Determinants of Corporate Sustainability Reporting

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A Project submitted to the Department of Accounting in partial fulfilment of the requirement for the award of Bachelor of Science (B.Sc) Honours Degree in Accounting, University of Benin, Benin City.

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DECLARATION

I **OTIKPO OGHENEMARO STEPHEN** declare that,

i. This study is based on a study undertaken by me in the Department of Accounting, Faculty of Management Sciences, University of Benin, Benin City, under the supervision of **DR. HENRY EMIFE MONYE-EMINA** of the Department of Accounting, Management Sciences, University of Benin, Benin City, Nigeria.

ii. This work has not been submitted for the award of degree elsewhere.

iii. Ideas and views are product of my personal research and where the view of others has been expressed, they have been duly acknowledged.

iv. Any liability arising from this work is to be wholly borne by me alone

_____ _____

OTIKPO OGHENEMARO STEPHEN **DATE**
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CERTIFICATION

We, certify that this research project was carried out by **OTIKPO OGHENEMARO STEPHEN** with matriculation number MGS2104663 of the Department of Accounting, Faculty of Management Sciences, University of Benin, Benin city and do approve that it is adequate in scope and quality in partial fulfilment of the requirements for the award of Bachelor of Science (BSc.) degree in Accounting.

_____ _____

DR. HENRY EMIFE MONYE-EMINA **Date**

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(Project Coordinator)

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Prof. Osasu Obaretin **Date**

(Head of Department)

DEDICATION

This project work is dedicated to God Almighty for His abundant grace in my life and for seeing me through my academic pursuit and aspirations.

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ABSTRACT

This study examines the factors influencing environmental disclosure among oil and gas companies in Nigeria. It adopts an ex-post facto research design with a longitudinal approach, utilizing panel data spanning eleven (11) financial years (2014–2024) from oil companies listed on the Nigerian Exchange (NGX). The variables investigated include leverage, firm size, profitability, audit firm type, financial constraint, and firm age.

The findings reveal that leverage, profitability, firm size, audit firm type, firm age, and financial constraint all have no significant effect on the level of environmental accounting disclosure by oil and gas companies in Nigeria. Based on these results, the study recommends that future research should consider a broader sample of companies and incorporate additional variables beyond those used in the current model, to provide a more comprehensive understanding of the determinants of environmental disclosure in the Nigerian oil and gas sector.

CHAPTER ONE

1.1 Background of the Study

The rapid growth of the global economy has produced unintended negative consequences for the environment, including uncontrolled waste disposal, global warming, and frequent natural disasters (Angela & Handoyo, 2021). These adverse environmental effects, largely driven by corporate activities, have weakened the ecosystem's ability to fulfill its societal functions such as providing clean air and water, energy resources, and fertile land for agricultural use. The damaging implications of this degradation on both human life and the natural environment have prompted stakeholders and users of financial reports to demand increased transparency through the disclosure of both quantitative and qualitative information on firms' environmental impacts (Atang & Eyisi, 2020).

Over recent decades, environmental accounting disclosure has gained prominence, becoming a critical element of national and international policy agendas, particularly in industries engaged in environmentally sensitive operations. Such activities not only challenge ecological sustainability but also influence corporate financial reporting, which must align with global best practices. The rising call for companies to integrate environmental information into their annual reports is driven by multiple factors stakeholder expectations, regulatory requirements, environmental activism, competitive pressures, and the pursuit of operational efficiency (Muttanachai & Stanton, 2012).

Consequently, the demand for credible, verifiable data on environmental performance has positioned environmental disclosure as a central topic of discussion among stakeholders (Uwalomwa, 2011).

Environmental accounting, a broad field within accounting, serves both internal and external purposes. Internally, it provides managers with environmental data to support strategic decision-making in areas such as pricing, cost control, and capital budgeting. Externally, it ensures the publication of environmental information relevant to investors, regulators, and the general public (Beredugo & Mefor, 2013). However, the current landscape of environmental reporting remains unclear, as regulatory and standard-setting bodies have yet to establish or enforce comprehensive frameworks for environmental disclosure. In developing countries such as Nigeria, research shows that environmental accounting disclosure is largely voluntary due to the absence of both domestic and international standards to guide these practices.

In many cases, companies disclose environmental information to meet industry norms, respond to external pressure from activists, maintain good relationships with parent companies especially multinational corporations or reflect firm-specific factors such as ownership structure, size, and profitability. Environmental reporting is particularly crucial in Nigeria's downstream oil sector, given its profound impact on the environment and local livelihoods. Consequently, international oil companies operating in developing

economies like Nigeria where environmental regulations are often weak are urged to adopt and adhere to global best practices (Uwalomwa, 2011).

1.2 Statement of the Problem

Environmental reporting and disclosure remain ambiguous, as statutory and quasi-regulatory bodies, along with standard setters, have not yet fully mandated or embraced environmental disclosure requirements. In developing nations, especially Nigeria, prior research indicates that environmental accounting disclosure is primarily voluntary due to the lack of both local and international regulatory frameworks. Several studies have explored the determinants of environmental disclosure (Deegan et al., 2002; de Villiers & Barnard, 2000; Sumiani et al., 2007; Tilling & Tilt, 2010), while others have examined its relationship with firm-specific characteristics such as profitability, leverage, and size (Nor et al., 2016; Cormier et al., 2005; Deegan et al., 2002).

Although these studies have contributed to understanding environmental disclosure practices, most relied on cross-sectional data gathered from employee perceptions (Ahmad et al., 2003; Fifka, 2012; Suttipun & Stanton, 2012; Sulaimana et al., 2014; Chandok et al., 2017). This reliance limits generalizability and calls for longitudinal studies that can better identify causal relationships between firm characteristics and environmental disclosure (Ahmad et al., 2003; Suttipun & Stanton, 2012).

In terms of sectoral focus, only a few studies have investigated environmental disclosure in the oil and gas industry (Abdullah & Azhar, 2016; Al-Drugi & Fodio, 2012). Many of

these studies were conducted in developed economies, showing mixed results regarding the influence of firm attributes. For example, while some research found that profitability positively affects environmental disclosure but firm size, leverage, and audit firm type exert negative effects, others excluded leverage entirely (Abdullah & Azhar, 2016). Conversely, studies on Nigerian oil and gas companies revealed that firm size, audit firm type, and profitability positively influence environmental disclosure (Abdullah & Azhar, 2016; Abubakar, 2017; Ebiringa, 2013; Dibia & Onwuchekwa, 2015; Suleiman et al., 2014; Uwalomwa, 2011).

To date, no study has comprehensively examined the combined effects of firm size, profitability, leverage, audit quality, firm age, and financial constraints on environmental disclosure. This study seeks to fill this gap by analyzing how these corporate characteristics influence the extent of environmental disclosure among Nigerian oil and gas firms. Specifically, it addresses the following research questions:

1. Does leverage significantly affect environmental disclosure by Nigerian oil and gas companies?
2. Does firm size significantly influence environmental disclosure by Nigerian oil and gas companies?
3. Does profitability significantly affect environmental disclosure by Nigerian oil and gas companies?

4. Does audit firm type significantly influence environmental disclosure by Nigerian oil and gas companies?
5. Does firm age significantly influence environmental disclosure by Nigerian oil and gas companies?
6. Do financial constraints significantly affect environmental disclosure by Nigerian oil and gas companies?

1.3 Research Objectives

The main objective of this study is to examine the determinants of environmental disclosure among Nigerian oil and gas companies. The specific objectives are to:

1. Determine whether leverage significantly affects environmental disclosure.
2. Examine the relationship between firm size and environmental disclosure.
3. Assess whether profitability significantly influences environmental disclosure.
4. Investigate whether audit firm type significantly affects environmental disclosure.
5. Evaluate the relationship between firm age and environmental disclosure.
6. Determine whether financial constraints significantly affect environmental disclosure.

1.4 Research Hypotheses

The following hypotheses, stated in their null forms, were tested in the course of this study:

- **H_{01}:** Leverage has no significant effect on environmental disclosure by oil and gas companies in Nigeria.
- **H_{02}:** Firm size has no significant relationship with environmental disclosure by oil and gas companies in Nigeria.
- **H_{03}:** Profitability has no significant relationship with environmental disclosure by oil and gas companies in Nigeria.
- **H_{04}:** Audit firm type has no significant effect on environmental disclosure by oil and gas companies in Nigeria.
- **H_{05}:** Firm age has no significant relationship with environmental disclosure by oil and gas companies in Nigeria.
- **H_{06}:** Financial constraints have no significant relationship with environmental disclosure by oil and gas companies in Nigeria.

1.5 Scope of the Study

This research focuses on identifying the determinants of environmental disclosure among oil and gas firms listed on the Nigerian Exchange Group. The population includes all quoted oil and gas companies as of December 2024. The study covers an eleven-year period (2014–2024) to capture the post-IFRS adoption era, which significantly reshaped financial reporting practices and disclosure requirements in Nigeria.

1.6 Significance of the Study

This study's importance lies in understanding how corporate attributes influence environmental disclosure among listed Nigerian oil and gas firms. Its findings are expected to provide valuable insights for regulators, policymakers, investors, and corporate managers seeking to enhance transparency and accountability in environmental reporting. The results may also contribute to developing clearer guidelines and frameworks for environmental disclosure practices in emerging markets. However, because the study focuses exclusively on Nigeria's oil and gas sector, caution should be exercised when generalizing its conclusions to other industries or regions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of the Study

This study explores the determinants of environmental disclosure within Nigeria's oil and gas sector. The chapter reviews relevant literature on key explanatory variables leverage, firm size, profitability, firm age, and financial constraints while presenting the conceptual framework and theoretical foundations that underpin the study. It also examines empirical evidence on how these firm characteristics influence environmental disclosure among Nigerian oil and gas companies.

2.2 Conceptual Review

2.2.1 Environmental Disclosure

Environmental disclosure refers to the dissemination of information often with financial implications concerning an organization's environmental impact and compliance with regulations. In Nigeria's oil and gas industry, such disclosure highlights how firms address environmental consequences arising from their operations on land, ecosystems, and communities.

The concept gained global prominence after the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Ishak (2010) describes environmental disclosure as a strategic communication tool for engaging stakeholders,

while Deegan (2007) links it to corporate social responsibility (CSR) reporting. Parker (1986), as cited in Setyorim and Ishak (2010), defined it as corporate reporting that reflects the social and environmental effects of operations, the performance of social programs, and the fulfillment of social responsibilities.

2.2.2 Leverage

Leverage involves using borrowed capital to increase potential returns (Alawiye & Akomolafe, 2019). While it can magnify profitability, it also elevates financial risk (Ismail et al., 2018). Structurally, leverage is expressed as the ratio of debt to equity in a company's capital mix. It represents a strategy where borrowed funds are used to acquire assets with the expectation that generated returns will exceed borrowing costs.

Financial leverage, also known as gearing, refers to the proportion of debt and preference shares relative to equity (Pandey, 2010). Because creditors have limited participation in profits, they often impose protective covenants such as restrictions on borrowing, dividend policy, or asset use to safeguard their interests (Bodie et al., 2004).

Leverage can take two forms: operating and financial leverage (Ogiedu et al., 2007). Ratios such as debt-to-equity, interest coverage, and equity multiplier help assess a firm's risk exposure (Ismail et al., 2018). However, high leverage may reduce a firm's willingness to disclose environmental information due to fear of negative market reactions.

Empirical evidence remains mixed. Studies by Cormier and Magnan (2002) and Brammer and Pavelin (2006) found a negative relationship between leverage and disclosure, while Roberts (1992) and Naser et al. (2006) observed a positive one. In environmentally sensitive sectors, firms often disclose more to enhance credibility with lenders and mitigate reputational risk.

2.2.3 Firm Size

Numerous studies have shown a positive correlation between firm size and the level of environmental disclosure (Brammer & Pavelin, 2006; Zeng et al., 2012). Larger firms face greater public scrutiny, which motivates them to provide detailed environmental information to maintain legitimacy and stakeholder trust.

Additionally, large firms' frequent need for external funding encourages transparency to strengthen public perception and investor confidence (Burgwal & Vieira, 2014). Industry type also influences disclosure levels, as companies in environmentally sensitive sectors tend to disclose more information due to regulatory and reputational pressures (Ho & Taylor, 2007; Newson & Deegan, 2002).

2.2.4 Profitability

Profitability reflects a firm's ability to generate returns over a given period. Firms with strong financial performance are more likely to disclose environmental information to reinforce their reputation and stakeholder confidence (Ullmann, 1985). Since such

reporting incurs costs, profitable firms are better positioned to afford comprehensive disclosures (Brammer & Pavelin, 2006).

Empirical findings, however, vary. Some studies link profitability positively with environmental disclosure, while others find no significant relationship. Measures such as return on assets (ROA), return on equity (ROE), and earnings per share (EPS) are commonly used to assess this relationship.

2.2.5 Audit Firm Type

Auditors play a critical role in ensuring the credibility of both financial and non-financial information. Large audit firms, particularly the "Big Four" (PwC, KPMG, Deloitte, and Ernst & Young), are perceived to provide higher-quality audits (Alsaeed, 2006). Their global reputation compels them to uphold transparency and accuracy in client reporting (Aluwong & Fadio, 2019).

Consequently, firms audited by Big Four firms are often viewed as more credible and legitimate. These auditors increasingly integrate advanced technologies, such as AI-driven audit tools, to enhance accountability and reliability in environmental disclosures.

2.2.6 Firm Age

Firm age the number of years a company has operated can influence its reporting behavior and performance. Older firms, having accumulated operational experience and

market reputation, tend to disclose more information to maintain stakeholder trust (Morgan et al., 2004; Abubakar, 2011).

Older firms also exhibit lower information asymmetry and enjoy better access to capital markets (Faulkender, 2002). Therefore, firm age often has a positive association with environmental disclosure levels (Tayem, 2017).

2.2.7 Financial Constraints

Financial constraints limit a firm's capacity to secure funds and invest in sustainability initiatives (Wang et al., 2008). Companies facing liquidity challenges may struggle to implement or report environmental practices (Kaaro, 2004). These constraints often lead to incomplete or low-quality disclosures, diminishing stakeholder confidence and competitiveness.

High compliance costs and lack of expertise or technology can exacerbate these challenges (Dhaliwal et al., 2011). To measure financial constraint, the Hadlock–Pierce SA index based on firm size and age is commonly used (Bodnaruk et al., 2015). Overcoming financial constraints enables firms to enhance transparency, improve sustainability reporting, and strengthen stakeholder relations.

2.3 Empirical Review

2.3.1 Leverage and Environmental Disclosure

Research findings on leverage and environmental disclosure are inconsistent. Some studies report negative effects (Dibia & Onwuchekwa, 2015; Ahmed & Abubakar, 2017), while others find positive associations (Maliah et al., 2014; Patrick et al., 2017).

In Nigeria, studies such as Dibia and Onwuchekwa (2021) and Aluwong and Inuwa (2019) observed a significant positive relationship between leverage and environmental disclosure among oil and gas firms, suggesting that indebted firms disclose more to maintain lender confidence.

2.3.2 Firm Size and Environmental Disclosure

Firm size consistently emerges as a major determinant of environmental reporting (Nawaiseh, 2015; Burgwal & Vieira, 2014). Larger firms face stronger stakeholder pressures and can more easily absorb disclosure costs (Cooke, 1991). However, conflicting findings exist, as some studies report negative or insignificant relationships (Dibia & Onwuchekwa, 2015; Gatimbu & Wabwine, 2016).

In Nigeria, research by Dibia and Onwuchekwa (2021) and Aluwong and Inuwa (2019) confirmed that firm size significantly and positively affects environmental disclosure quality.

2.3.3 Profitability and Environmental Disclosure

Empirical evidence on profitability's role remains mixed. Some studies, such as Hussainey et al. (2011), show profitability as a significant driver of CSR disclosure, while others (Suleiman et al., 2014) find no significant effect.

In Nigeria, Dibia and Onwuchekwa (2021) and Aluwong and Inuwa (2019) reported that profitability significantly influences the quality of environmental disclosures among oil and gas companies.

2.3.4 Audit Firm Type and Environmental Disclosure

Large, reputable audit firms are associated with higher-quality disclosures (Teoh & Wong, 1993; Watkins et al., 2004). Big Four auditors encourage transparency to protect their brand integrity (Ahmed & Courtis, 1999). However, some Nigerian studies (Dibia & Onwuchekwa, 2015; Aluwong & Fadio, 2019) found auditor type to have an insignificant influence on disclosure levels.

2.3.5 Financial Constraints and Environmental Disclosure

Financial constraints hinder firms' ability to implement sustainability initiatives (Lamont et al., 2001). Reduced transparency can heighten information asymmetry and financing costs. However, comprehensive environmental reporting can mitigate these challenges by improving investor confidence and access to finance (Dhaliwal et al., 2011; Aerts et al., 2008).

Empirical studies reveal that enhanced environmental disclosure reduces financing costs and improves market liquidity (El Ghoul et al., 2011; Plumlee et al., 2015). Thus, firms that disclose environmental information more extensively are likely to experience fewer financial constraints.

2.4 Theoretical Framework

Two theories **Stakeholder Theory** and **Legitimacy Theory** form the foundation of this study.

Stakeholder theory emphasizes that businesses should consider the interests and expectations of all stakeholders in decision-making (Mitroff, 1983). It highlights the ethical and moral responsibilities of firms toward their environment and society.

Legitimacy theory posits that organizations disclose information to align with societal norms and values (Deegan, 2002). Companies engage in environmental reporting to maintain legitimacy and close any perceived "legitimacy gap."

Together, these theories explain why firms voluntarily disclose environmental information to satisfy stakeholder expectations, preserve legitimacy, and demonstrate accountability in their operations.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the methodological framework adopted for the empirical analysis of the study. It discusses the research design, population, sample size, sampling techniques, data sources, model specification, and methods of data analysis.

3.2 Research Design

The study adopts an *ex post facto* research design. This design is considered appropriate because it focuses on examining the relationships between variables without manipulating them. The research is longitudinal in nature, utilizing panel data spanning eleven (11) financial years, from 2014 to 2024, and covers oil and gas firms listed on the Nigerian Exchange Market.

3.3 Population and Sampling Technique

The population of this study comprises all companies listed on the Nigerian Exchange Group as of December 31, 2024. The target population is specifically the oil and gas sector. The sample consists of all ten (10) oil and gas companies listed on the Exchange as of the same period. Due to the relatively small number of firms in this sector, the study

includes the entire population of listed oil and gas companies, thereby eliminating the need for further sampling.

3.4 Source of Data Collection

This study relies exclusively on secondary data. To ensure the reliability of the information, data were manually extracted from the annual reports of the selected companies for the twelve-year period (2014–2024). Given the focus on corporate environmental reporting, additional data were obtained from stand-alone environmental or sustainability reports voluntarily published by some of the listed firms. These reports were used to comprehensively capture the extent of environmental disclosure among the companies.

3.5. Model Specification

The study adopted and modifies the model specification of Dibia and Onwuchekwa (2015) and the model for the study is specified thus;

ENVD=F(SIZE,PROFIT, LEV,B4, AGE, FINCOM) (1)

This can be re-specified in regression form as;

ENVD=B0+ B1SIZE + B2PROFIT + B3 LEV + AGE + FINCOM + Ut (2)

Where: ENVD = Environmental Disclosure

LEV = Leverage,

PROFIT = Profitability,

SIZE = Company Size

B4 = Big 4 (Audit Type): An indicator variable equal to 1 if a company is audited by the Big 4,

zero otherwise.

AGE= Firm Age

FINCOM= Financial Constraint

U = Stochastic term

The apriori signs are $B_1 > 0$, $B_2 > 0$, $B_3 > 0$, $B4 > 0$, $B5 > 0$, $B6 > 0$.

Table 3.1: Operationalization of the Variables

Variables	Notation	Measurements	a priori expectation	Source (Used by)
Environmental disclosure	END	Proportion of environmental disclosure score measured by the un-weighted GRI-G4 environmental disclosure 34-item index.	-nil-	Ienciu et al. (2012)
Firm size	Fsize	Natural log of total assets	+	Akbas (2016)
Profitability	ROA	Profit after tax	+	Baboukardos (2017)
Leverage	LCV	Total debt/Total Asset	+	Dibia and Onwuchekwa (2015)
Audit firm type	Big 4	An indicator variable equal to 1 if a company is audited by the Big 4, zero otherwise.	+	Aluwong & Fobio(2019)
Firm age	Fage	Natural logarithm between the fiscal years and the year of a firm's inception	+	Tayem (2017)
Financial constraint	SA Index	Hadlock-Pierce (SA) Index	_	Hadlock and Pierce (2010)

Source: Researcher's Compilation (2025)

3.6 Method of Data Analysis

The study analyzed using descriptive and inferential statistics. The descriptive statistics entailed mean, minimum, maximum, and standard deviation, kurtosis, skewness and Jarque- Bera statistics. The Inferential statistics were applied using panel least squares.

Some diagnostic tests were conducted on the model to ensure that the basic assumptions of regression are not violated. These diagnostic tests include Breush-Godfrey serial correlation LM Test for serial correlation; heteroskedasticity to test for residual error; variance inflator factor test for Multicollinearity; and kurtosis, skewness and Jarque-Bera to test for normality. Furthermore, the Hausman Test wass conducted to select between the fixed effect and random effect panel regression for the model estimation.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents the analysis of the secondary panel data collected for the study. The statistical methods employed include descriptive statistics, correlation matrix, and panel regression technique. The outcome of the regression was used to test the hypotheses formulated in the course of the study.

4.2 Descriptive Statistics

Table 4.1 Results of the Descriptive Statistics

	ENVD	LEV	FSIZE (₦'000)	ROA	BIG4	FAGE	SA_INDEX
Mean	0.392323	0.732799	274924112.4	0.022996	0.703390	34.80508	0.752422
Median	0.441176	0.707932	65717793	0.026711	1.000000	35.50000	0.510375
Maximum	0.705882	2.478465	3143270270	1.762669	1.000000	59.00000	4.309535
Minimum	0.000000	0.022934	47150.00	-0.71357	0.000000	3.000000	-3.08753
Std. Dev.	0.135368	0.305677	522903291.8	0.198346	0.458711	13.56545	1.463895
Skewness	-2.00684	2.345365	3.303234	5.184920	-0.89057	-0.38778	0.131382
Kurtosis	6.632450	13.74047	16.00496	53.26552	1.793115	2.476337	3.322834
Jarque-Bera	144.0799	675.3562	1046.140	12951.27	22.75941	4.305594	0.851895
Probability	0.000000	0.000000	0.000000	0.000000	0.000011	0.116159	0.653151
Sum	46.29412	86.47029	3.24E+10	2.713469	83.00000	4107.000	88.78576
Sum Sq. Dev.	2.143980	10.93228	3.20E+19	4.602921	24.61864	21530.52	250.7296
Observations	118	118	118	118	118	118	118

Source: EViews10, 2025

Table 4.1 presents the mean values of the study variables alongside their respective standard deviations, based on data from sampled oil and gas companies over the 12-year period (2012–2023). For environmental disclosure (ENVD), the mean value was 0.3923, indicating that, on average, the companies disclosed about 39% of the GRI environmental reporting requirements during the study period. The median value of 0.44118 (approximately 44%) suggests that half of the sampled firms disclosed more than 44% of the requirements. The minimum and maximum values of 0% and 70.6%, respectively, show that while some firms provided no environmental disclosures, others (e.g., Seplat Petroleum Plc) disclosed nearly 71% of the requirements in certain years.

For leverage (LEV), the mean ratio of 0.733 (73.3%) reflects that, on average, most firms in the sample were highly leveraged. The median value of 0.705 indicates that at least half of the firms maintained a debt-to-asset ratio above 70%.

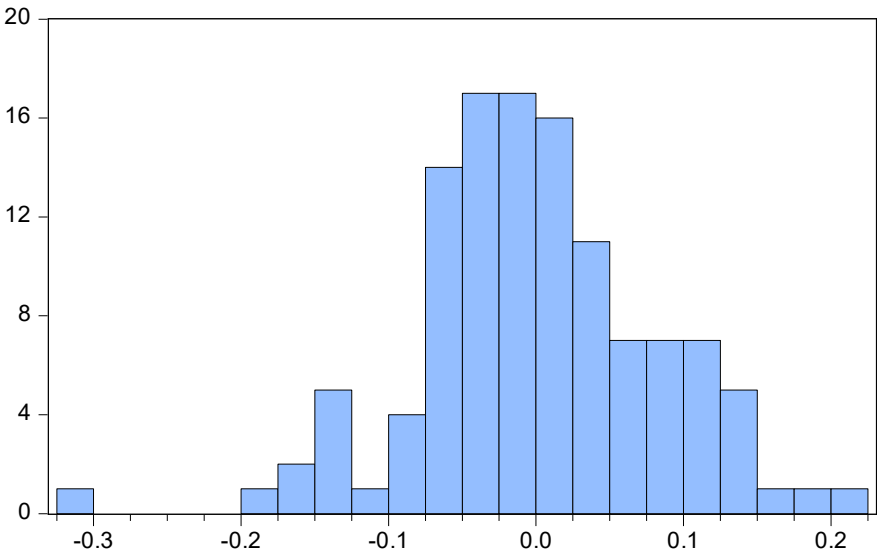
Firm size (FSIZE), measured by total assets, had a mean value of ₦274.9 billion, indicating the average asset base of the sampled companies over the study period. The maximum asset value, recorded by Oando Plc in 2023, was ₦3.14 trillion, while the smallest firm, Rak Unity Plc, had assets of just ₦47 million at the start of the study. The median asset value of ₦65.7 billion suggests that 50% of the sampled firms had total assets below this threshold.

Regarding profitability, the mean return on assets (ROA) was 0.023 (2.3%), with values ranging from -0.714 to 1.763. This average level of profitability indicates modest performance overall, as Jewell and Mankin (2011) consider a 5% ROA as good performance. Nonetheless, the maximum ROA implies that some firms were highly efficient in utilizing assets to generate earnings, while others underperformed significantly.

In terms of audit quality, the variable BIG4 shows that, on average, 70% of the sampled companies were audited by one of the Big Four audit firms. Firm age (FAGE), measured by the years listed on the Nigerian Exchange (NGX), had a mean of 35 years. The oldest company in the sample had been listed for 59 years, while the youngest had only 3 years of listing history.

Finally, the Hadlock-Pierce (SA) Index, used as a proxy for financial constraints, had a mean of 0.75, indicating that about 75% of the sampled firms faced financial constraints during the period under review.

Figure 1: Result of the Histogram Normality Test



Source: EViews 10 (2025)

The overall result of the normality test is shown in Figure 1. As observed, the Jarque-Bera statistics test of goodness-of-fit showed a value of about 10.6, which indicates that not all the variables conform with the standard normal distribution. The positive kurtosis suggests that the distribution is largely non-symmetry which is peculiar to panel data-sets. The p-value of 0.005 is lesser than 5%, which suggests that the majority of the data did not followed a normal distribution.

4.3 Correlation Analysis

Table 4.2. Results of the Correlation matrix

Covariance Analysis: Ordinary

Correlation							
Probability	ENVD	LEV	ROA	FSIZE	BIG4	AGE	SA_INDEX
ENVD	1.000000						

LEV	0.263081	1.000000					
	0.0040	-----					
ROA	0.062404	-0.178360	1.000000				
	0.5020	0.0533	-----				
FSIZE	0.733966	0.142373	0.018487	1.000000			
	0.0000	0.1241	0.8425	-----			
BIG4	-0.105806	-0.228050	0.007989	0.042449	1.000000		
	0.2542	0.0130	0.9316	0.6481	-----		
AGE	-0.132673	0.198437	-0.017690	-0.323719	-0.160382	1.000000	
	0.1521	0.0312	0.8492	0.0003	0.0828	-----	
SA_INDEX	-0.649588	0.080956	0.008692	0.680425	0.093297	-0.398000	1.000000
	0.0000	0.3835	0.9256	0.0000	0.3150	0.0000	-----

Source: EViews 10 (2025)

The outcome of the correlation coefficients in Table 2 shows a mixed correlation of both positive and negative values. In particular, we observe a positive correlation between the variables of FSIZE, ROA, and LEV and the variable ENVD. However, their probability values, which stood at 0.004, 0.502, and 0.000, mean that only the variables of FSIZE

and LEV are statistically significant. This implies that large and highly leveraged firms are associated with greater environmental reporting practices and disclosures. On the other hand, the variables BIG4, AGE, and SA-INDEX showed negative correlation coefficients of -0.106, -0.133, and -0.649, respectively. However, only SA-INDEX is statistically significant with a low p-value of 0.000 ($p < 0.05$). In other words, the variables ROA, BIG4, and AGE are not statistically significant owing to their high probability values of 0.50, 0.25, and 0.152, respectively. Also, the result revealed relatively low coefficient values, with no indication of any problem with multicollinearity. The highest coefficient of correlation is between FSIZE and ENVD (i.e., 0.734).

4.4 Regression and Diagnostic Tests

The study carried out various diagnostic tests in order to ensure that the basic assumptions underlying regression modelling were not violated. This sub-section presents the outcomes.

Table 4.3 Results of the VIF Tests

Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.003477	57.24647	NA
LEV	0.000769	7.971463	1.172935
ROA	0.001626	1.058133	1.043981
SIZE	5.73E-22	3.270148	2.557218
BIG4	0.000314	3.633422	1.077710
AGE	0.000246	48.93897	1.303314

SA_INDEX	7.47E-05	3.307620	2.611747

Source EViews 10 (2025)

The result of the test of VIF is a further confirmation of the absence of the problem of collinearity of the regression variables. The centred variance inflation factors are all clustered around the value of 1.00 (the highest been 2.6), which indicates the absence of multicollinearity. The centered VIF has a benchmark of 10.00, beyond which there is an indication of a problem of multicollinearity. Going by the decision rule, it can be asserted that there are no issues with unstable parameter estimates in the regression lines of the models.

Table 4.4 Results of the Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	1.372440	Prob. F(6,111)		0.2319
Obs*R-squared	8.149373	Prob. Chi-Square(6)		0.2274
Scaled explained SS	12.10481	Prob. Chi-Square(6)		0.0597
Test Equation:				
Dependent Variable: RESID^2				
Included observations: 118				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018641	0.008560	2.177713	0.0315
LEV	0.000928	0.004025	0.230421	0.8182
ROA	-0.000246	0.005853	-0.041949	0.9666
SIZE	4.42E-12	3.47E-12	1.271277	0.2063
BIG4	0.000511	0.002571	0.198566	0.8430
AGE	-0.003417	0.002276	-1.501631	0.1360
SA_INDEX	-0.003218	0.001254	-2.565338	0.0116
R-squared	0.069062	Mean dependent var		0.006742
Adjusted R-squared	0.018742	S.D. dependent var		0.012406
S.E. of regression	0.012289	Akaike info criterion		-5.902658
Sum squared resid	0.016764	Schwarz criterion		-5.738295
Log likelihood	355.2568	Hannan-Quinn criter.		-5.835922

F-statistic	1.372440	Durbin-Watson stat		1.643349
Prob(F-statistic)	0.231947			

Source: EViews 10 (2025)

From Table 4.4, the test for heteroscedasticity, which checks for the presence or absence of non-constant variance, was conducted using the Breusch-Pagan-Godfrey test. The decision rule is to conclude that there is no heteroscedasticity if the corresponding probability value of the F-statistic is greater than 5%. Based on the decision rule, the p-value of 0.23 is greater than 5%, which shows that the model is homoskedastic and does not contain unequal variances.

Table 4.5 Results of the Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	25.26148	Prob. F(2,109)		0.0000
Obs*R-squared	37.37210	Prob. Chi-Square(2)		0.0000
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Presample and interior missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.016972	0.049247	-0.344633	0.7310
LEV	-0.009551	0.023171	-0.412181	0.6810
ROA	-0.003319	0.033663	-0.098598	0.9216
SIZE	3.66E-11	2.07E-11	1.767785	0.0799
BIG4	-0.005600	0.014798	-0.378437	0.7058
AGE	0.006411	0.013108	0.489095	0.6258
SA_INDEX	-0.006164	0.007318	-0.842307	0.4015
RESID(-1)	0.446511	0.093746	4.762989	0.0000
RESID(-2)	0.215554	0.094628	2.277908	0.0247
R-squared	0.316713	Mean dependent var		-4.49E-17
Adjusted R-squared	0.266563	S.D. dependent var		0.082461
S.E. of regression	0.070620	Akaike info criterion		-2.389787

Sum squared resid	0.543611	Schwarz criterion	-2.178464
Log likelihood	149.9975	Hannan-Quinn criter.	-2.303984
F-statistic	6.315369	Durbin-Watson stat	1.726571
Prob(F-statistic)	0.000001		

Source: EViews 10 (2025)

From Table 4.5, the outcome of the Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation revealed that the null hypothesis of zero autocorrelation in the residuals cannot be rejected due to the low probability value (Prob. F, Prob. Chi-Square) of 0.0000, which is far less than 5%. However, the presence of serial correlation does not affect the unbiasedness or consistency of panel data estimation.

Table 4.6 Results of the Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: ENVD C LEVROAFSIZEBIG4AGESA_INDEX
Omitted Variables: Squares of fitted values

	Value	Df	Probability	
t-statistic	4.816447	110	0.2212	
F-statistic	23.19816	(1, 110)	0.2142	
Likelihood ratio	22.58019	1	0.1241	
F-test summary:				
	Sum of Sq.	Df	Mean Squares	
Test SSR	0.121435	1	0.121435	
Restricted SSR	0.697249	111	0.006282	
Unrestricted SSR	0.575814	110	0.005235	
LR test summary:				
	Value	Df		
Restricted LogL	135.3118	111		
Unrestricted LogL	146.6019	110		
Unrestricted Test Equation:				

Dependent Variable: ENVD				
Method: Least Squares				
Date: 09/15/25 Time: 16:53				
Sample: 1 120				
Included observations: 118				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.855714	0.366061	-5.069405	0.0000
LEV	-0.004181	0.025409	-0.164547	0.8696
ROA	-0.022382	0.036217	-0.617995	0.5379
FSIZE	0.114881	0.023654	4.856803	0.0000
BIG4	0.009244	0.015948	0.579619	0.5634
AGE	-0.012293	0.013947	-0.881402	0.3800
SA_INDEX	-0.152488	0.027062	-5.634751	0.0000
FITTED^2	1.952343	0.405349	4.816447	0.0000
R-squared	0.731427	Mean dependent var		0.392323
Adjusted R-squared	0.714336	S.D. dependent var		0.135368
S.E. of regression	0.072351	Akaike info criterion		-2.349185
Sum squared resid	0.575814	Schwarz criterion		-2.161342
Log likelihood	146.6019	Hannan-Quinn criter.		-2.272915
F-statistic	42.79610	Durbin-Watson stat		1.000643
Prob(F-statistic)	0.000000			

Source: EViews 10 (2025)

From Table 4.6, the outcome of the Ramsey reset test for (mis)specification showed a p-value of 0.22 (22%). The high probability values suggest that there is no evidence of misspecification in the equation.This means that the model does not have problems with omitted variables or functional form misspecification.

4.4.1 Multivariate Analysis

This sub-section presents the analyses of the panel regression model specified in the third chapter of the study. The pooled OLS pattern of panel data was estimated considering

that the study is sector-based research which subsets are considered homogenous. The outcome of the analysis is presented in Table 4.7 below.

Table 4.7. Results of the Pooled Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.586415	0.364939	-7.087255	0.0000
LEV	0.031655	0.026614	1.189418	0.2368
ROA	0.066324	0.027731	2.391716	0.0185
FSIZE	0.173740	0.050096	3.468175	0.0007
BIG4	-0.011443	0.016825	-0.680118	0.4978
AGE	-0.016176	0.015253	-1.060535	0.2912
SA_INDEX	-0.164319	0.029522	-5.565926	0.0000
R-squared	0.674788	Mean dependent var		0.392323
Adjusted R-squared	0.657208	S.D. dependent var		0.135368
S.E. of regression	0.079256	Akaike info criterion		-2.174776
Sum squared resid	0.697249	Schwarz criterion		-2.010414
Log likelihood	135.3118	Hannan-Quinn criter.		-2.108040
F-statistic	38.38589	Durbin-Watson stat		0.611140
Prob(F-statistic)	0.000000			

Source: EViews 10 (2025)

From Table 4.7, the coefficient of determination (R-squared) indicates that the model explains approximately 67.5% of the variation in environmental disclosures (ENVD), suggesting a fairly strong explanatory power. The adjusted R-squared value of 0.657 implies that about 34% of the systematic variation in ENVD remains unexplained by the regressors over the 12-year study period. In addition, the overall probability value (0.000)

and the high F-statistic of 38.39 are statistically significant at the 1% level, confirming the existence of a linear relationship between the independent variables and environmental disclosures.

Regarding firm leverage (LEV), the model reports a positive coefficient of 0.032 with a probability value of 0.237, which is statistically insignificant. This implies that while leverage may slightly increase environmental disclosure, the effect is negligible and insufficient to reject the null hypothesis. In contrast, profitability (ROA) shows a positive coefficient of 0.066 and a significant probability value of 0.0185 ($p < 0.05$). This indicates that a 1% increase in return on assets is expected to raise compliance with environmental disclosures by about 6.6%.

Firm size (FSIZE) is statistically significant with a low probability value of 0.0007 ($p < 0.05$) and a positive coefficient of 0.174, suggesting that larger firms disclose more environmental information. Specifically, a 1% increase in firm size (measured by total assets) is associated with a 17% rise in disclosure. On the contrary, the BIG4 variable has a negative coefficient of -0.0114 and a probability value of 0.4978, indicating statistical insignificance. Although not significant, the negative coefficient suggests that firms audited by Big Four auditors may disclose slightly less environmental information.

Similarly, firm age (AGE) has a negative coefficient with a probability value of 0.29, which is statistically insignificant. However, the financial constraints variable (SA-

INDEX) presents a negative coefficient of -0.164 with a highly significant probability value of 0.0000, significant at the 1% level. This result suggests that a 1% increase in financial constraints reduces the quality of environmental disclosure by about 16.4%, holding other factors constant.

4.5 Test of Hypotheses

The study sets its decision rule for accepting the hypothesis at the 5% level of significance. Therefore, if the probability value (p-value) is less than 0.05 (5%), we will reject the null hypothesis. The following are the results of the tested hypothesis:

Hypothesis 1:

H_{O1}: Leverage has no significant effect on environmental accounting disclosure by oil and gas companies in Nigeria.

From the regression results shown in Table 4.7, leverage (LEV) recorded an absolute t-value of 1.189 and a p-value of 0.2368, which is greater than the critical t-value of 1.90 at the 5% significance level. Consequently, the study rejects the null hypothesis that posits no significant relationship between leverage and corporate environmental accounting disclosure. This implies that leverage has a significant relationship with corporate environmental accounting disclosure.

Hypothesis 2:

H_{O2}: Profitability has no significant relationship with environmental accounting disclosure by oil and gas companies in Nigeria.

Based on the regression results presented in Table 4.7, the Return on Assets (ROA) recorded an absolute t-value of 2.392 and a p-value of 0.0185, which is below the 5% significance threshold. Consequently, the null hypothesis asserting that no significant relationship exists between firm profitability and corporate environmental disclosure is rejected. This indicates that firm profitability has a significant positive relationship with corporate environmental disclosure.

Hypothesis 3:

H_{O3}: Firm size has no significant relationship with environmental accounting disclosure by oil and gas companies in Nigeria.

From the regression results presented in Table 4.7, it was observed that firm size (FSIZE) has an absolute t-value of 3.468 and a p-value of 0.0007, which exceeds the critical t-value of 1.90 and falls below the 5% level of significance. Consequently, the study rejects the null hypothesis that posits no significant relationship between firm size and corporate environmental disclosure. This indicates that firm size has a significant positive influence on accounting disclosure.

Hypothesis 4:

H_{O4}: Audit firm type has no significant effect on environmental accounting disclosures by oil companies in Nigeria.

Based on the regression results presented in Table 4.7, the variable **BIG4 (audit firm type)** has a calculated *t*-value of **0.68**, which is less than the critical *t*-value of **1.90**, and a *p*-value of **0.498**, which exceeds the 5% significance level. Consequently, the study fails to reject the null hypothesis, indicating that there is **no significant relationship** between audit firm type and corporate environmental disclosure. In essence, audit firm size does not have a significant influence on environmental accounting disclosure.

Hypothesis 5:

H_{O5}: Firm age has no significant relationship with environmental accounting disclosure by oil and gas companies in Nigeria.

Based on the regression results presented in Table 4.7, the absolute calculated t-value for firm age (AGE) is 1.061, which is lower than the critical t-value of 1.90. Additionally, the p-value of 0.2912 (29.12%) exceeds the 5% significance level. Consequently, the study fails to reject the null hypothesis, indicating that there is no statistically significant relationship between firm age and corporate environmental disclosure. In other words, firm age does not have a significant effect on environmental accounting disclosure.

Hypothesis 6:

H_{O6}: Financial constraint has no significant relationship with environmental accounting disclosure by oil and gas companies in Nigeria.

Based on the regression results shown in Table 4.7, the SA-INDEX, which represents financial constraints, recorded an absolute t-value of 5.566 exceeding the critical t-value of 1.90 and a p-value of 0.000, which is below the 5% significance threshold. Consequently, the null hypothesis asserting that financial constraints have no significant effect on environmental accounting disclosure among Nigerian oil and gas firms is rejected. This indicates a significant negative relationship between financial constraints and environmental accounting disclosure.

4.6 Discussion of Findings

Based on the analysis, the first hypothesis revealed that leverage (LEV) has no significant relationship with corporate environmental disclosure. This outcome is attributed to the high probability value of 0.237, which exceeds the 5% threshold. Nonetheless, the positive coefficient suggests that highly leveraged oil and gas firms may still be inclined to disclose more environmental information. This contradicts the study's initial expectation, which, consistent with Cormier and Magnan (2002) and Brammer and Pavelin (2006), assumed that debt financing pressures would reduce environmental expenditure and, by extension, environmental disclosure. Empirically, however, the result aligns with the findings of Maliah et al. (2014), Patrick et al. (2017), and Naser et al.

(2006), who reported a positive association between leverage and disclosure in highly polluting sectors. Conversely, it conflicts with the findings of Ohidoa et al. (2016), Dibia and Onwuchekwu (2015), Prastiwi et al. (2016), and Suleiman et al. (2014), who observed no influence of leverage on environmental reporting. The divergence may be linked to the peculiarities of the oil and gas sector, whose environmentally unfriendly activities necessitate compliance with environmental practices regardless of capital structure. For the second hypothesis, the findings indicate a significant positive relationship between profitability and corporate environmental disclosure. With a probability value of 0.0185 (1.85%), below the 5% threshold, profitability is shown to be a strong determinant of environmental reporting practices. This suggests that profitable oil and gas firms are more engaged in environmental initiatives and disclosures. The outcome supports the study's expectation but contradicts Cormier et al. (2005), Ten (2009), and Dibia (2015), who found profitability to be insignificant in advanced economies. In the Nigerian context, however, the result corroborates Aluwong and Inuwa (2019), who reported a similar positive effect of profitability on disclosure. The disparity may be explained by differences in study periods earlier studies used data up to 2015 when environmental awareness was lower and in methodology, as they employed dummy variables, while this study applied unweighted content analysis. The third hypothesis result shows a positive relationship between firm size and environmental disclosure (ENVD). The coefficient suggests that, holding other factors constant, an increase in firm

size could lead to a 17% rise in disclosure levels. This supports the theoretical perspective (e.g., Burgwal & Vieira, 2014) that larger firms, due to their visibility, are more inclined to disclose environmental information to satisfy stakeholders, maintain reputation, and avoid regulatory sanctions. Empirically, the result is consistent with Nawaiseh (2015), Dibia and Onwuchekwu (2015), and Lin and Qamruzzaman (2023), but contradicts Gatimbu and Wabwine (2016), who found a negative association. Such disparities may stem from country-specific factors and differences in environmental regulations. In contrast, the fourth hypothesis indicated that audit firm size (BIG4) has a negative coefficient, with a probability value of 0.498, which is statistically insignificant. Thus, the null hypothesis could not be rejected. This contradicts the study's initial expectation that Big 4 auditors would encourage greater disclosure. As Nawaiseh (2015) noted, the reputational effect of large auditors is more pronounced in jurisdictions with strong legal frameworks and investor protections. In Nigeria, where institutional quality is weak, audit firm reputation may not substitute for regulation in driving disclosure. This finding diverges from Fatima (2014), who found audit quality to enhance disclosure in Malaysia, but is consistent with Dibia and Onwuchekwa (2015) and Aluwong and Inuwa (2019), who observed no significant effect in Nigerian oil and gas firms. Similarly, the fifth hypothesis showed that firm age (AGE) has a negative coefficient with a probability value of 0.2912, suggesting no significant effect on disclosure. Accordingly, the null hypothesis was accepted. This contradicts the study's expectation that older firms, having

less information asymmetry (Morgan et al., 2004), would disclose more to protect reputation. Instead, the result implies that older firms may adopt conservative disclosure practices, as their long-standing market presence already signals stability. This outcome contrasts with Abu Bakar (2011), who found older firms to engage in broader disclosures, supporting the reputational capital view. The difference may arise from measurement methods, as some prior studies categorized firm age, while this study used the raw number of years. Finally, the sixth hypothesis revealed a significant negative relationship between financial constraints (SA-INDEX) and environmental disclosure. With a probability value of 0.000, significant at the 1% level, the null hypothesis was rejected. This implies that financially constrained firms disclose less environmental information. In line with Schauer et al. (2019) and the Hadlock-Pierce (SA) Index framework (Hadlock & Pierce, 2010), firms with higher index scores face greater financing difficulties, limiting their ability to invest in environmental initiatives and reporting. The result is consistent with Meng et al. (2023) and Yao et al. (2019), who also found financial constraints to reduce disclosure. Notably, Meng et al. (2023) further showed that enhanced disclosure can, in turn, ease financing constraints, particularly in high-polluting industries such as oil and gas.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In examining the determinants of environmental disclosure of Oil and Gas companies quoted in Nigeria stock exchange, a review of extant literature has been conducted and empirical examination carried out. Hence, this chapter is dedicated to the summary and concluding aspect of the study. The crux of this section is to summarize the entire study.

5.2 Summary of Findings

Aligned with the overarching objective of the study, which is to investigate the determinants of environmental disclosure in Nigerian oil and gas companies, comprehensive analyses have been conducted, and the findings are summarized as follows:

1. Leverage has no significant effect on environmental accounting disclosure by oil and gas companies in Nigeria.

2. Audit firm type has no significant effect on environmental accounting disclosures by oil companies in Nigeria.

3. Firm age has no significant relationship with environmental accounting disclosure by oil and gas companies in Nigeria.

5.4 Conclusion

Environmental disclosure could be a strategy within environmental management to communicate with stakeholders. Additionally, environmental disclosure could be frequently synonymous with corporate social responsibility reporting. Aligned with the overarching objective of the study, which is to investigate the determinants of environmental disclosure in Nigerian oil and gas companies, comprehensive analyses have been conducted and found that, improving environmental disclosures could significantly alleviate the financing constraints of enterprises, and such a mitigation effect is more pronounced in highly polluting firms, such as oil and gas companies.

5.5 Recommendations

The study proposes the implementation of incentives to encourage disclosures. For instance, in many developed economies, environmental disclosures have been included as a prerequisite for stock exchange listing.

5.6 Recommendation for Further Study

Further study could be conducted to include more companies' fixtures variables aside those in our models. This would expand the outlook on the determinants of Environmental disclosure of Oil and Gas companies.

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APPENDIX TWO (RESULTS)

POOLED OLS

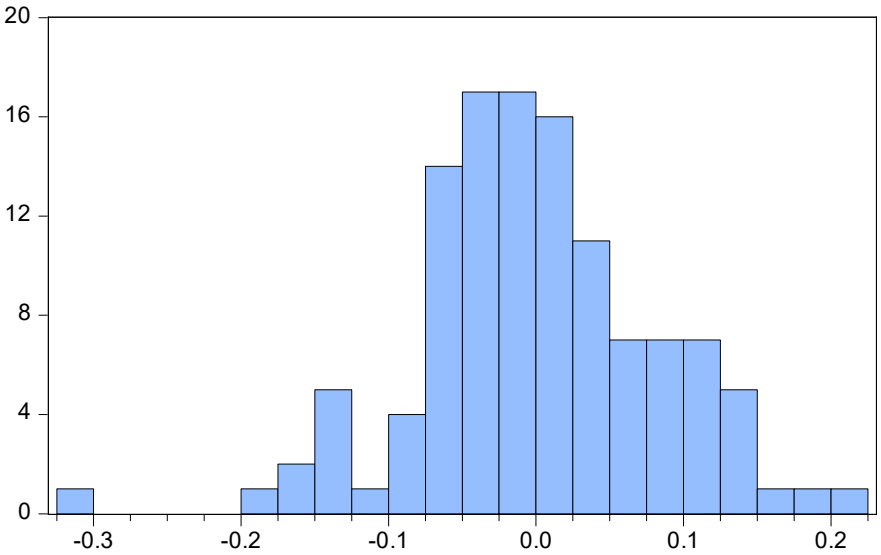
Dependent Variable: ENVD
Method: Panel Least Squares
Date: 09/15/25 Time: 16:32
Sample: 2014 2024
Periods included: 12
Cross-sections included: 10
Total panel (unbalanced) observations: 118
White cross-section standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.586415	0.364939	-7.087255	0.0000
LEV	0.031655	0.026614	1.189418	0.2368
ROA	0.066324	0.027731	2.391716	0.0185
FSIZE	0.173740	0.050096	3.468175	0.0007
BIG4	-0.011443	0.016825	-0.680118	0.4978
AGE	-0.016176	0.015253	-1.060535	0.2912
SA_INDEX	-0.164319	0.029522	-5.565926	0.0000
R-squared	0.674788	Mean dependent var		0.392323
Adjusted R-squared	0.657208	S.D. dependent var		0.135368
S.E. of regression	0.079256	Akaike info criterion		-2.174776
Sum squared resid	0.697249	Schwarz criterion		-2.010414
Log likelihood	135.3118	Hannan-Quinn criter.		-2.108040
F-statistic	38.38589	Durbin-Watson stat		0.611140
Prob(F-statistic)	0.000000			

	ENVD	LEV	ROA	FSIZE	BIG4	FAGE	SA_INDEX
Mean	0.392323	0.732799	0.022996	274924112.4	0.703390	34.80508	0.752422
Median	0.441176	0.707932	0.026711	65717793	1.000000	35.50000	0.510375
Maximum	0.705882	2.478465	1.762669	3143270270.	1.000000	59.00000	4.309535
Minimum	0.000000	0.022934	-0.713574	47150.00	0.000000	3.000000	-3.087526
Std. Dev.	0.135368	0.305677	0.198346	522903291.8	0.458711	13.56545	1.463895
Skewness	-2.006844	2.345365	5.184920	3.303234	-0.890570	-0.387779	0.131382
Kurtosis	6.632450	13.74047	53.26552	16.00496	1.793115	2.476337	3.322834
Jarque-Bera	144.0799	675.3562	12951.27	1046.140	22.75941	4.305594	0.851895
Probability	0.000000	0.000000	0.000000	0.000000	0.000011	0.116159	0.653151
Sum	46.29412	86.47029	2.713469	3.24E+10	83.00000	4107.000	88.78576
Sum Sq. Dev.	2.143980	10.93228	4.602921	3.20E+19	24.61864	21530.52	250.7296
Observations	118	118	118	118	118	118	118

Variance Inflation Factors
Date:09/15/25 Time: 16:51
Sample: 1 120
Included observations: 118

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.003477	57.24647	NA
LEV	0.000769	7.971463	1.172935
ROA	0.001626	1.058133	1.043981
SIZE	5.73E-22	3.270148	2.557218
BIG4	0.000314	3.633422	1.077710
AGE	0.000246	48.93897	1.303314
SA_INDEX	7.47E-05	3.307620	2.611747



Series: Residuals	
Sample 1 120	
Observations 118	
Mean	-4.49e-17
Median	-0.009976
Maximum	0.222337
Minimum	-0.322410
Std. Dev.	0.082461
Skewness	-0.280168
Kurtosis	4.357236
Jarque-Bera	10.60066
Probability	0.004990

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	25.26148	Prob. F(2,109)	0.0000
Obs*R-squared	37.37210	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/15/25 Time: 16:52
Sample: 1 120
Included observations: 118
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.016972	0.049247	-0.344633	0.7310
LEV	-0.009551	0.023171	-0.412181	0.6810
ROA	-0.003319	0.033663	-0.098598	0.9216
SIZE	3.66E-11	2.07E-11	1.767785	0.0799
BIG4	-0.005600	0.014798	-0.378437	0.7058
AGE	0.006411	0.013108	0.489095	0.6258

SA_INDEX	-0.006164	0.007318	-0.842307	0.4015
RESID(-1)	0.446511	0.093746	4.762989	0.0000
RESID(-2)	0.215554	0.094628	2.277908	0.0247
R-squared	0.316713	Mean dependent var		-4.49E-17
Adjusted R-squared	0.266563	S.D. dependent var		0.082461
S.E. of regression	0.070620	Akaike info criterion		-2.389787
Sum squared resid	0.543611	Schwarz criterion		-2.178464
Log likelihood	149.9975	Hannan-Quinn criter.		-2.303984
F-statistic	6.315369	Durbin-Watson stat		1.726571
Prob(F-statistic)	0.000001			

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	1.372440	Prob. F(6,111)		0.2319
Obs*R-squared	8.149373	Prob. Chi-Square(6)		0.2274
Scaled explained SS	12.10481	Prob. Chi-Square(6)		0.0597

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date:092/15/25 Time: 16:53
Sample: 1 120
Included observations: 118

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018641	0.008560	2.177713	0.0315
LEV	0.000928	0.004025	0.230421	0.8182
ROA	-0.000246	0.005853	-0.041949	0.9666
SIZE	4.42E-12	3.47E-12	1.271277	0.2063
BIG4	0.000511	0.002571	0.198566	0.8430
AGE	-0.003417	0.002276	-1.501631	0.1360

SA_INDEX	-0.003218	0.001254	-2.565338	0.0116
R-squared	0.069062	Mean dependent var		0.006742
Adjusted R-squared	0.018742	S.D. dependent var		0.012406
S.E. of regression	0.012289	Akaike info criterion		-5.902658
Sum squared resid	0.016764	Schwarz criterion		-5.738295
Log likelihood	355.2568	Hannan-Quinn criter.		-5.835922
F-statistic	1.372440	Durbin-Watson stat		1.643349
Prob(F-statistic)	0.231947			

Ramsey RESET Test
Equation: UNTITLED
Specification: ENVD C LEVROAFSIZEBIG4AGESA_INDEX
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	4.816447	110	0.2212
F-statistic	23.19816	(1, 110)	0.2142
Likelihood ratio	22.58019	1	0.1241

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	0.121435	1	0.121435
Restricted SSR	0.697249	111	0.006282
Unrestricted SSR	0.575814	110	0.005235

LR test summary:

	Value	Df
Restricted LogL	135.3118	111
Unrestricted LogL	146.6019	110

Unrestricted Test Equation:
Dependent Variable: ENVD
Method: Least Squares
Date: 09/15/25 Time: 16:53
Sample: 1 120
Included observations: 118

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.855714	0.366061	-5.069405	0.0000
LEV	-0.004181	0.025409	-0.164547	0.8696
ROA	-0.022382	0.036217	-0.617995	0.5379
FSIZE	0.114881	0.023654	4.856803	0.0000
BIG4	0.009244	0.015948	0.579619	0.5634
AGE	-0.012293	0.013947	-0.881402	0.3800
SA_INDEX	-0.152488	0.027062	-5.634751	0.0000
FITTED^2	1.952343	0.405349	4.816447	0.0000
R-squared	0.731427	Mean dependent var		0.392323
Adjusted R-squared	0.714336	S.D. dependent var		0.135368
S.E. of regression	0.072351	Akaike info criterion		-2.349185
Sum squared resid	0.575814	Schwarz criterion		-2.161342
Log likelihood	146.6019	Hannan-Quinn criter.		-2.272915
F-statistic	42.79610	Durbin-Watson stat		1.000643
Prob(F-statistic)	0.000000			

Covariance Analysis: Ordinary
Date: 09/15/25 Time: 16:47
Sample: 2014 2024
Included observations: 118
Balanced sample (listwise missing value deletion)

Correlation							
Probability	ENVD	LEV	ROA	FSIZE	BIG4	AGE	SA_INDEX
ENVD	1.000000						

LEV	0.263081	1.000000					
	0.0040	-----					
ROA	0.062404	-0.178360	1.000000				
	0.5020	0.0533	-----				
FSIZE	0.733966	0.142373	0.018487	1.000000			
	0.0000	0.1241	0.8425	-----			
BIG4	-0.105806	-0.228050	0.007989	0.042449	1.000000		
	0.2542	0.0130	0.9316	0.6481	-----		
AGE	-0.132673	0.198437	-0.017690	-0.323719	-0.160382	1.000000	
	0.1521	0.0312	0.8492	0.0003	0.0828	-----	
SA_INDEX	-0.649588	0.080956	0.008692	0.680425	0.093297	-0.398000	1.000000
	0.0000	0.3835	0.9256	0.0000	0.3150	0.0000	-----

APPENDIX THREE (ENVIRONMENTAL DISCLOSURE INDEX)

s/n	ENVIRONMENTAL DISCLOSURE INDEX
1	Materials used by weight or volume
2	Percentage of materials used that are recycled input materials
3	Energy consumption within the organization
4	Energy consumption outside of the organization
5	Energy intensity
6	Reduction of energy consumption
7	Reductions in energy requirements of products and services
8	Total water withdrawal by source
9	Water sources significantly affected by withdrawal of water
10	Percentage and total volume of water recycled and reused
11	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas
12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas
13	Habitats protected or restored
14	Total number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk
15	Direct greenhouse gas (GHG) emissions (Scope 1)
16	Energy indirect greenhouse gas (GHG) emissions (Scope 2)
17	Other indirect greenhouse gas (GHG) emissions (Scope 3)
18	Greenhouse gas (GHG) emissions intensity
19	Reduction of greenhouse gas (GHG) emissions
20	Emissions of ozone-depleting substances (ODS)
21	NOX, SOX, and other significant air emissions
22	Total water discharge by quality and destination
23	Total weight of waste by type and disposal method
24	Total number and volume of significant spills
25	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally
26	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organization’s discharges of water and runoff
27	Extent of impact mitigation of environmental impacts of products and services
28	Percentage of products sold and their packaging materials that are reclaimed by category

29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations
30	Significant environmental impacts of transporting products and other goods and materials for the organization's operations, and transporting members of the workforce
31	Total environmental protection expenditures and investments by type
32	Percentage of new suppliers that were screened using environmental criteria
33	Significant actual and potential negative environmental impacts in the supply chain and actions taken
34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms

Source: GRI-G4 (2016)