578		0.166	0.049	0.261	-0.035	0.008	0.020	-0.131
(5) NAF.	0.347	0.246	0.252	0.146		0.110	0.363	0.178	-0.097	0.073	0.077
(6) BIG4	0.160	0.047	0.125	0.061	0.116		0.029	-0.000	-0.077	0.014	0.101
(7) SIZE.	0.624	0.593	0.455	0.188	0.374	0.060		0.094	-0.083	0.016	0.257
(8) TEN.	0.157	0.061	-0.023	-0.043	0.184	0.015	0.095		0.015	0.053	0.124
(9) REPLAG.	-0.004	-0.157	-0.287	-0.093	-0.129	-0.034	-0.111	0.004		-0.015	-0.113
(10) MON.	0.243	0.052	0.145	0.075	0.028	0.007	0.120	0.019	-0.015		-0.195
(11) GC	0.188	0.273	-0.009	-0.140	0.077	0.101	0.266	0.191	-0.110	-0.162	

Pearson | Spearman

LNAuditFees (LNAF) represents the natural logarithm of audit fees, while Environmental Score (E), Social Score (S), and Governance Score (G) measure a company's practices in environmental, social, and governance areas,

respectively. LNNAF (NAF) denotes the natural logarithm of consulting fees. BIG4 is a dummy variable indicating whether a company is audited by one of the Big Four firms (1) or not (0). SIZE represents the natural logarithm of the company's total assets, TENURE (TEN) reflects the auditor's duration with the company, and REPLAG (REPLAG) is the number of days between the fiscal year-end and the financial results announcement. SEGMENT (SEG) indicates the number of business segments the company operates, and GC (GC) is a dummy variable showing whether the company is listed in one of BM&FBovespa's corporate governance segments (1) or not (0)..

Source: Prepared by the authors

Analysis of the correlations reveals that the variable LNAuditFees (LNAF) has positive but weak correlations with the ESG dimensions: Environmental Score (E) with 0.317, Social Score (S) with 0.335, and Governance Score (G) with 0.238. This suggests that ESG practices can increase audit fees, although the influence is limited. The Size variable shows a moderate correlation of 0.609 with LNAF, indicating that larger companies pay higher fees due to greater operational complexity. In contrast, REPLAG (delay in releasing results) and SEGMENT (number of business segments) show weak correlations, suggesting a lower impact on audit costs. The variable BIG4 also shows a weak positive correlation with LNAF, indicating that being audited by one of the Big Four has a limited influence on fees. These results highlight that, while company size is a significant factor, ESG practices have a smaller impact on audit costs.

4.2 Discussion of Results

The results presented in Table 5 offer a detailed analysis of the factors that influence audit fees in companies, with a special focus on environmental, social, and governance (ESG) practices. The study shows that audit fees are intrinsically linked to various dimensions of corporate performance, which has significant implications for business strategies and audit cost management. The environmental variable (E) showed a negative and statistically significant coefficient (-0.013, $p < 0.05$), suggesting that companies with better environmental practices tend to incur lower audit fees. This result may reflect that robust environmental practices can reduce the complexity or perceived risks during audits, resulting in lower costs. In a market where environmental compliance is increasingly valued, auditors may see companies that adopt sound environmental policies as less risky, thus justifying lower fees.

On the other hand, the social variable (S) showed a positive coefficient (0.001) but was not statistically significant ($p > 0.10$). This suggests that although social practices may impact audit fees, this effect is not strong or consistent enough to be considered significant. The weak relationship may indicate that social practices influence audit costs less directly than environmental or governance practices.

Table 5: Regression Results: Effects of ESG Practices on Audit Fees

	LNAF.
C	0.869*
E	-0.013**
S	0.001
G	0.017**
NAF.	0.044***
BIG4	0.392***
SIZE.	0.556***
TEN.	0.047*

REPLAG.	0.004**
MON.	0.021***
GC.	0.250**
R-Squared	0.476
Adjusted R-squared	0.462
Standard error	0.908
F-Statistic	35.390
Observations	400

LNAuditFees (LNAF) represents the natural logarithm of audit fees, while Environmental Score (E), Social Score (S), and Governance Score (G) measure a company's practices in environmental, social, and governance areas, respectively. LNNAF (NAF) denotes the natural logarithm of consulting fees. BIG4 is a dummy variable indicating whether a company is audited by one of the Big Four firms (1) or not (0). SIZE represents the natural logarithm of the company's total assets, TENURE (TEN) reflects the auditor's duration with the company, and REPLAG (REPLAG) is the number of days between the fiscal year-end and the financial results announcement. SEGMENT (SEG) indicates the number of business segments the company operates, and GC (GC) is a dummy variable showing whether the company is listed in one of BM&FBovespa's corporate governance segments (1) or not (0)..

***, ** and * indicate statistical significance at 1%, 5% and 10%

Source: Prepared by the authors

Corporate governance (G), with a positive and significant coefficient (0.017, $p < 0.05$), shows a moderate correlation with audit fees. This indicates that companies with better governance practices tend to pay higher audit fees, possibly due to the greater rigor and complexity of audits in these companies. Strong governance may imply more detailed and demanding processes, reflected in higher costs.

The consulting fees variable (NAF.) showed a positive and highly significant coefficient (0.044, $p < 0.01$), suggesting that companies that spend more on consulting also tend to pay higher audit fees. This may result from the complementary relationship between auditing and consulting services, where greater investment in consulting reflects a need for more in-depth or specialized auditing.

The BIG4 variable, which indicates whether the company is audited by one of the Big Four, also showed a positive and highly significant coefficient (0.392, $p < 0.01$). This confirms the expectation that being audited by one of the world's largest firms is associated with substantially higher audit fees due to the prestige and perceived quality of these audits.

The size of the company (Size) also proved to be highly significant (coefficient of 0.556, $p < 0.01$), indicating that larger companies tend to pay higher audit fees. This result aligns with the observation that larger companies require more rigorous and detailed audits due to their operational complexity and greater visibility, resulting in higher costs.

The variable of length of relationship between the auditor and the company (Tenure) showed a positive and significant coefficient (0.047, $p < 0.10$), suggesting that a longer relationship with the auditor may be associated with slightly higher audit fees. This may reflect the auditor's greater familiarity with the company, allowing for more in-depth and costly audits.

The REPLAG variable, which measures the delay in disclosing financial results, showed a positive and significant coefficient (0.004, $p < 0.05$), indicating that greater delays in disclosure are associated with higher audit fees. This suggests that a lack of punctuality in financial disclosure may signal internal problems that require more extensive audits.

Finally, the SEGMENT variable (number of business segments) revealed a positive and

highly significant coefficient (0.021, $p < 0.01$), indicating that companies with more diversified operations in terms of business segments tend to pay higher audit fees. The additional complexity of auditing multiple segments justifies this increase in costs.

With an adjusted R-squared of 0.462, the model captures a significant part of the variation in audit fees, suggesting that the variables included offer a robust view of the main determinants. In the marketplace, these insights are valuable for formulating business strategies that balance growth, governance, ESG practices, and audit cost management, thereby minimizing exposure to unnecessary costs.

In turn, Table 6 was drawn up to make the study more robust, where quantile regression was used to analyze how ESG practices influence audit fees at different points in the distribution of the dependent variable. The inclusion of quantile regression in the study makes it possible to capture the variations in the effects of the explanatory variables over the different quantiles, something that would not be possible with a traditional linear regression.

Table 6: Quantile Regression Results: Effects of ESG Practices on Audit Fees

Variables	1st Quartile	Median	3rd Quartile
	LNAF.	LNAF.	LNAF.
C	-0.417	0.908*	1.474***
E	-0.007	-0.011	-0.018***
S	-0.002	-0.003	0.014
G	0.018	0.015**	0.000
NAF.	0.008	0.066***	0.048**
BIG4	0.331	0.133	0.266
SIZE	0.641***	0.594***	0.600***
TEN.	0.059**	0.030	0.005
REPLAG.	0.006***	0.004**	0.003*
MON.	0.019**	0.016***	0.013***
GC.	0.397***	0.296**	0.179
Comments 400	Pseudo R-squared 0.245 Adjusted R-squared 0.225 Standard error 1.039 Prob(Quasi-LR stat) 0.000	Pseudo R-squared 0.321 Adjusted R-squared 0.304 Standard error 0.920 Prob(Quasi-LR stat) 0.000	Pseudo R-squared 0.379 Adjusted R-squared 0.363 Standard error 1.099 Prob(Quasi-LR stat) 0.000

LNAuditFees (LNAF) represents the natural logarithm of audit fees, while Environmental Score (E), Social Score (S), and Governance Score (G) measure a company's practices in environmental, social, and governance areas, respectively. LNNAF (NAF) denotes the natural logarithm of consulting fees. BIG4 is a dummy variable indicating whether a company is audited by one of the Big Four firms (1) or not (0). SIZE represents the natural logarithm of the company's total assets, TENURE (TEN) reflects the auditor's duration with the company, and REPLAG (REPLAG) is the number of days between the fiscal year-end and the financial results announcement. SEGMENT (SEG) indicates the number of business segments the company operates, and GC (GC) is a dummy variable showing whether the company is listed in one of BM&FBovespa's corporate governance segments (1) or not (0).

***, ** and * indicate statistical significance at 1%, 5% and 10%

Source: Prepared by the authors

Table 6 reinforces the study by using quantile regression to analyze the influence of ESG practices on audit fees at different points in the distribution of the dependent variable. In

the 1st quartile, ESG practices (E, S, G) were not statistically significant, indicating that these practices do not significantly affect costs in companies with lower audit fees. Factors such as company size (Size), consulting fees (NAF), length of relationship with the auditor (Tenure), delay in disclosure of results (REPLAG), and number of business segments (SEG) were more relevant. At the median, governance (G) had a significant positive impact, suggesting that robust governance practices increase audit fees, while company size (Size) also showed a considerable influence. In the 3rd quartile, environmental practices (E) significantly reduced audit costs in companies with high fees. The analysis reveals the complexity of the relationship between ESG practices and audit fees, which varies according to the level of costs, the size of the company and other factors, such as the delay in financial disclosure, being important determinants in all quantiles.

5 Conclusion

This study investigated the relationship between environmental, social, and governance (ESG) practices and companies' audit fees using a linear regression model applied to 400 company observations from 2018 to 2022. The analysis revealed important insights into how each ESG dimension influences audit costs, directly impacting the market and corporate management.

The results show that companies that adopt more robust environmental practices tend to incur lower audit fees, confirming hypothesis H1. The Environmental Score (E) variable showed a negative and statistically significant coefficient, suggesting auditors see companies with strong environmental practices as less risky. The market can interpret this as valuing environmental sustainability, where mitigating environmental risks is rewarded with lower audit costs. This reflects a growing trend in which investors and stakeholders value companies that proactively manage their environmental impacts, seeing them as less likely to face regulatory penalties or litigation related to the environment. As a result, these companies can benefit from less costly audits since they have less exposure to risks requiring more detailed investigations.

On the other hand, hypothesis H2, which suggested that social practices (S) would not significantly influence audit fees, was also confirmed. The Social Score (S) variable did not significantly impact audit costs. This may reflect the complexity of the social dimension, where social practices, although crucial to corporate responsibility and reputation, do not translate directly into financial risks that auditors would need to assess in detail. In the market, this may indicate that while social responsibility is vital for image and long-term sustainability, it does not directly influence the costs associated with financial auditing. Companies with robust social practices may not see reduced audit fees but still benefit from a strengthened reputation and positive public relations.

Hypothesis H3, which postulated that stronger governance practices would be associated with increased audit fees, was confirmed. The Governance Score (G) variable showed a positive and significant coefficient, suggesting that robust corporate governance requires more rigorous and detailed audits by increasing the complexity of internal processes and transparency. In the market, strong governance is seen as essential for ensuring compliance and protecting shareholders' interests, but it can also result in higher audit costs. Auditors must devote more resources to assessing compliance with governance practices, especially in companies that follow strict and detailed standards. So, while good governance increases

investor confidence and improves risk perception, it also requires greater investment in comprehensive audits, reflecting the complexity of operations and the need for continuous monitoring.

These findings suggest that in today's market, effective environmental practices can be a strategy to mitigate risks and reduce operating costs, such as audit fees. However, while increasing audit costs, governance practices are crucial to ensuring transparency and investor protection, which may justify the additional investment. While important, social practices do not directly impact audit costs; they remain vital for corporate reputation and long-term sustainability.

In addition to ESG practices, other variables also proved to be significant. Consulting fees (NAF) and the presence of one of the big audit firms (BIG4) are strongly associated with higher audit costs, indicating that companies that invest in consulting and are audited by the Big Four tend to incur higher fees. The company's size (Size) was also a significant factor, suggesting that larger companies, due to their complexity, require more detailed audits and are therefore more costly. Other variables, such as the length of the relationship with the auditor (Tenure) and the delay in financial disclosure (REPLAG), also influence the fees, reflecting operational and governance aspects that affect the depth and cost of audits.

These results provide valuable insights for managers, regulators, and investors, highlighting the importance of a balanced approach to ESG, where each dimension should be considered in light of its specific impacts on audit costs, perceived risk, and market value. Future studies could explore these dynamics in different sectors or geographical contexts to better understand the interactions between ESG practices and the costs associated with financial audits.

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